



HEALTH AND POLLUTION ACTION PLAN

Republic
of Ghana

May, 2019

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May, 2019

A project implemented by the
United Nations Industrial Development Organization
in partnership with the
World Health Organization
and in collaboration with the
**Inter-ministerial Technical Working Group
of the Republic of Ghana**

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Mitigating Toxic Health Exposures in Low- and Middle-Income Countries

FOREWORD



Ghana is on the verge of economic transformation. The country's economy is projected to grow at a rate of 7.3% in 2019, an improvement over the 2018 growth rate of 6.3%. In 2017, the economy accelerated to an 8.5% growth rate making it the second-fastest growing African economy. Between 2010 and 2018, Ghana's population increased from 24.7 million to an estimated 30 million. The 51% urban population is estimated to grow even faster because of the increasing rural-to-urban drift. The anticipated increase in industrial and economic activities coupled with increasing population, urbanization and consumption is projected to invariably result in an increase in the volumes and complexity of pollutants to which the Ghanaian population may be exposed.

Today, most of our water bodies have been polluted by mining and other industrial activities as well as by leachate from poor municipal solid and liquid waste management. Air pollution is on the ascendency and the WHO estimates that indoor and outdoor pollution accounts for nearly 28,000 deaths in Ghana annually.

In order to catalyse rural development, create jobs and transform our rural economies, the government as part of its medium to long term plan is embarking on an industrialization agenda titled: One District, One Factory. This programme will be expected to raise the average growth rate of the manufacturing sector to at least 6% per annum. Small and medium-sized enterprises (SMEs), which constitute over 90% of our industrial sector, will be expected to multiply and diversify. The anticipated industrial expansion coupled with the increasing challenges associated with our municipal waste management systems call for strategic and innovative approaches for addressing pollution in order to avoid its human health impacts.

This Health and Pollution Action Plan (HPAP) provides detailed information on the most critical sources of Ghana's pollution challenges as well as the actions and the recommendations for mitigating their human health impacts. It provides a framework for Government, other national stakeholders, and development partners who have mandates and interest in assisting Ghana to address pollution, within which to pursue together a structured approach, following the path of our national efforts to address the menace. It will enable us maximize the use of resources, do away with duplication of efforts, and enhance our ability to monitor and evaluate progress towards avoiding, reducing and mitigating the impact of pollution on our health. This invariably will boost the health of our human resources and enhance our efforts to build an economically productive and ecologically sustainable society.



Prof. **Kwabena Frimpong-Boateng**
Minister for Environment, Science, Technology and Innovation
Republic of Ghana

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This Health and Pollution Action Plan (HPAP) is the result of months of consultations and technical engagements with various ministries, government departments and agencies, development partners and Civil Society Organizations in addressing environmental risks related to health, all under the leadership of the Minister for Environment, Science, Technology and Innovation.

Of crucial importance has been the support received from the Environmental Protection Agency, Ghana Health Service, the Soil Research and Water Research Institutes of the Council for Scientific and Industrial Research, the World Health Organization's Ghana office, the Kumasi Metropolitan Assembly, the Kumasi Composting and Recycling Plant, and the Building and Road Research Institute.

The government of the Republic of Ghana is grateful to the European Union and the United States Agency for International Development for providing financial support which made this work possible and to the United Nations Industrial Development Organization for facilitating the process and technical inputs.

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Finally, we are grateful to all the representatives from the government, development organizations, non-government organizations, and academic institutions who participated in the HPAP workshops and meetings, and who assisted in the review and editing of this document. They are listed in Annex 1.

We thank you all!

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ABBREVIATIONS

ADB	Asian Development Bank
AGI	Association of Ghana Industries
AMA	Accra Metropolitan Assembly
AQMP	Air Quality Management Plan
ASGM	Artisanal and Small-Scale Gold Mining
ASM	Artisanal and Small-Scale Mining
BAT/BEP	Best Available Technologies and Best Environmental Practice
BOD	Biochemical Oxygen Demand
BFRs	Brominated Flame Retardants
BRRI	Building and Road Research Institute
CD	Communicable Disease
CHIM	Centre for Health Information Management
COD	Chemical Oxygen Demand
CSIR	Council for Scientific and Industrial Research
CWSA	Community Water and Sanitation Agency
DALY	Disability Adjusted Life Year
DESSAP	District Environmental Sanitation Strategy and Action Plan
DHIMS2	District Health Information Management System
EC	European Commission
EEE	Electrical and Electronic Equipment
EIA	Environmental Impact Assessment
EIS	Environmental Impact Statement
EMP	Environmental Management Plan
EPA	Environmental Protection Agency, Ghana
GAHP	Global Alliance on Health and Pollution
GBD	Global Burden of Disease
GDP	Gross Domestic Product
GHS	Ghana Health Service
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
GNCPC	Ghana National Cleaner Production Centre
GNI	Gross National Income
HCW	Health Care Waste
ICT	Information and Communications Technology
IIR	Institute of Industrial Research
ILO	International Labour Organization
KCARP	Kumasi Compost and Recycling Plant
KMA	Kumasi Metropolitan Authority
LMICs	Low and Medium Income Countries
MESTI	Ministry of Environment, Science, Technology and Innovation

MiNT	Materials in Transition
MLGRD	Ministry of Local Government and Rural Development
MDA	Ministries, Departments and Agencies
MMDA	Municipal, Metropolitan, District Assembly
MOF	Ministry of Finance
MOFA	Ministry of Food and Agriculture
MOTI	Ministry of Trade and Industry
MSW	Municipal Solid Waste
MSWR	Ministry of Sanitation and Water Resources
MTNDPF	Medium Term National Development Policy Framework
NCD	Non-Communicable Disease
NCWSP	National Community Water and Sanitation Programme
NDPC	National Development Planning Commission
NEP	National Environmental Policy
NESSAP	National Environmental Sanitation Strategy and Action Plan
NGO	Non-Governmental Organization
PAGE	Partnership for Action on Green Economy
PCBs	Polychlorinated Biphenyls
PE	Pure Earth
RECP	Resource Efficient and Cleaner Production
SLCPs	Short Lived Climate Pollutants
TDC	Tema Development Corporation
TDS	Total Dissolved Solids
TMA	Tema Municipal Assembly
TSIP	Toxic Sites Identification Program
TSS	Total Suspended Solids
UHI	Urban Health Initiative
ULAB	Used Lead Acid Battery
UNEP	United Nations Environment Programme
UNIDO	United Nations Industrial Development Organization
USAID	United States Agency for International Development
VOC	Volatile Organic Compound
WB	World Bank
WEEE	Waste Electrical and Electronic Equipment
WHO	World Health Organization
WRC	Water Resources Commission
WRI	Water Research Institute

EXECUTIVE SUMMARY



Until recently, the impact of pollution was consistently underestimated. The 2017 Lancet report showed that pollution is now one of the biggest drivers of death and disease in the world, causing 16% of all deaths globally. The report showed further that the majority of the disease burden from pollution (92%) falls on people in low- and middle-income countries. The linkage between pollution and health was recognized in the 2030 Agenda for Sustainable Development. Within Goal 3, “Ensure healthy lives and promote well-being for all, at all ages”, target 3.9 aims to “by 2030, substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination.”

Ghana’s 1992 Constitution provides the broad framework for the responsibilities of the state and citizens for environmental protection and the maintenance of a clean, healthy and safe environment which promotes human wellbeing for national development. In fulfilment of these broad responsibilities, Ghana has signed onto a number of international agreements and treaties on health and pollution and enacted a variety of national legal and policy frameworks for safeguarding the health of citizens and environment.



BY 2030,
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An analysis of the types of diseases causing mortality conducted by the Institute for Health Metrics and Evaluation (IHME) in their 2016 Global Burden of Disease (GBD) study shows that the proportion of deaths due to non-communicable diseases (NCDs) in Ghana is increasing year after year. The percentage of deaths from NCDs had risen by 1.6 times, from 27% in 1990 to 44.1% in 2016. In parallel, the proportion of deaths from communicable diseases (CDs) has reduced significantly, from 67.9% in 1990 to below 50% in 2016. Additionally, deaths related to pollution contributed to about 16% of deaths in Ghana in 2016. Air pollution, both indoor and outdoor, caused more deaths than water-related contamination and chemical exposure did. Data from the IHME GBD 2016 study shows that air pollution was the second-highest driver of death and disability combined, just after the malnutrition risk factor. In economic terms, the 2017 Lancet Report indicated that diseases resulting from pollution and for which data was available were estimated to cost Ghana between US\$226 million and US\$300 million in 2015 due to lost productivity - the equivalent of 0.6% to 0.8% of the country's 2015 Gross Domestic Product (GDP). The welfare damages from

pollution-attributable diseases equalled US\$2,839 million, or 7% of the gross national income (GNI) for the same year.

This Health and Pollution Action Plan (HPAP) Project therefore aimed to: (1) Identify and evaluate the health impacts of pollution from five classes of pollution risk factors namely: Exposures to ambient (outdoor) air pollution, Exposures to household (indoor) air pollution, Unsafe water and inadequate sanitation, Exposures to soil pollution from heavy metals and toxic chemicals, and Occupational exposures to pollution; (2) Prioritize pollution issues based on the magnitude of their health impacts within national agencies; and (3) Define and advance concrete interventions to reduce exposures to these sources of pollution and related health effects.

The HPAP process was led by representatives of the Ministry of Environment, Science, Technology and Innovation, and was facilitated by UNIDO. Its development involved stakeholder mapping and consultation to understand their areas of interest, existing and upcoming interventions on health and pollution, and potential areas of collaboration. National reports, policies, journals and other documents on health and pollution were also reviewed. A national level inception workshop was also held with the Minister of Environment, Science, Technology and Innovation, Professor Frimpong Boateng as key note speaker. The inception workshop expounded the health and pollution issue, and sought stakeholders' views on the national priority areas for health and pollution. A Technical Working Group of stakeholder representatives from the EPA, GHS, UNIDO, WHO-Ghana, Pure Earth and the CSIR-SRI and CSIR-WRI (see Annex 1) led the pollution source prioritization process for the HPAP and contributed technical expertise to the development of project proposals for addressing the identified priority pollution issues. The HPAP together with its project proposals was validated by the wider stakeholder body at a national validation workshop. The outcome of the HPAP process has been this concise Action Plan.

Six main pollution sources were initially identified by the technical working group as being of high priority based on the health risk of the pollution sources, severity of occurrence, and population affected. They were:

1. Municipal Solid Waste Management as the highest priority source of pollution
2. Pollution from the manufacturing sector as the second highest priority source of pollution
3. Gold Mining as the third highest priority source of pollution
4. Downstream Petroleum Companies (including oil refineries and fuel stations) as the fourth highest priority source of pollution
5. Electronic Waste (e-Waste) Management as the sixth highest priority source of pollution
6. Medical Waste Management as being the least priority.

The TWG however decided to focus the in-depth work of the HPAP process on the following three areas:

1. Municipal Solid Waste Management
2. Industrial Pollution, and
3. Toxic Pollutants of all forms at contaminated sites.

The focus on the three sources above was due to the fact that a number of the initially identified sources were either subsumed under others or had substantial national attention. For instance, medical waste management and electronic waste management were considered to be subsets of municipal waste management while gold mining was considered to be receiving substantial national attention due to governments efforts to transform the sector and the myriad of interventions by development partners such as UNIDO, UNDP, ILO, WHO and other local non-governmental institutions. The national intervention by WHO, EPA, GHS, UN-Habitat and other stakeholders under the Urban Health Initiative programme on air pollution are however considered a part of this HPAP.

Since the objective of the HPAP process was to help to achieve action in the short-to-medium term with measurable outcomes for some of the high priority challenges, this Action Plan in addition to describing the pollution challenges and associated health impacts of the priority sources includes project proposals aimed at addressing the problem. These proposals were put together by the technical working group and validated at a national stakeholder workshop.

The first Project proposal is on Sustainable Waste Management Pilot in the Kumasi metropolis. Being the second largest metropolis in Ghana and with the highest annual population growth rate of 4.8%, Kumasi, like many other Municipal, Metropolitan and District Assemblies (MMDAs), is overwhelmed by its municipal solid waste management problems. The former garden city, produces between 1,500 and 2,000 MT of waste daily. Of this amount, approximately 1,200 to 1,300 MT is disposed of at the Metropolis' sole, poorly managed, Oti landfill. The uncollected and untreated waste remains within communities; including in drains, at street corners, in the underbrush and in uncompleted structures. The Metropolis owes over GHC 70 million to its landfill management company due to its inability to raise enough revenue to settle its debt and though plans are underway to generate energy from the landfill, the metropolis is yet to realise this goal. According to the Medium-Term National Development Policy Framework (MTNDPF) (2018-2021), solid waste management remains inadequate in many places, with the proportion of solid waste properly disposed of nationally having declined from 79% in 2014 to 70% in 2016. The overall objective of this project proposal therefore is to contribute to sustainable municipal waste management in the Kumasi metropolis as a model for nationwide replication.

The second Project proposal is on Resource Efficient - Cleaner Production (RECP) in the Chemu catchment area. The contribution of the industrial sector to GDP has gradually decreased over the years. Manufacturing enterprises are domestic market oriented and lag behind those in other countries due to inefficient

operations. This stems from the use of obsolete technologies, over-staffing, and workers with limited skills, in combination with high input costs and taxes. Additionally, the industrial sector of Ghana is a major source of pollution for water bodies, air, and land from their constant release of solid, liquid and gaseous waste into the environment according to the MTNDPF. The Chemu Lagoon in Tema is a typical casualty of such industrial (as well as municipal) pollution and a threat to public health. There are about 200 industrial operations within the catchment of the lagoon releasing chemical and biological effluents of various compositions and concentrations. According to the EPA's 2017 annual report, all but a few of the industrial groups monitored recorded effluent concentrations which exceeded the EPA guidelines. The report stated further that generally, the effluent quality of the textile industry was unsatisfactory. The measured concentrations of key parameters including pH, BOD, COD, TSS, total phosphorus, TDS, colour, turbidity, nitrate-nitrogen, sulphide, chloride, chromium (VI), and conductivity were higher than their EPA recommended guideline levels. The overall objective of the second project proposal is therefore to reduce pollution and waste generation from manufacturing enterprises located in the Chemu catchment area by application of resource productivity increasing RECP solutions.

The third Project proposal is on National Contaminated Site Identification and Assessment. Like many LMICs, several categories of waste are imported into Ghana for the purpose of – mostly informal – recycling which pays no regard to the hazard posed to the environment, the workers themselves nor the health risk to people living in the area. One such category is waste electrical and electronic equipment (WEEE). The World Bank estimates that about 109,650 tons of WEEE was processed at Agbogbloshie in Accra, the capital of Ghana, in 2014. Other estimates suggest that 129,000 tons of e-waste is processed in Ghana annually. This volume is expected to double by 2020. An evaluation of exposure to polychlorinated biphenyls (PCBs) and brominated flame retardants (BFRs) such as polybrominated diphenyl ethers (PBDEs) and hexabromocyclododecanes (HBCDs) from e-waste in Ghana using breast milk samples in 2004 and 2009 indicated high levels of PBDEs and PCBs in spite of the fact that Ghana is a non-industrialized country compared to many Asian and European countries. Many of these chemicals are known to contaminate the soil where the recycling activities take place. Mercury released from artisanal and small-scale mining (ASM) also poses significant risk to Ghanaians as it contaminates the soils in and around the mining sites. Other sources of exposure and soil contamination include automobile repair shops where spent engine oils containing cadmium, chromium and other hazardous components are poorly disposed of in the environment and the agricultural sector where pesticides and other agrochemicals are poorly handled and disposed. Past interventions such as the Toxic Sites Identification Program (TSIP) sponsored by the EU and USAID and implemented by Pure Earth identified and screened about 220 contaminated sites in Ghana. The 220 sites constitute just a fraction of what potentially exists. These are yet to be fully adopted and integrated into a National Pollution Action Plan for mitigation, and remediation action has yet to be taken on them. The proposed project therefore aims at expanding the TSIP by updating the existing database, identifying and screening new sites and assessing the impacts of the sites on human health and the environment.



INTRODUCTION

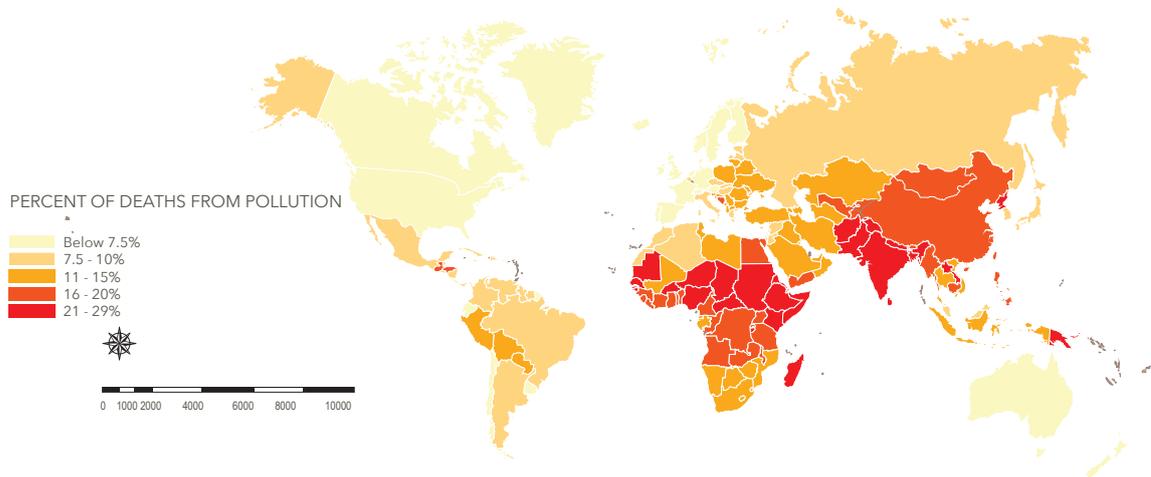


POLLUTION AND HEALTH

The impacts of pollution on health have always been recognized, although the size of the impacts has consistently been underestimated. A recent report by the Lancet Commission on Pollution and Health¹ rectifies this erroneous impression and quantifies the impact of pollution on human health. The Commission finds that pollution is now one of the biggest drivers of death and disease in the world, causing 16% of all deaths globally. The overwhelming majority of the disease burden from pollution (92%) falls on people in low- and middle-income countries. The impacts of Pollution are felt most acutely by communities that are poorly equipped to address the problem and recover from those impacts. Pollution has severe implications for sustainable

1 [https://www.thelancet.com/pdfs/journals/lancet/PIIS0140-6736\(17\)32345-0.pdf?code=lancet-site](https://www.thelancet.com/pdfs/journals/lancet/PIIS0140-6736(17)32345-0.pdf?code=lancet-site) free account registration required.

Figure 1. Percentage of all deaths in 2015 that were caused by pollution



development, exacerbates the poverty cycle, harms the environment and biodiversity, causes lifelong disability, and stagnates economic growth.

“THE IMPACTS OF POLLUTION ARE FELT MOST ACUTELY BY COMMUNITIES THAT ARE POORLY EQUIPPED TO ADDRESS THE PROBLEM AND RECOVER FROM THOSE IMPACTS”.

INTERNATIONAL AND REGIONAL NORMATIVE CONTEXT

The linkage between pollution and health has been recognized in the 2030 Agenda for Sustainable Development. Within Goal 3, “Ensure healthy lives and promote well-being for all, at all ages”, target 3.9 aims to “by 2030, substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination.”

Libreville Declaration on Health and Environment in Africa (2008)

The Libreville Declaration aimed to secure political commitment for

catalysing the policy, institutional and investment changes required to reduce environmental threats to health, in support of sustainable development². The Declaration represents a common framework for the implementation of health and environment priority actions, with commitments to: linking health and pollution better in policies, strategies, regulations and national development plans; building capacities to better prevent environment-related health problems; supporting education and training at all levels; establishing and/or strengthening systems for health and environment surveillance; enforcing compliance with relevant international conventions and national regulations; undertaking systematic assessment of health and environment risks; undertaking advocacy on health and environment issues aimed at institutions and communities; achieving a balance in the allocation of national budgetary resources for inter-sectoral health-and-environment programmes.

Building on the Libreville Declaration, the Luanda Commitment of November 2010 outlines Africa's top health and environment priorities and requests governments to take further specific actions to address them. These priorities include: provision of safe drinking water; provision of sanitation and hygiene services; management of environmental and health risks related to climate variability and change including rise in sea level particularly affecting Small Island Developing States; sustainable management of forests and wetlands; management of water, soil and air pollution, and biodiversity conservation; vector control and management of chemicals (particularly pesticides) and waste (including biomedical, electronic and electrical waste); food safety and food security including the management of genetically modified organisms in food production; environmental health of children and women; health in the workplace; and management of natural and man-made disasters.

Abuja Communiqué 2016 - Reduction of sulphur in fuel

The Abuja communiqué was jointly issued by the United Nations Environment Programme (UNEP), the Economic Communities of West Africa States (ECOWAS) Commission, and the Climate and Clean Air Coalition (CCAC) in 2016. The aim of the communiqué was to lower sulphur limits for imported diesel from 3,000 ppm to 50 ppm (parts per million) in the short term and to 10 ppm in the medium term. It also advises member states to move towards the use of cleaner vehicles.

Abidjan Agreement (2009) - West and Central Africa Regional Framework Agreement on Air Pollution

The Abidjan Framework Agreement on air pollution in West and Central Africa brought together 21 countries including Ghana. The objective of the agreement is to develop actionable targets to address air pollution issues in the following key areas: transport, industry and mining, household pollution, waste disposal, bush fires, uncontrolled burning and deforestation, urban planning and management, and national and regional environmental governance.

2 www.climhealthafrica.org/wp-content/uploads/2016/01/Implementation-of-the-Libreville-Declaration_Poster.pdf

Abidjan Convention on Cooperation in the Protection and Development of the Marine and Coastal Environment of the West and Central African Region (1984)

In 1976, UNEP recommended the development of an Action Plan “to link assessment of the quality of the marine environment and the causes of its deterioration with activities for the management and development of the marine and coastal environment”. The result was this Convention. It covers the marine environment, coastal zones and related inland waters falling within the jurisdiction of the States of the West and Central African Region, including Ghana. The Convention is a comprehensive umbrella agreement for the protection and management of the marine and coastal areas. It lists the sources of pollution which require control. These include land-based sources of pollution, and pollution from or through the atmosphere. It also identifies environmental management issues for which cooperative efforts are to be made; coastal erosion, specially protected areas, combating pollution in cases of emergency; and environmental impact assessment. There are also articles on scientific and technological cooperation and liability and compensation.

Among the 22 countries which have ratified, 17 countries are parties to the Convention including Ghana. Recently, the Convention has been revitalized, with the adoption of: (1) Regional Contingency Plans and other Means of Preventing and Combating Pollution Incidents (2011); (2) an Additional Protocol Concerning Cooperation in the Protection and Development of Marine and Coastal Environment from Land-based Sources and Activities in the Western, Central and Southern African Region (the LSBA Protocol) (2012); (3) the Ad Hoc Committee on Science and Technology (created in 2014) and Regional Coordination Centre for Marine Pollution Emergency of the Abidjan Convention.

Basel Convention on the control of transboundary movements of hazardous wastes and their disposal (1992)

The Basel Convention came into action after a public outcry in 1980 in Africa and other parts of the developing world because of deposits of toxic wastes imported from abroad. Among the major aims of this Convention is that of reducing waste generation and ensuring proper disposal. This helps to ensure that waste disposal sites are protected from contamination of harmful products such as chemicals. The Convention entered into force on 5 May 1992. Ghana ratified the convention in 2003.

Bamako Convention on the ban of the import into Africa and the control of transboundary movement and management of hazardous wastes within Africa (1998)

As a follow-up to the Basel Convention, the African nations entered into the regional Bamako Convention which contains stronger controls on the transboundary movement of wastes. The Convention prohibits the import into Africa of any hazardous (including radioactive) wastes. It protects water bodies such as oceans and inland water bodies from pollution, ensures proper waste

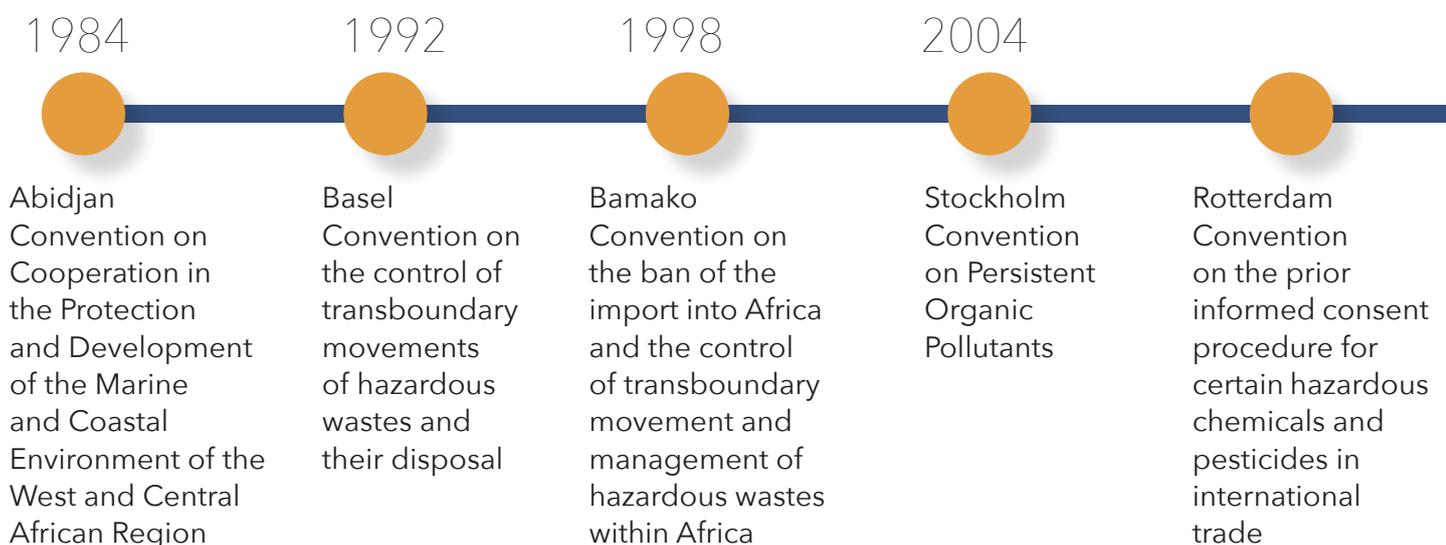
management, promotes cleaner production, and regulates the amount of emissions which helps to reduce air pollution.

Rotterdam Convention on the prior informed consent procedure for certain hazardous chemicals and pesticides in international trade (2004)

This Convention on “Prior-Informed Consent” aims to promote shared responsibility and cooperative efforts among the responsible parties in the international trade of certain hazardous chemicals in order to protect human health and the environment. It also helps to provide an environmentally sound use of hazardous chemicals by ensuring that their characteristics and effects are discussed before they are put into use. Ghana signed the Rotterdam Convention on the 11th of September 1998 and ratified it on the 30th of May 2003.

Stockholm Convention on Persistent Organic Pollutants (2004)

This global treaty protects human health and the environment from persistent organic pollutants (POPs). The Convention focuses on eliminating or reducing releases of POPs. It helps to tackle the problem of hazardous chemicals which are harmful to humans and their health especially those which remain intact in the environment over long periods of time. Thus, it helps to prevent diseases such as cancers, dysfunctional immune systems and birth defects. Nations are obliged to establish national mechanisms to formulate and implement their own blueprint of actions for a sustainable healthy environment. Ghana signed and adopted the Convention on 23rd of May 2001 and ratified it on 30th of May 2003.



Minamata Convention on mercury (2017)

This global treaty aims to protect human health and environment from the adverse effects of mercury. The Convention's major aim is to control releases of mercury from human activities; it also addresses mercury disposal, site contamination and health issues posed by mercury. Ghana ratified the Convention in March 2017.

Strategic Approach to International Chemicals Management (2006)

The Strategic Approach to International Chemicals Management (SAICM) is a policy framework to promote chemical safety around the world. SAICM supports the achievement of the 2020 goal agreed at the 2002 Johannesburg World Summit on Sustainable Development. The overall objective of SAICM is to achieve the sound management of chemicals throughout their life cycle so that by the year 2020, chemicals are produced and used in ways that minimize significant adverse impacts on the environment and human health. Ghana has been the recipient of several grants related to the implementation of chemicals control legislation through the Quick Start programme.

2006



Strategic Approach to International Chemicals Management

2008



Libreville Declaration on Health and Environment in Africa

2009



Abidjan Agreement - West and Central Africa Regional Framework Agreement on Air Pollution

2016



Abuja Communiqué - Reduction of sulphur in fuel

2017



Minamata Convention on mercury

HEALTH AND ENVIRONMENT FRAMEWORK IN GHANA

Ghana has a number of regulations and strategic frameworks governing health and pollution. These are usually administered by designated state institutions. Generally, all state institutions with such responsibilities are either established by an Act of Parliament or a subsidiary legislation and thus have legally enforceable mandates for the management of the health impacts of environmental pollution including responsibilities for putting in place policies, strategies, plans, regulations and other administrative arrangements for the same.

Below is a description of some of the fundamental institutional, regulatory and strategic frameworks for the management of occupational exposure related issues, health, including public health and for the protection of the environment from pollution.

The 1992 Constitution of Ghana

The 1992 Constitution of Ghana provides the broad framework for environmental protection and the maintenance of a clean, healthy and safe environment which promotes human wellbeing for national development. Article 36 (9) of the Constitution enjoins the State to take appropriate measures needed to protect and safeguard the national environment for posterity; and to seek cooperation with other states and bodies for the purposes of protecting the wider international environment for mankind. Article 36 (10) further directs the State to safeguard the health, safety and welfare of all persons in employment, so as to establish the basis for the full deployment of the creative potential of all Ghanaians. Moreover, citizens have an obligation under Article 41 (k) to protect and safeguard the environment since the exercise and enjoyment of rights and freedoms is inseparable from the performance of duties and obligations.

National Environmental Policy, 1991

The National Environmental Policy (NEP) adopted in 1991 evolved from the National Environmental Action Plan (NEAP) process. The plan provides a broad framework for the integration of environmental issues into development strategies and actions. The ultimate aim of the NEP was to improve the surroundings, living conditions, and the quality of life for the entire citizenry, both present and future. It sought to ensure reconciliation between economic development and natural resource conservation, making high quality environment a key element to Ghana's economic and social development. It also aimed at ensuring that a preventive approach was adopted in the pursuit of sound environmental management. The adoption of the NEP led to the enactment of the Environmental Protection Agency (EPA) Act 1994 (Act 490); and subsequently the passing of the Environmental Assessment Regulations, 1999 (LI 1652).

The statement in the NEP on the environment requires the State to "take appropriate measures, irrespective of the existing levels of environmental pollution and extent of degradation, to control pollution and the importation and use of potentially toxic chemicals".

The Environmental Protection Agency Act, 1994 (Act 490)

This Act was promulgated to amend and consolidate the laws relating to environmental protection, pesticides control and regulation, and for other related purposes. It established the Environmental Protection Agency (EPA) and broadly mandated it to coordinate with other state institutions to fulfil national environmental protection objectives.

Being the state agency with cardinal responsibility for protection and enhancement of the country's air, land and water resources, the EPA is empowered to promulgate rules and regulations relating to the import, export, manufacture, distribution, sale, use as well as disposal of pesticides and other chemicals. The agency is also mandated to prescribe standards and guidelines relating to the pollution of air, water, and land, as well as any other forms of environmental pollution including the discharge of waste. Additionally, it has responsibility to coordinate the activities of the Municipal, Metropolitan, District Assemblies (MMDAs) and other institutions concerned with the technical or practical aspects of waste management, to establish and enforce industrial emission standards and to ensure compliance with the Environmental Impact Assessment procedures in the planning and execution of development projects, including compliance in respect of existing projects. Moreover, it is mandated to implement Ghana's international environmental obligations under treaties, conventions and declarations such as the Minamata Convention on mercury, the Stockholm Convention on POPs, the Basel Convention on transboundary movement of wastes, etc.

The EPA Act also established a National Environment Fund to support environmental education, research and human resource development.

The Environmental Assessment Regulation, 1999 (L. I. 1652)

This Regulation was enacted consequent to section 64 of the EPA Act 1994 to give legal backing to Environmental Impact Assessment procedures in Ghana. The Regulations require all undertakings which have or are likely to have adverse effect on the environment or public health to be subjected to varying degrees of environmental assessment. It classifies undertakings or development activities into Schedules 1 and 2, depending on their environmental impact risks, and provides different environmental assessment conditions for each category. For instance, Schedule 1 undertakings require registration and environmental permit and/or a preliminary environmental report and environmental impact statement, while Schedule 2 activities require mandatory environmental impact assessments, made in accordance with procedures and criteria established by the Regulations, and the issuance of an environmental statement.

Regulation 14 requires the environmental statement to, inter alia, specify the concentrations of pollutants in environmental media including air, water, and land, from mobile or fixed sources at the pre-construction, construction, operation, decommissioning and post-decommissioning phases. It must also indicate the possible health effects of the undertaking on persons within and around the site of the proposed undertaking and state the measures for mitigating the potential impacts.

Schedule 1 activities include agricultural and related services such as community pastures involving the clearing of more than 40 ha of land, crop farms involving the clearing of land located in an environmentally sensitive area, fishing and other forestry services including the application of pesticides. Schedule 2 activities include mining and quarrying, crude oil and natural gas facilities, manufacturing activities such as food, rubber, textiles, wood, paper, leather, metals, etc. Other schedule 2 activities include construction of highways, dams, waste disposal facilities, and hotels.

The EPA has subsequently developed sector-specific Environmental Assessment guidelines as well guidelines for the preparation of Environmental Management Plans.

Environmental Quality Guidelines for air, effluents, and noise, 2000

In fulfilment of its mandate within the EPA Act 1994, the EPA in 2000 put in place environmental quality guidelines for air, effluents, and noise. The guidelines establish monitoring and reporting requirements for effluent and other discharges. Companies in Ghana have a duty to ensure that their wastewater quality, particulate emissions, and other discharges meet the EPA guidelines.

As an enhancement to these broad guidelines the EPA also developed sector-specific effluent and air quality guidelines in 2000. Under these guidelines, companies must ensure that effluent parameters for a particular industry meet the national guidelines levels. Additionally, the EPA has air quality discharge and emission guidelines for various locations including residential, commercial and industrial among others. The Air Quality Guidelines also states the permissible limits of air emissions/ discharges into the environment.

National Environmental Sanitation Policy, 2010

The National Environmental Sanitation Policy (2010) is the outcome of reviews to address limitations of the environmental sanitation policy published in 1999 and to reflect the changing context of national and international development priorities. The policy is aimed at developing and maintaining a clean, safe and pleasant physical and natural environment in all human settlements, to promote the socio-cultural, economic and physical wellbeing of all sections of the population. It recognizes the need to develop rapid response systems for adopting emerging international regulations on issues such as global warming, Waste of Electrical and Electronic Equipment (WEEE) or e-waste, special hazardous waste as well as waste management technology. The policy also proposes collaboration among the appropriate agencies for the achievement of its objectives.

Water Resources Commission Act, 1996 (Act 522)

This Act established the Water Resources Commission as the main Agency with responsibility for the regulation and management of the use of water resources and for coordinating all policies in respect of the same. Among other things, the Commission is mandated to advise pollution control agencies in Ghana on matters concerning the management and control of pollution of water resources

and to grant water rights to potential water users. Under the Act, it is an offence if a person “interferes with, or alters the flow of, or pollutes or fouls, a water resource beyond the level that the Act itself or the Environmental Protection Agency may prescribe.”

Community Water and Sanitation Act, 1998 (Act 564)

This Act mandates the Community Water and Sanitation Agency (CWSA) to facilitate the provision of safe drinking water and related sanitation services to rural communities and small towns in Ghana. As part of its obligations, the Agency also has to initiate and pursue, in collaboration with the Ministries of Local Government, Environment, Health and Education, formal and informal education programmes for the creation of public awareness in rural communities and small towns on water-related health hazards. Moreover, it is mandated to facilitate the implementation of the National Community Water and Sanitation Programme (NCWSP) using the decentralized structures at the district and community levels as prescribed by the Act.

Water Use Regulations, 2001 (LI 1692)

These Regulations prohibit the use of water resources without written authorization from the Water Resources Commission. The Regulations set out the process for the issuance of water use permits or grant of water rights for various water uses including: domestic, commercial, industrial, agricultural, power generation, fisheries (aquaculture), recreational, and underwater wood harvesting.

National Water Policy, 2007

Ghana’s Water Vision for 2025 has as its main objective to “promote an efficient and effective management system and environmentally sound development of all water resources in Ghana”. The National Water Policy provides a framework for the sustainable development of Ghana’s water resources. Its overall goal is to “achieve sustainable development, management and use of Ghana’s water resources to improve health and livelihoods, reduce vulnerability, while assuring good governance for present and future generations”. The Policy focuses on the three strategic areas of: (i) water resources management; (ii) urban water supply; and (iii) community water and sanitation.

In order to address pollution and other challenges faced by water resources, the policy seeks among other things to promote partnerships between the public and private sectors for the protection and conservation of water resources through the use of cleaner and efficient technologies, effective waste management, and sound land management and agricultural practices; to encourage the efficient use of fertilizers so as to reduce pollution of water bodies and ensure conservation of water; require industries, including mining operations, to develop and implement environmental management systems which take into account the impact of industries on the country’s water resources and also fully implement the enacted requirements related to licensing of water uses (permits) and issuance of wastewater (effluent) discharge permits.

Factories, Offices and Shops Act, 1970 (Act 328)

This Act makes provisions which broadly cater for occupational health and safety in the workplace and industrial hygiene. For instance, the Act requires employers to provide personal protective equipment for workers who may be exposed to “to any injurious or offensive substance”. It also provides for the provision of a designated eating place for workers who work in an environment where “any poisonous or otherwise injurious substance is so used as to give rise to dust or fumes”.

Furthermore, the Act empowers the sector Minister to authorize medical supervision of workers where “it appears to the Minister that in any factory, shop, or class of factory or shop:

- a. cases of illness have occurred ...; or
- b. by reason of alteration of any process, or the introduction of any new process or new substance for use in a process, there may be risk of injury to the health of persons employed in that process; or
- c. young persons are or are about to be employed in work which may cause risk of injury to their health; or
- d. there may be risk of injury to the health of persons employed from any substance or material brought to the factory or shop to be used or handled therein, or from any change in the conditions of work or other conditions in the factory or shop”.

Moreover, under section 77 of the Act, an Inspector may at any time, after informing the occupier of a premises or the occupier’s agent, “take for analysis sufficient samples of any substance used or intended to be used in a factory, office, or shop, being a substance in respect of which he suspects a contravention of any regulation made under this Act, or which he thinks may prove on analysis to be likely to cause bodily injury to the persons employed”.

Labour Act, 2003 (Act 651)

The Labour Act was passed to amend and consolidate laws relating to labour, employers, trade unions and industrial relations, to establish a National Labour Commission, and to provide for matters related to the same. The Act inter alia instructs employers to ensure that every worker employed by them, regardless of the type of work which they do, enjoys safe and healthy conditions. Employers are further obliged to provide their workers the necessary information, instructions, training and supervision, having due regard to their age, literacy level, and other relevant circumstances, so that they can safeguard, so far as is reasonably practicable, their own health and safety.

Additionally, employers are to supply and maintain, at no cost to their workers, adequate safety appliances and personal protective equipment, and to instruct them in the use of these appliances/ equipment. Workers are also directed to use safety appliances, firefighting equipment and personal protective equipment provided by their employer in compliance with the employer’s instructions.

Hazardous and Electronic Waste Control and Management Act, 2016 (Act 917)

This Act was passed for the control, management and disposal of hazardous waste, electrical and electronic waste and related purposes. The Act prohibits the export, import, transboundary movement, and sale of hazardous waste unless there is written authorization from the sector Minister of the country from which the waste is being imported, or to which it is being exported, is a party to the Basel Convention on the transboundary movement of hazardous waste, and the importer/exporter meets other qualifying criteria.

Furthermore, the Act empowers law enforcement officers to search any land, premises, facility, or vehicle, and seize any substance reasonably suspected to be hazardous materials, and also to arrest anyone who is suspected to be dealing in hazardous materials.

In accordance with the Act, the EPA has responsibility for monitoring the management of hazardous waste and any other waste in order to prevent any harmful effect of the waste on human health and the environment. The Act also establishes a fund to inter alia manage and ensure the environmentally sound disposal of e-waste in Ghana.

The Mercury Act, 1989 (PNDCL 217)

The Act legalizes the possession, distribution, and use of mercury. It is done with the authorization of the Minister of Trade and Industry and purchased from a government licensed dealer. Unlicensed possession and use of the metal is therefore prohibited and thus punishable. The law allows the use of mercury for gold refining but it charges small-scale miners to observe good mining practices in their use of mercury.

Local Governance Act, 2016 (Act 936)

The local government system was promulgated by Article 240 of the 1992 constitution. Under the system, the Metropolitan, Municipal and District Assemblies (MMDAs) have administrative authority at the decentralized level. The Ministry of Local Government and Rural Development (MLGRD) is the supervising Ministry for the MMDAs in Ghana. The Local Governance Act 2016 is the main legal framework which sets out the powers and duties of the MMDAs. Of relevance to the HPAP is that, among many other functions, the MMDAs are mandated to issue and regulate permits to carry out physical developments which include waste collection, disposal and management in general. This function is carried out through the Waste Management Departments (WMDs) and the Environmental Health and Sanitation Departments of MMDAs.

Health Care Waste Management Policy and Guidelines, 2006

The objectives of the policy is to ensure that health care waste is managed effectively in compliance with existing laws and regulations and any others to be passed in future in order to protect health care workers, their clients (patients,

caregivers and visitors), and the environment from potential disease-causing waste materials. The guidelines provide standards, procedures, and processes for handling health care waste in the sector institutions as well as mechanisms for monitoring of performance.

The policy classifies waste into hazardous and non-hazardous waste based on the point of generation, method of storage, and the treatment options available. It further sets out the steps for handling each unit of waste from generation, segregation, storage, transport, treatment and final disposal as well as the equipment and tools which may be required to undertake the various tasks. Moreover, it assigns roles and responsibilities to various stakeholders and prescribes measures for protecting waste handlers.

In order to ensure the effectiveness of the policy, all health facilities are required to develop waste management plans, contingency plans to cater for emergencies and, in collaboration with the local assemblies, to make provisions for protecting the health and safety of all staff involved in the waste management chain.

Public Health Act, 2012 (Act 851)

The Public Health Act, 2012 was passed to revise and consolidate the law relating to public health to prevent disease, promote, safeguard, maintain and protect the health of humans and animals, and to provide for related matters. The powers for the administration of the Act are largely vested in the Minister for Health which is authorized to collaborate with other state institutions such as the National Disaster Management Organization (NADMO) to address public health emergencies arising from environmental sanitation, waste management and pollution, road construction, water use, occupational health, health impact assessments, mining operations, oil and gas, plastic waste, agro- or bio-chemicals and any other matters of importance to public health.

The Act also established the Food and Drugs Authority and empowered it to provide and enforce standards for the sale of food, herbal medicinal products, cosmetics, drugs, medical devices and household chemical substances.

Ghana Health Services and Teaching Hospitals Act, 1999 (Act 526)

The Act established the Ghana Health Service (GHS) to provide and manage comprehensive and accessible health service, with special emphasis on primary health care at regional, district and sub-district levels in accordance with national policies. It also established the Public Health Division (PHD) which develops public health policies, strategic plans, and programmes, and undertakes periodic reviews of the activities of the GHS and its programme implementation partners in the area of public health. The PHD also provides monitoring and evaluation systems for assessing and improving the operational effectiveness of the GHS's public health interventions and disease control.

The Criminal Offences Act, 1960 (Act 29)

Section 296 (a) of the Criminal Offences Act, 1960 (Act 29) makes it a punishable offense for a person to place, or permit to be placed, any carrion, filth, dirt, refuse, or rubbish, or any offensive or otherwise unwholesome matter, on any street, yard, enclosure, or open space, except at such places as may be set apart by the local authority or health officer for that purpose.

Section 296 (r) of the same Act makes the occupier of a land or building responsible for clearing and keeping the streets or roads around the premises, as well as the drains, gutters, and channels on it, free from dirt, underbrush, underwood, weeds, refuse, and any offensive matter.

Under section 297 (1), if waste or filth is placed around the premises but the offender has not been identified or discovered, the occupier of the premises shall be deemed to have placed them there. Under section 297 (2), every occupier therefore has a duty not just to ensure that their premises are free from such nuisance but also to report or arrest such a person and hand them over to the police or health officer. Prosecution of such offense may be carried out within a year of committing the offense (Section 297 (3)).

National Building Regulations, 1996 (LI 1630)

The Regulation stipulates in Section 145 (1) that a building for residential, commercial, industrial, civic or cultural use shall have a facility for refuse disposal. It further states in Section 145 (2) that each dwelling unit is required to have a standardized litterbin or other receptacle approved by the District Assembly, in which all refuse generated is to be stored temporarily. It provides for transfer stations to be located within reach and preferably protected from rain and designed to prevent spreading, pest infestation, and scavenging activities.

National Land Policy, 1999

The policy is the premier land administration framework, consolidating the previous fragmented legislation and administrative arrangements for land management in Ghana. It aims at the judicious use of the nation's land and all its natural resources by all sections of Ghanaian society in support of various socio-economic activities undertaken in accordance with sustainable resource management principles and the maintenance of viable ecosystems. The land policy is guided by a number of principles including the principle that all efforts are to be made to prevent as much as possible the destruction of the environment and that where this is not possible, the agency or organization causing the pollution should ameliorate the same.

The policy guidelines include the facilitation of equitable access to land, ensuring the sustainable use of land by, for example, avoiding disposal of solid waste and effluents in wetlands and ensuring that all development activities of land and water resources conform to the environmental laws in the country. It also focuses on enhancing land capability and conservation. The policy further gives guidance on the creation of effective institutional capacity at multiple

levels, the promotion of community participation in, and public awareness of, sustainable land management, and the promotion of research into all aspects of land ownership and tenure.

Plants and Fertilizer Act, 2010 (Act 803)

The Act provides the legal framework for plant protection, seeds, fertilizer control and related matters. Among other provisions, the Act establishes the legal and administrative requirements for the import, manufacture, distribution, export, and disposal of fertilizers in order to safeguard human life and the environment.

National Oil Spill Contingency Plan, 2009

The plan aims to bring together the combined resources of the nation, the oil, shipping, and exploration industries, to provide preparedness with regard to the threat of environmental pollution posed by potential oil and chemical spills. In the event of a spill, the main aims of the plan are to protect human health and secure their safety, minimize environmental impacts, and to restore the environment, as near as is practicable, to pre-spill conditions.

National Environmental Sanitation Strategy and Action Plan, 2010

The National Environmental Sanitation Strategy and Action Plan (NESSAP) was prepared in response to the Environmental Sanitation Policy (as revised, 2009). The central philosophy of the NESSAP is Material in Transition (MiNT) which states that waste is a material resource which is not discarded but to which value is added at various stages in its transition within the production and consumption cycle.

The NESSAP strategies and action plans cover solid waste management, excreta (liquid waste) management, storm water drainage, sullage conveyance, environmental sanitation education and enforcement, and management of healthcare and special industrial wastes. The policy focus areas are capacity development, information, education and communication, legislation and regulation, levels of service, sustainable financing and cost recovery, R&D, and monitoring and evaluation.

Land Use and Spatial Planning Act, 2016 (Act 925)

This Act revises and consolidates the laws on land use and spatial planning. It provides for sustainable development of land and human settlements through a decentralized planning system. It seeks to ensure judicious use of land in order to improve quality of life, promote health and safety in respect of human settlements, and to regulate national, regional, district and local spatial planning. Generally, the Act provides for the spatial aspects of socio-economic development and for related matters. It further provides for the development of a zoning scheme, issuance of land use certificates and permits for physical developments including waste disposal, and where substantial damage to the environment, public amenities or public health is caused or likely to be caused by a nuisance, provides powers to the MMDAs to abate it in collaboration with the EPA.

Mining and Mineral Act, 2006 (Act 703), as amended by the Minerals and Mining Act, 2015 (Act 900)

Act 703 is the overarching mining law, consolidating all previous laws relating to the enterprise. It provides inter alia for mineral rights holders to obtain the necessary approvals and permits from the Water Commission, Forestry Commission and the Environmental Protection Agency and to secure public and environmental health so far as it relates to exploitation of minerals.

Minerals and Mining (General) Regulations, 2012 (L.I. 2173)

The L. I. provides the general criteria for carrying out mining activities in Ghana. It directs licensees (whether for reconnaissance, prospecting, or mining) to comply with the terms and conditions of any environmental permit issued for the operations to be carried out under the license. Some of these conditions may include preparation of an environmental impact assessment, environmental management plans, and the reclamation of mined lands.

Minerals and Mining (Explosives) Regulations, 2012 (L.I. 2177)

The L. I. provides a governing framework for the import, transport, manufacture, use, and disposal of explosives. It enjoins operators within the industry to make adequate provisions for the protection of the environment and prevention of pollution as well as the protection of human health and safety in the handling of explosives. They are also instructed to report all incidents relating to the environment and/or human health and safety during the handling of explosives to the inspector of explosives.

Ghana Landfill Guidelines, 2002

The Guidelines provide practical information to enable license applicants, license holders, and their designated advisors and managers to comply with the policy of the District Assemblies and related legislative requirements. The main objectives of the guidelines include improving the standard of waste disposal operations in Ghana; setting out options for the environmentally acceptable disposal of solid waste; providing a framework of sustainable waste disposal standards within which to operate; providing a framework for upgrading all landfills in Metropolitan, Municipal and large urban areas to high density aerobic (HDA) landfills by the end of 2010 and full sanitary landfills by 2020, and also to set out the regulatory framework for landfills.

Energy Efficiency Regulations, 2008 (LI 1932)

The L.I. bans the manufacture, sale, or import of incandescent filament lamps and the import of used refrigeration equipment.

National Fertilizer Policy, 2013

The goal of the policy is to promote a viable agro-industrial economy, integrated fully into national development strategies for poverty reduction, competitiveness

of agribusinesses, sustainable environmental management and industrial growth. Its objectives include facilitating the mastering of scientific, technological and organizational capabilities for fertilizer production and their increased use in Ghana. It also promotes the culture of judicious use of fertilizers to ensure environmental sustainability.

In order to achieve its environmental sustainability objective, the policy provides for government to enforce proper disposal by manufacturers and blenders of waste products from fertilizer production plants, ensure judicious use by farmers through effective extension services, and ensure that marketers and transporters take the necessary measures to protect the environment (air, water and soil) from pollution. Additionally, research institutions are expected to regularly update site-specific and crop-specific recommendations to ensure judicious use.

The following are the inter-Ministerial Committees and other coordinating mechanisms which are most relevant to the pollution-health link.

Hazardous Chemicals Committee

This committee was established by Section 10 of the EPA Act, 1994 (Act 490) to inter alia monitor the use of hazardous chemicals by collecting information on the import, export, manufacture, distribution, sale, use, and disposal of these chemicals, and to advise the EPA Board and the Executive Director on the regulation and management of hazardous chemicals. It is a multi-stakeholder committee with members drawn from the EPA, Ghana Standards Authority, Ghana Atomic Energy Commission, Ghana Cocoa Board, Crops Services and Veterinary Services Divisions of the Ministry of Food and Agriculture, and the Council for Scientific and Industrial Research.

The Pesticides Technical Committee

Section 53 of the EPA Act, 1994 (Act 490) established the Pesticides Technical Committee (PTC) to provide technical advice to the EPA Board with regards to the management and control of the import, export, manufacture, distribution, sale, use, and disposal of pesticides. The PTC is made up of members from the EPA, Ministry of Environment, Science Technology and Innovation (MESTI), National Nuclear Research Institute, the Ghana Atomic Energy Commission, Cocoa Services Division of the Ghana Cocoa Board, Plant Protection and Regulatory Services Division and Veterinary Services Division of the Ministry of Food and Agriculture, Ministry of Health, Ghana Standards Board, Customs, Excise and Preventive Service, the Association of Ghana Industries, Ghana National Association of Farmers and Fishermen, and the Ministry of Lands and Natural Resources.

It has a number of subcommittees including those on Human Toxicology/ Ecotoxicology, Bio-efficacy, Labelling and Advertisement, which evaluate the dossier submitted on pesticides under consideration, as well as a Scientific Committee which performs in-depth scientific evaluations before a pesticide is introduced into the Ghanaian market.

Poisons Information and Control Centre

The centre was established in 2002 by the Ghana Health Service (GHS) to serve as an information service centre providing health professionals with advice on the management of cases of poisoning, to train primary health personnel in the management of common poisonings, to train agricultural personnel in prevention and first aid management of pesticide poisoning and to create public awareness education and information programmes for the prevention of poisoning.

DHIMS2 Health Database

DHIMS2 is the District Health Information Management System, deployed in 2012 by the Ghana Health Service for collecting, collating, analysing and interpreting routine health service data. DHIMS2 operates in all 254 districts in Ghana and is available to all health facilities and service delivery points. DHIMS2 is managed by the Centre for Health Information Management (CHIM) of the Ghana Health Service. The principal objective of CHIM is to generate information for health services planning and management in Ghana. DHIMS2 is therefore an attempt to generate a much more reliable and comprehensive local database which aids planning, decision-making and evidence-based actions by managers rather than relying on international estimates. It is also a platform for exchange. There are currently over 10,000 registered users from government, quasi-government, private and faith-based facilities that are submitting their service report each month via the DHIMS2.

All health facilities collect service data from the community levels and input them into DHIMS2 online on a daily/weekly/monthly/quarterly basis according to given schedules. Transactional data from eTracker is uploaded in real time. Service data is made available online as real-time data, visible to registered managers at all levels. The system is designed to generate tables, graphs, pivot tables, maps and others. The lowest unit for data entry and analysis is the health facility.

Inter-Ministerial Committee on Illegal Mining (IMCIM)

Prior to 2017, illegal mining, especially illegal small-scale artisanal gold mining, had become widespread throughout the country. It was characterized by an aggressive disregard of national mining laws and consequently was resulting in degradation of water bodies, forests, soil and other ecological systems. Non-Ghanaian nationals were also involved in the illegal operations contrary to section 83 (a) of the Mineral and Mining Act, 2006 (Act 702).

The committee was therefore established in March 2017 to lead the fight against illegal mining activities. In order to facilitate its work, a secretariat was also commissioned in December 2017 to coordinate the affairs of the committee.

The mandates of the IMCIM are:

1. To strengthen the existing stakeholder agencies that are related to the small-scale mining sector, i.e. the Minerals Commission, the EPA, the Water Commission, and the Forestry Commission;

2. To ensure that these agencies enforce the existing laws relating to the small-scale mining sector;
3. To set-up ad-hoc district mining committees whose function is to coordinate the various activities of Ministries that constitute the IMCIM;
4. To review the alleged 1,350 legally registered small-scale mining companies and to regularize any discrepancies where possible;
5. To sanitize and regularize small-scale mining activities in the various mining districts to ensure that miners work within the legal framework;
6. To train small-scale miners in sustainable mining and mineral processing practices;
7. To reclaim degraded land and restore impacted water bodies; and
8. To coordinate activities related to alternative livelihoods for the youth, especially illegal miners in the various mining communities.

The Committee is made up of representatives of the following Ministries:

- a. Environment, Science, Technology and Innovation (Chair to the Committee)
- b. Lands and Natural Resources
- c. Monitoring and Evaluation
- d. Local Government and Rural Development
- e. Chieftaincy & Religious Affairs
- f. Regional Re-Organisation and Development
- g. Interior
- h. Defence
- i. Information
- j. Sanitation and Water Resources
- k. A Presidential Staffer acts as secretary to the Committee.

Minamata Convention Implementation Committee

The Committee, which is chaired by MESTI, is a multi-stakeholder group tasked with guiding Ghana's implementation of the Minamata Convention requirements. Among other tasks, the Committee will develop mercury reduction targets and determine the strategies for reducing and, where feasible, eliminating mercury use in Ghana. It is made up of representatives from MESTI, GHS, Ministry of Information, Customs Excise and Preventive Services, Ministry of Trade, and other

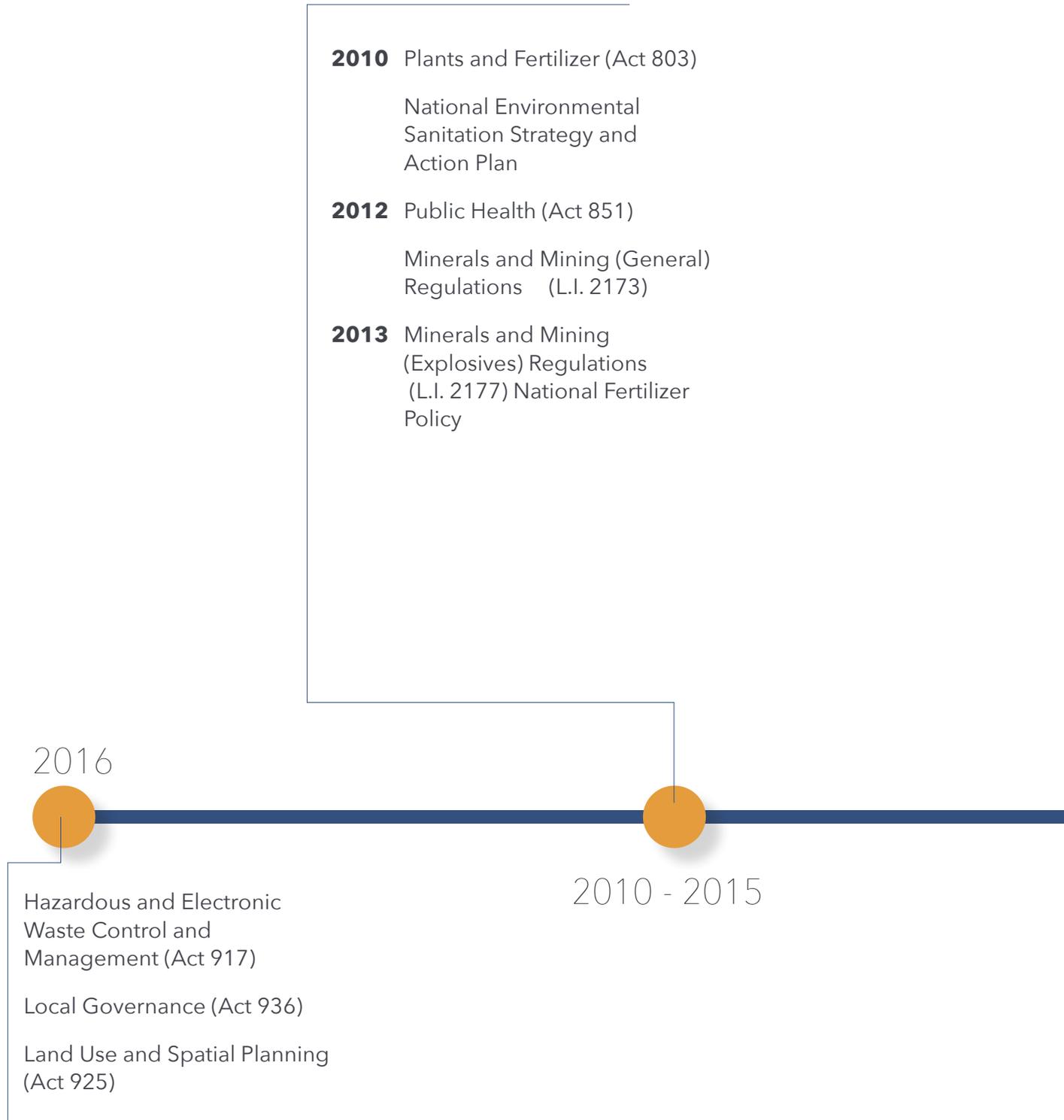
relevant state agencies. Development partners such as United Nations Industrial Development Organization (UNIDO), World Health Organization (WHO), United Nations Industrial Development Programme (UNDP) and ILO also participate in the meetings of the committee.

Urban Health Initiative Steering Committee

The Urban Health Initiative (UHI) aims to catalyse more effective urban action on air pollution and Short Lived Climate Pollutants (SLCPs) by linking health, environment and development decision-makers to forge policies that reduce SLCPs³. The initiative, facilitated by WHO, is led by a Steering Committee co-chaired by the Head of the Public Health Directorate of the GHS and the Head of Environmental Quality Unit of the EPA. The role of the committee is to support the collection and validation of air pollution baseline data from the transport and waste management sectors and to build institutional capacity in the use of the data collection and analytical tools employed by the project.

The committee is made up of representatives from the Ministry of Health (MOH), GHS, Ministry of Sanitation and Water Resources (MSWR), MESTI, EPA, Ministry of Transport (MoT), National Petroleum Commission (NPC), Energy Commission, School of Public Health - University of Ghana, School of Public Health - University of Cape Coast, Kintampo Health Research Centre, Accra Metropolitan Assembly (AMA), Coalition of NGOs in Health, School Health and Education Promotion (SHEP) under the Ghana Education Service (GES), Council for Scientific and Industrial Research- Building and Road Research Institute (CSIR-BRRI).

3 <http://www.ccacoalition.org/en/resources/urban-health-factsheet>



- 2000** Environmental Quality Guidelines for air, effluents, and noise
- 2001** Water Use Regulations, (LI 1692)
- 2002** Ghana Landfill Guidelines,
- 2003** Labour (Act 651)
- 2006** Health Care Waste Management Policy and Guidelines
Mining and Mineral (Act 703), as amended by the Minerals and Mining Act, **2015** (Act 900)
- 2007** National Water Policy
- 2008** Energy Efficiency Regulations (LI 1932)
- 2009** National Oil Spill Contingency Plan

- 1991** National Environmental Policy
- 1992** Constitution of Ghana
- 1994** The Environmental Protection Agency
- 1996** Water Resources Commission (Act 522)
National Building Regulations (LI 1630)
- 1998** Community Water and Sanitation (Act 564)
- 1999** The Environmental Assessment Regulation, (L. I. 1652)
Ghana Health Services and Teaching Hospitals (Act 526)
National Land Policy

2000 -2009

1990 - 1999

1960 -1989

- 1960** The Criminal Offences (Act 29)
- 1970** Factories, Offices and Shops Act
- 1989** The Mercury Act (PNDCL 217)

NATIONAL PLANNING SYSTEMS

National Development Planning Commission

The National Development Planning Commission (NDPC) is the country's main institution with oversight responsibility for national-level strategic planning. It was established under Articles 86 and 87 of the 1992 Constitution as part of the Executive. The National Development Planning Commission Act, 1994, (Act 479) and the National Development Planning (System) Act, 1994, (Act 480), provide the core legal framework for the establishment of the Commission and the performance of its functions.

Article 87 of the Constitution, mandates of the Commission to "advise the President on development planning policy and strategy" and, "at the request of the President or Parliament, or on its own initiative", to:

1. Study and make strategic analyses of macro-economic and structural reform options;
2. Make proposals for the development of multi-year rolling plans taking into consideration the resource potential and comparative advantage of the different districts of Ghana;
3. Make proposals for the protection of the natural and physical environment;
4. Make proposals for ensuring the even development of the districts of Ghana by the effective utilization of available resources; and
5. Monitor, evaluate and coordinate development policies, programmes and projects.

The NDPC is therefore an integral part of the HPAP process.

The Medium-Term National Development Policy Framework (MTNDPF) (2018-2021)

The framework operationalizes the vision, policies, and programmes outlined in the President's Coordinated Programme of Economic and Social Development Policies (CPESDP), 2017-2024, with the vision to "create an optimistic, self-confident and prosperous nation, through the creative exploitation of our human and natural resources, and operating within a democratic, open and fair society in which mutual trust and economic opportunities exist for all." It is the implementation framework intended to guide the overall economic and social development of the country for the stipulated period. All plans are therefore required to match the principles laid out therein.

In order to achieve its goal, the MTNDPF is anchored to the following strategic areas: restoring the economy; transforming agriculture and industry; strengthening social protection and inclusion; revamping economic and social infrastructure; and reforming public service delivery institutions.

Among myriad issues, the framework identifies specific health and pollution priority areas and proposes actions for addressing them. The issues with a bearing on the HPAP are highlighted below:

	Key Issue	Policy Objective
	HEALTH AND HEALTH SERVICES <ul style="list-style-type: none"> Increasing morbidity, mortality and disability due to communicable, non-communicable and emerging diseases 	Reduce disability, morbidity, and mortality
	WATER AND ENVIRONMENTAL SANITATION	
	<ul style="list-style-type: none"> Poor quality of drinking water 	Improve access to safe and reliable water supply services for all
	<ul style="list-style-type: none"> Low levels of material for re-use and recycling Poor sanitation and waste management Unsustainability of sanitation and health services Low level of investment in sanitation sector Poor hygiene practices Inadequate policy and institutional coordination and harmonisation in sanitation and hygiene services delivery Poor planning and implementation of sanitation plans Inconsistencies and conflicts in the implementation of legislation regulating the decentralised system in sanitation sectors 	Enhance access to improved and reliable environmental sanitation services
	<ul style="list-style-type: none"> Poor collection, treatment, and discharge of municipal and industrial wastewater Frequent outbreak of faecal-oral diseases (e.g., cholera and typhoid) Occurrence of wastewater flooding Presence of faecal matter on urban agricultural produce 	Promote efficient and sustainable wastewater management
	ENVIRONMENTAL POLLUTION	
	<ul style="list-style-type: none"> Improper disposal of solid and liquid waste Inadequate engineered landfill sites and wastewater treatment plants Destructive impact of plastic waste on terrestrial, aquatic and marine ecosystems Improper management of e-waste Air and noise pollution, especially in urban areas High incidence of acute respiratory illness caused by air pollution Emissions from poorly maintained vehicles Ineffective enforcement of noise regulations 	Reduce environmental pollution

HPAP PROCESS IN GHANA: ACTIVITIES AND TIMELINE



The HPAP process focused on five pollution risk factors with known health impacts:

- a. Indoor air pollution
- b. Outdoor air pollution
- c. Contamination - biological and non-biological - of water and inadequate sanitation
- d. Exposures to soil pollution from heavy metals and toxic chemicals
- e. Occupational exposure to pollution

The HPAP process was led by representatives of the Ministry of Environment, Science, Technology and Innovation, and was facilitated by UNIDO. Development of the HPAP followed the five-step process outlined in Annex 2 with slight modifications where it became necessary to do so.



THE HPAP PROCESS WAS LED BY REPRESENTATIVES OF THE MINISTRY OF ENVIRONMENT, SCIENCE, TECHNOLOGY AND INNOVATION, AND WAS FACILITATED BY UNIDO. DEVELOPMENT OF THE HPAP FOLLOWED THE FIVE-STEP PROCESS OUTLINED IN ANNEX 2 WITH SLIGHT MODIFICATIONS WHERE IT BECAME NECESSARY TO DO SO.

The following were the key activities executed as part of the HPAP preparation process:

1. Stakeholder Mapping and Consultation

A stakeholder mapping activity was undertaken before the inception of the project to identify the stakeholders with interest in and/or functions relating to the HPAP. The identified stakeholders were consulted to understand their interest areas, existing and upcoming interventions, and potential areas of collaboration. National reports, policies, journals and other documents on health and pollution were also reviewed.

2. Inception Workshop

The HPAP project was launched by the Minister of Environment, Science, Technology and Innovation in May 2018 at a national level stakeholder workshop. The objectives of the

inception workshop were to officially launch the HPAP project, expound the health and pollution issue, and seek stakeholders' views on the national priority areas so far as the subject matter was concerned.

In attendance were the Minister for Environment Science, Technology and Innovation, the Deputy Minister of MESTI, the Special Advisor to MESTI, UNIDO, the Pure Earth Country Coordinator, and other participants coming from the GHS, EPA, research institutions such as the Crop Research and Soil Research Institutes of the Council for Scientific and Industrial Research, and some universities. The WHO, FAO, as well as some Non-Governmental Organizations also attended.

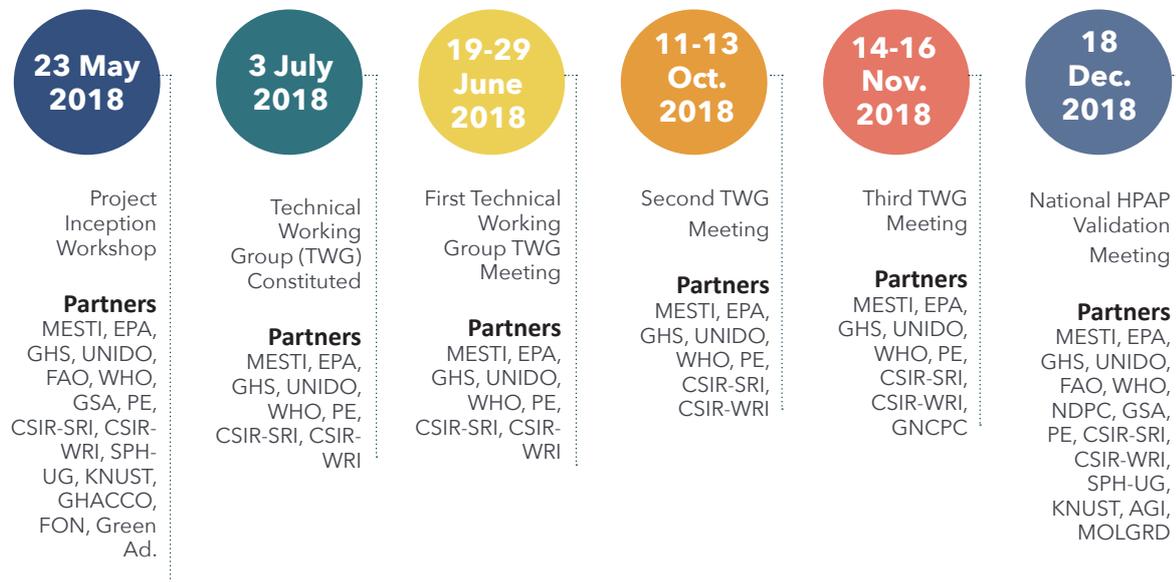
3. Technical Working Group

Following the Inception workshop were 3 Technical Working Group (TWG) meetings (19-20 July, 11-13 October and 14-16 November) after TWG was constituted at the beginning of July 2018 with the overall goal of engendering national ownership to support the HPAP development process. Members included representatives from the EPA, GHS, UNIDO, WHO-Ghana, Pure Earth (PE) and the CSIR-SRI and CSIR-WRI (see Annex 1). The members brought their vast and varied technical capacities to bear on the project and enabled the project to avoid common mistakes in problem identification, prioritization and project design, drawing on their experiences from similar projects. The members' key functions were to lead the pollution source prioritization process for the HPAP and contribute technical expertise to the development of project proposals for addressing the identified priority pollution issues.

4. National HPAP Validation Workshop

The validation meeting was held in December 2018 for the wider stakeholder body to review and make contributions to the HPAP document with its extended project proposals - the final product, and to give their final endorsement to the document. This exercise was critical to ensure that the final product was acceptable to, and met the expectations of the stakeholders. In attendance were the Special Advisor to the Minister of Environment, Science, Technology and Innovation, the UNIDO Representative for Ghana and Liberia and the UNIDO National Health and Pollution consultant, the WHO Representative for Ghana, and the Pure Earth Country Coordinator (PECC). Other participants included the Head of Environment of the West and Central Africa office of USAID, The CEO of the Association of Ghana Industries (AGI) and a representative of the National Development Planning Commission. Participants from the Ministry of Local Government and Rural Development, School of Public Health, Ghana Standards Authority, the United Nations Development Programme (UNDP) and United Nations Office for Project Services (UNOPS) were also present (Annex 1).

The table below summarizes the specific steps, the dates they took place, and the partners who were involved:



Technical inputs were provided by the following agencies and organizations:

- The Environmental Protection Agency
- Ghana Health Service
- Council for Scientific and Industrial Research - Water Research Institute
- Council for Scientific and Industrial Research - Soil Research Institute
- United Nations Industrial Development Organization
- World Health Organization
- Pure Earth
- Ghana National Cleaner Production Centre

The outcome of the HPAP process has been this concise Action Plan for the Government of Ghana to review, validate and implement, with ongoing support from the relevant national stakeholders and international partners.

A basic objective of the HPAP process is to help to achieve action in the short-to-medium term with measurable outcomes for some of the high priority challenges. Therefore, in addition to describing the process used to prioritize issues and create the Plan, and describing the pollution challenges and associated health impacts that were identified as priorities through the consultative and analytical process, this Action Plan includes brief recommended actions, programmes, and projects that would reduce the impacts on public health from priority pollution issues.

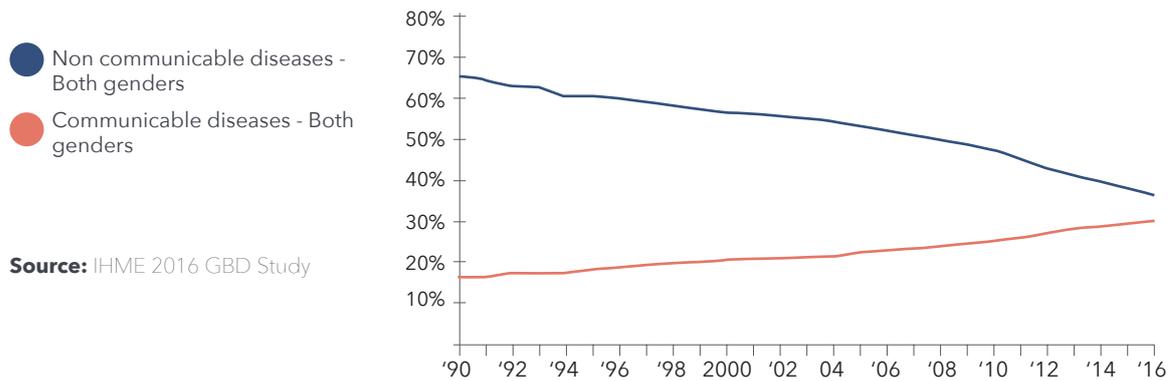
SUMMARY OF HEALTH IMPACTS FROM MAJOR POLLUTION CHALLENGES



The National Health and Pollution Action Plan is based on inputs from national agencies, national and international data on pollution sources and impacts, and on an analysis of existing studies and reports describing pollution challenges in Ghana and the resulting burden of disease. A description of available national data is given in Annex 3.

POLLUTION IMPACTS DATA FROM IHME 2016 GBD STUDY

The assessment of health impacts from pollution in Ghana relies in part on data on Deaths and Disability Adjusted Life Years (DALYs) from Global Burden of Disease (GBD) studies conducted by the Institute for Health Metrics and Evaluation (IHME) - see Annex 4.

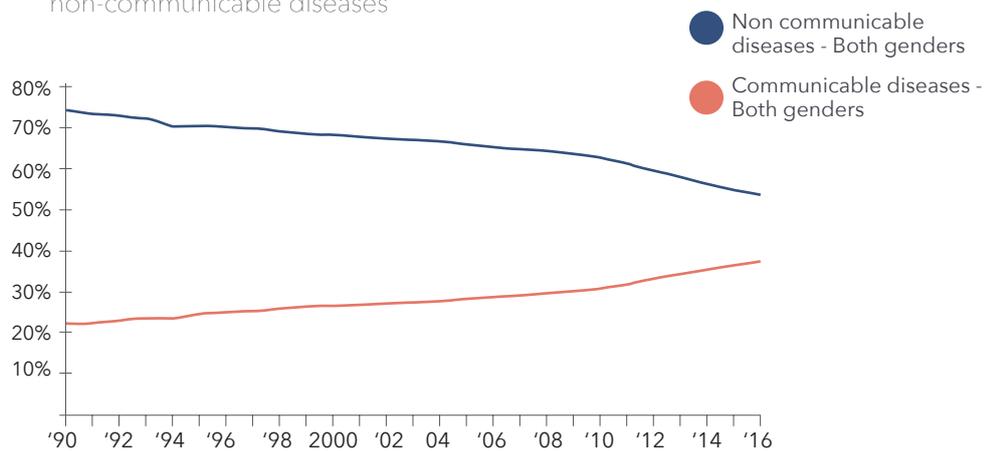
Figure 2: Percentage of annual deaths attributable to communicable and non-communicable diseases

AN ANALYSIS OF THE TYPES OF DISEASES CAUSING MORTALITY IN GHANA SHOWS THAT THE PROPORTION OF DEATHS DUE TO NONCOMMUNICABLE DISEASES IS INCREASING YEARAFTER YEAR.

An analysis of the types of diseases causing mortality in Ghana shows that the proportion of deaths due to non-communicable diseases (NCDs) is increasing year after year. Figure 2 shows that after 16 years, from 1990 to 2016, the percentage of deaths from NCDs had risen by 1.6 times, from 27% in 1990 to 44.1% in 2016. In parallel, the proportion of deaths from communicable diseases (CDs) has reduced significantly, from 67.9% in 1990 to below 50% in 2016.

Figure 3 shows the percentage of annual DALYs attributable to CDs and NCDs. The proportion from NCDs has increased while that from CDs has declined over the years. The DALYs attributable to NCDs increased from 22.5% in 1990 to 38.6% in 2016. The percentage of total annual DALYs attributable to CD is still higher than that of NCDs but the gap is gradually narrowing.

Figure 3. Percentage of total annual DALYs attributable to communicable and non-communicable diseases

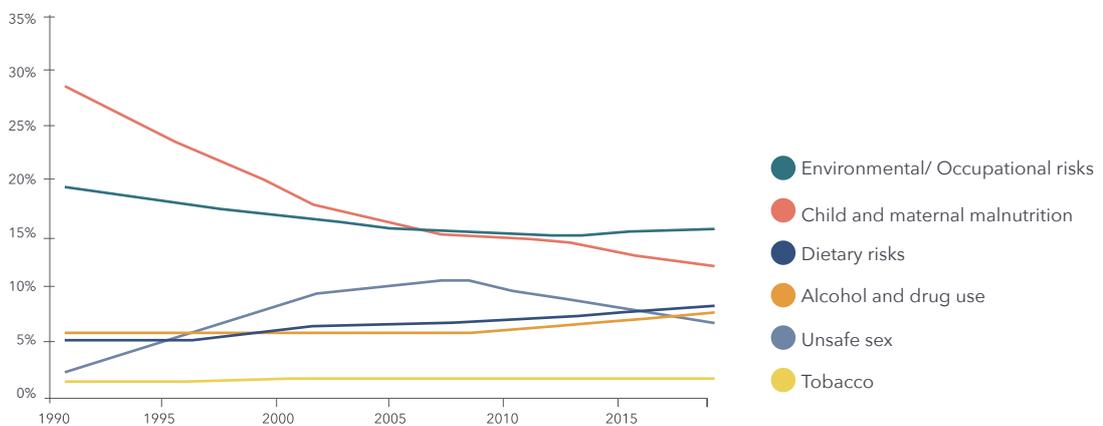


Source: IHME 2016 GBD Study

Figures 2 and 3 imply that more people are likely to die from NCDs, or to have their lifespans shortened or be handicapped by NCDs.

Environmental/Occupational exposures contribute significantly to deaths and disabilities from NCDs. In 2016, they accounted for 18% of all annual deaths in Ghana, followed by 12.1% from child and maternal malnutrition, 8.8% from dietary risks, 8.2% from alcohol and drug use, 7.3% from unsafe sex and 2.6% from tobacco.

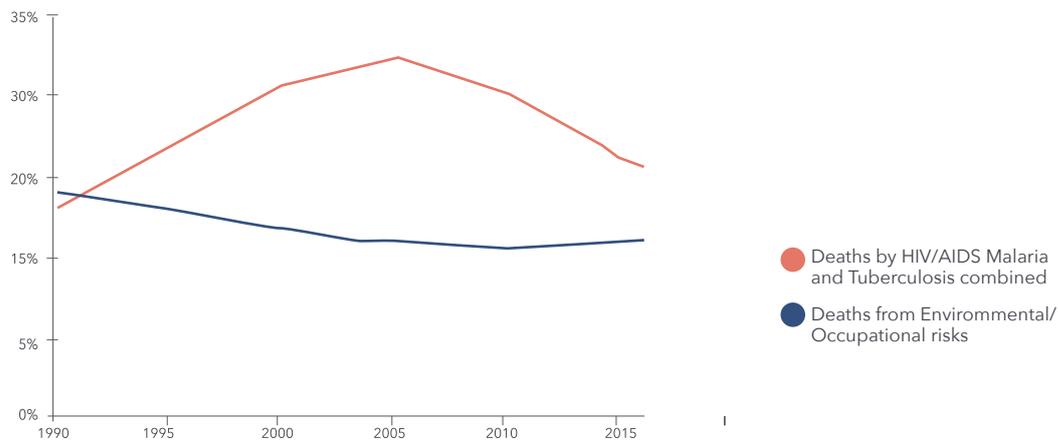
Figure 4. Percentage of all annual deaths in Ghana caused by leading risk factors



Source: IHME 2016 GBD Study

When deaths attributable to pollution exposures are compared with the combined deaths from such high-profile communicable diseases as HIV/AIDS, malaria and tuberculosis (Figure 5), it is noticeable that though the percentage of deaths from these CDs has in the recent past been considerably higher than that from environmental/occupational risks, the gap is narrowing: the proportion of deaths by these CDs has dropped dramatically since 2005, while that from environmental/ occupational risks, after a small reduction has, since 2010, been increasing slightly.

Figure 5: Percentage of annual deaths attributable to pollution vs. HIV/AIDS, Malaria and Tuberculosis (combined)



Source: IHME 2016 GBD Study

Note that this chart compares a risk factor (pollution exposures) to diseases

The following table summarizes the annual deaths in Ghana in 2016 from various sources of pollution, in total and as a percentage of all deaths, as estimated in the Global Burden of Disease study.

Table 1. Summary of annual deaths from Pollution in Ghana

Summary of Annual Deaths from Pollution in Ghana		
Pollution Type	2016 Annual Deaths	As % of all Deaths
 Air	Household air	14,458
	Outdoor air	11,803
	Total Air	22,397
 Water	Unsafe sanitation	2,526
	Unsafe water	3,210
	Total Water	6,536
 Chemicals	Lead	517
	Occupational carcinogens	1,379
	Total Chemicals	2,474
Total - All Pollution	29,379	15.53

Source: IHME 2016 GBD Study

According to the GBD study, deaths related to pollution contributed to about 16% of deaths in Ghana in 2016. As seen from Table 1, air pollution, both indoor and outdoor, caused more deaths than water-related contamination and chemical exposure did. Data from the IHME GBD 2016 study shows that air pollution was the second-highest ranking, driving death and disability combined, just after the malnutrition risk factor.

It should be noted, however, that some of these figures need to be treated with care, because IHME data only considers a limited range of environmental risks. For example, the data only includes well established pollution-disease pairs where robust estimates are available. It does not include emerging but still unquantified health effects of known pollutants, nor does it adequately characterize health effects of emerging pollutants. Similarly, soil pollution is limited to lead-acid battery recycling sites and artisanal and small-scale gold mining sites. Water pollution does not account for chemical pollution of water. It can thus be concluded that IHME data reflects a conservative estimate and that the total number of pollution-related deaths may be higher than indicated by the figures in Table 1.

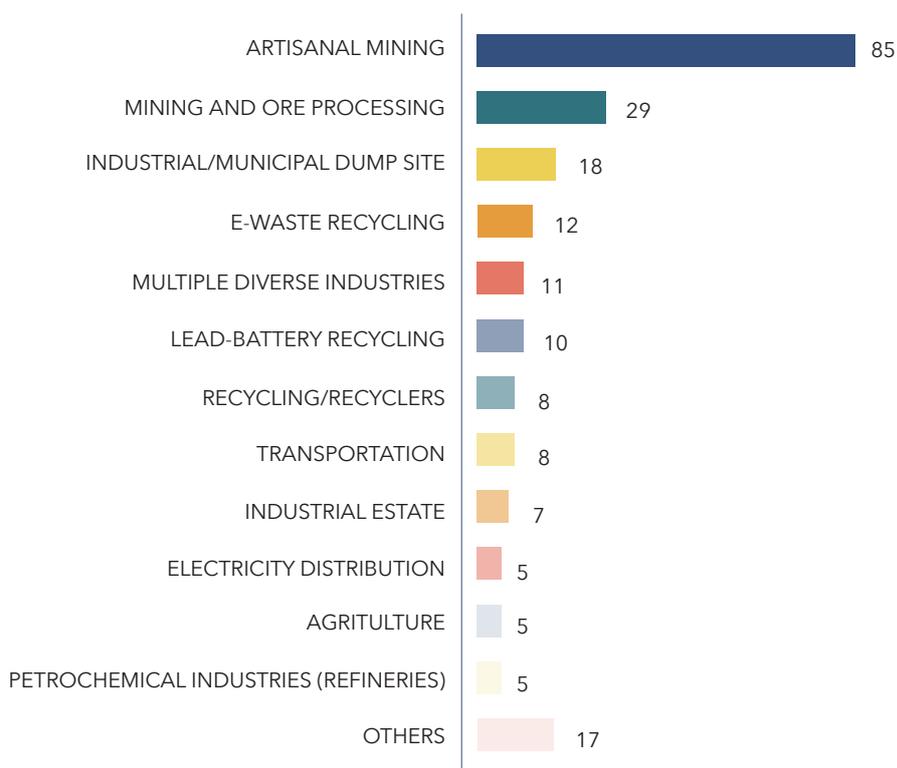
POLLUTION IMPACTS PROVIDED FROM AVAILABLE NATIONAL AND REGIONAL DATA

Pollution data from Toxic Sites Identification Program (TSIP)

The Toxic Sites Identification Program (TSIP) has been implemented in Ghana since 2012 by Pure Earth (formerly Blacksmith Institute), in collaboration with UNIDO. The program has been financially supported by European Union (EU), Asian Development Bank (ADB), the United States Agency for International Development (USAID), the World Bank (WB), and Green Cross Switzerland. In the period 2012-2017, about 221 sites in Ghana were assessed successfully and the data from those sites has been added into the global TSIP database⁴. The detailed data from contaminated sites can be accessed through the link <http://contaminatedsites.org/TSIP/>.

The main sites assessed in Ghana were artisanal and small-scale mining sites (86 of the 221 sites assessed), mining and ore processing sites (29), followed by e-waste recycling sites, dumping sites, and many others. Figure 6 presents the types of sites assessed, by activity.

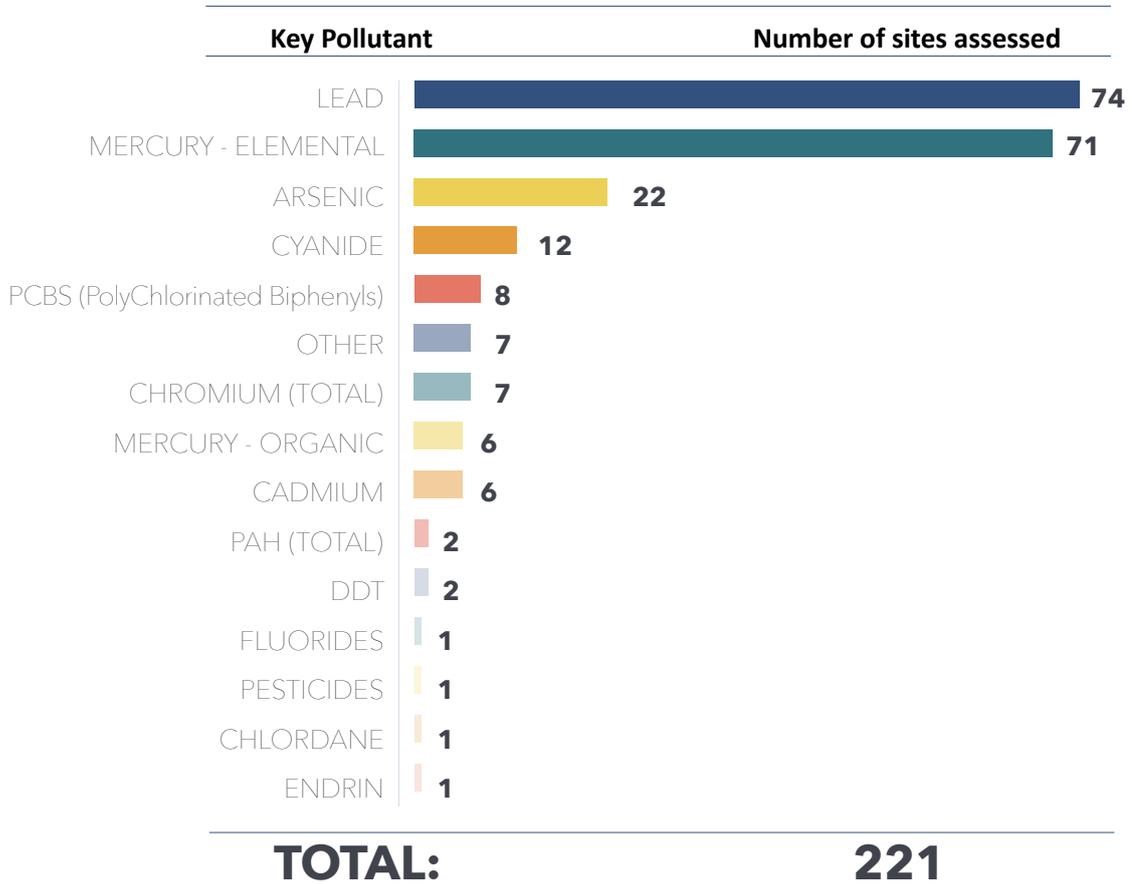
Figure 6. Types of Sites Assessed



4 Pure Earth, 2018. *Final Report to UNIDO, Toxic Sites Identification Program (TSIP)*, Ghana, September 13, 2018

So far, 221 sites have been investigated and key pollutants identified. The greatest portion of sites was contaminated primarily with either lead (74 sites) or elemental mercury (71 sites). Figure 7 below is a summary of key pollutants encountered in the 221 sites.

Figure 7. Key Pollutants identified



A 2015 study, which employed a cluster random sampling analysis that relied on a 50% weighted mixture of area and population statistics and an analysis involving simple random sampling relying on the mean number of sites found per sample, concluded as follows:

“Our current extrapolation shows that there are an estimated 1,561 to 1,944 heavy metals contaminated sites within Ghana, excluding mercury (Clusters: 812 to 3,075 sites). This is approximately nine times the number of contaminated sites previously documented by the Pure Earth Toxic Sites Identification Program”⁵.

5 Caravanos, J., R. Dowling, Grigsby P., Rivera, A., Ericson, B., Akuffo, B. and R. Fuller. (2015) *Estimates of Heavy Metals Exposure from Toxic Waste Sites: A Ghanaian Case Study*

TSIP had no studies which attempted to quantify the human health impacts of the contaminants found at the 221 investigated sites.

Studies on the Health Impacts of Pollution

Studies on pollution-related human health impacts in Ghana are generally scanty and have mixed results. The following summarizes the more relevant information which is available.

Pollution from Mercury

A 2002 study on the health impacts of mercury pollution in artisanal mining concluded that it was likely that some small-scale miners in Ghana have died through mercury intoxication but there were no official records of such mortalities⁶ (this conclusion applies for most pollutants to which the Ghanaian population is exposed).

A decade later, in 2012⁷, 343 small-scale gold miners were tested for the presence of elemental mercury in their body. Of these, 160 (46.65%) had urine mercury levels above the recommended exposure limit (<5.0µg/L). Complaints of numbness were significantly associated with mercury exposure among those who had previously worked at other small-scale gold mines. A large proportion of small-scale gold miners in Prestea were found to be exposed to mercury in excess of occupational exposure limits.

Impacts of Pollution from the treatment of Waste of Electrical and Electronic Equipment

Elevated urine levels of Co, Cr, Cu, Fe and Pb and serum levels of Co, Fe, Hg, Pb, Se and Zn were found in persons working at the Agbogbloshie e-waste recycling site in a 2011 Health Assessment Study conducted by GreenAd, Pure Earth, and Ghana Health Service⁸.

Human exposure to polychlorinated biphenyls (PCBs) and brominated flame retardants (BFRs) such as polybrominated diphenyl ethers (PBDEs) and hexabromocyclododecanes (HBCDs) was also evaluated in Ghana using breast milk samples collected in 2004 and 2009.

6 Adimado, A. A., & Baah, D. A. (2002). Mercury in Human Blood, Urine, Hair, Nail, and Fish from the Ankobra and Tano River Basins in Southwestern Ghana. *Bulletin of Environmental Contamination and Toxicology*, 68, 339{ 346. doi:10.1007/s001280259

7 Mensah E. K., E. Afari¹, F. Wurapa, S. Sackey, A. Quainoo, E. Kenu, K. M. Nyarko (2016). *Exposure of Small-Scale Gold Miners in Prestea to Mercury, Ghana, The Pan African Medical Journal* 2016; 25 (Supp 1):6.- ISSN 1937-8688.

8 GreenAd, B.I. and GHS, 2011. *Assessment of Health Status and Effects of Exposure to Chemicals at Agbogbloshie e Waste Recycling and Dump Site - Accra, Ghana*, Green Advocacy Ghana, Blacksmith Institute and Ghana Health Services, April 2011

The mean levels and ranges of PBDEs (4.5; 0.86-18 ng/g lipid weight [ng/g lw]) and PCBs (62; 15-160 ng/g lw) observed in the study were unexpectedly high, in spite of the fact that Ghana is a non-industrialized country when compared with many of the Asian and European countries⁹.

Impact of Agrochemical Pollution

The agricultural sector has long been faced with the challenge of indiscriminate handling and use of pesticides. In addition, a 2012 study carried out in the Upper East region by the Northern Presbyterian Agricultural Services and Partners (a Tamale based NGO) observed that four banned or restricted pesticides (DDT, aldrin, lindane and dieldrin) were on sale in local agro-dealer shops¹⁰. High levels of cadmium were also detected in soils at Ahafo Kenyasi in the Brong Ahafo Region of Ghana¹¹.

ECONOMIC COSTS OF POLLUTION IN GHANA

Premature death and disease due to pollution impose great costs on national budgets and health-care spending, especially in industrializing low- and middle-income countries such as Ghana. Diseases caused and exacerbated by pollution result in medical expenditures and in pain and suffering. Pollution-related disease can reduce labour force participation, labour market productivity, and economic output. In children, pollution-related disease can cause failure in school and perpetuate intergenerational poverty. Early life exposures to neurotoxic pollutants such as lead and mercury can impair cognition, diminish the ability to concentrate, and disrupt behaviour, thus reducing lifetime earnings. The costs of disease and premature death caused by pollution, especially the more modern forms of pollution, are rising rapidly.

Diseases resulting from pollution and for which data are available were estimated to cost Ghana between US\$226 million and US\$300 million in 2015 due to lost productivity - the equivalent of 0.6% to 0.8% of the country's 2015 Gross Domestic Product (GDP)¹². The welfare damages from pollution-attributable diseases equal US\$2,839 million, or 7% of the gross national income (GNI) for the same year. The national data on direct healthcare spending used to treat pollution-attributable diseases is not available in Ghana. These figures were based on estimated data from

9 Asante, K. A., Adu-Kumi, S., Nakahiro, K., Takahashi, S., Isobe, T., Sudaryanto, A., Devanathan, G., Clarke, E., Ansa-Asare, O.D., Dapaah-Siakwan, S. and Tanabe, S. (2011)- Human exposure to PCBs, PBDEs and HBCDs in Ghana: temporal variation, sources of exposure and estimation of daily intakes by infants. *Environment International*, 37, 921-928 pp.

10 NPASP, (2012); *Ghana's pesticide crisis: The need for further Government action*, Northern Presbyterian Agricultural Services and Partners

11 Yaw Amoyaw Osei, *Pure Earth Country Coordinator*, *Personal communication*, 12 November 2018

12 The Lancet Commission on pollution and health, 2017, *The Lancet 2017: Supplementary appendix*, [https://www.thelancet.com/pdfs/journals/lancet/PIIS0140-6736\(17\)32345-0.pdf?code=lancet-site](https://www.thelancet.com/pdfs/journals/lancet/PIIS0140-6736(17)32345-0.pdf?code=lancet-site) free account registration required.

the 2017 Lancet Report and a complete description of the cost estimate methodology can be referred at the Supplementary appendix of the same Report.

The costs of pollution-related disease are often overlooked and undercounted because they are associated with non-communicable diseases that appear and extend for many years after the initial exposure, are spread across large populations, and are not captured by standard economic indicators. These costs are much more difficult to calculate than the costs of pollution control, which are usually tangible and concrete. Although the costs of pollution-related disease can have large effects on the budgets of health ministries and increase spending in health systems, they are typically buried in general health expenditures and hospital budgets, hidden in productivity reports, do not affect the budgets of environment ministries, and are not attributed to pollution.

The costs of pollution-related disease include: 1) direct medical expenditures, including hospital, physician, and medication costs, long-term rehabilitation or home care, and non-clinical services such as management, support services, and health insurance costs; 2) indirect health-related expenditures, such as time lost from school or work, costs of special education, and the cost of investments in the health system (including health infrastructure, research and development, and medical training); 3) diminished economic productivity in persons whose brains, lungs, and other organ systems are permanently damaged by pollution; and 4) losses in output resulting from premature death.

Pollution-related disease is responsible also for intangible costs, such as those of poor health in people made ill by pollution, disruption of family stability when a person of working age becomes disabled or dies prematurely as a result of pollution, and the loss in years of life to the person themselves.



SUMMARY OF PRIORITY POLLUTION CHALLENGES AND HEALTH IMPACTS



The Medium Term National Development Policy Framework (MTNDPF) (2018-2021) is the national blueprint underpinning all national plans and strategies for the period 2018 to 2021. The HPAP therefore takes its cue from the fundamental propositions and expectations of the MTNDPF. While the document does not necessarily organize the national health and pollution issues in any hierarchy of importance, it has, in addition to other strategic national documents, informed the identification of issues and the formulation of solutions to Ghana's health and pollution challenges.

Through the Technical Working Group meetings, key sources of pollution were prioritized based on their health risk, severity of occurrence, and population affected. Six pollution sources were initially identified as being of interest



THROUGH THE
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WORKING GROUP
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SOURCES OF
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AND POPULATION
AFFECTED.

during the HPAP prioritization exercise: Gold Mining, Electronic Waste (e-Waste) Management, Municipal Solid Waste Management, Chemical Based Industries, Downstream Petroleum Companies (including oil refineries and fuel stations), and Medical Waste Management.

ISSUES NOT SELECTED AS PRIORITIES FOR ACTION IN THE HPAP

Although pollution from gold mining activities, particularly Artisanal and Small-Scale Gold Mining (ASGM), Management of Waste Electrical and Electronic Equipment (WEEE) or e-Waste, Downstream Petroleum Companies (including oil refineries and fuel stations), Air Pollution (both Indoor

and Outdoor) and Medical Waste Management had all been identified to be of interest, they were not prioritized by the Technical Working Group for a number of reasons.

Pollution from Artisanal and Small-Scale Gold Mining (ASGM)

The artisanal and small-scale gold mining sector employs over one million people¹³ and supports four to five million more in associated service industries and markets¹⁴. In 2016, the sector produced 1.6 million oz. of gold, representing 39% of the total gold production in the country¹⁵.

Over the past few decades, small-scale gold mining (both legal and illegal) has become a source of grave environmental, health, and social concern in Ghana. Evidence from the ground also indicates that large stretches of farm and forest lands unallocated for gold mining have been destroyed by illegal miners¹⁶. Illegal small scale mining (locally known as *galamsey*) refers to "... *any mining activity that has not been licensed by the appropriate state regulatory institutions and has negative effects on the environment*"¹⁷.

There is currently no reliable data on the location and the extent of *galamsey* in Ghana¹⁸ and there is therefore considerable uncertainty about the area of land affected by it. The National Planning Development Commission (NDPC) estimates that up to 21% (50,000km², or 5 million ha) of the total land area of Ghana has been affected by illicit mining activities, most of them are gold mining¹⁹. On the other hand, a recent study gives a much lower figure for the area of land impacted by *galamsey*. Using satellite imagery for the southwestern part of the country, where most of the gold is mined, it estimated that in 2013 the total area of *galamsey* was about 27,800 ha. Assuming a maximum impact radius around *galamsey* of 10km, the study further estimated that the impact zone covered nearly 552,000 ha. This same study estimated that *galamsey* had more than tripled in the area which it studied between 2011 and 2015.

13 Hilson, G. M., and Hilson, A (2015). *Entrepreneurship, poverty and sustainability: critical reflections on the formalization of small-scale mining in Ghana*. International Growth Centre. <http://tinyurl.com/gwussp4>.

14 UNECA, (2011). *In Artisanal and small-scale gold mining in Ghana Evidence to inform an 'action dialogue'*

15 *Minerals Commission Annual Report* (2016). In IMCIM, (2018); *Road Map towards lifting of Ban on Artisanal and Small-scale Gold Mining*

16 Note that legal mining operations have also been taking place in areas unallocated for gold mining.

17 IMCIM, (2018); *Road Map towards lifting of Ban on Artisanal and Small-scale Gold Mining*

18 Aragon & Rud, (2013). In Snapira B., Simms D.M., Wainea T.W. (2017). Mapping the expansion of *galamsey* gold mines in the cocoa growing area of Ghana using optical Remote Sensing, *Cranfield University, Cranfield, Bedfordshire, MK43 0AL, UK International Journal of Applied Earth Observation, and Geoinformation*, Vol. 52, June 2017, PP 225-233

19 NDPC, 2018: *Medium-Term National Development Policy Framework, An Agenda For Jobs: Creating Prosperity and Equal Opportunity For All (First Step) 2018-2021* pp 77

Applying the same rate of expansion to the rest of gold mining region leads to a total estimated galamsey area of 43,800 ha in 2015²⁰ from which one can extrapolate that the impact zone covers perhaps some 870,000 ha, or about one-fifth of NDPC's estimate. The same report states further that "... our maps also show that galamsey is encroaching on protected forest reserves - 603 ha of encroached forest in 2015 within the change area".

Galamsey operators usually obtain land from chiefs who may be acting alone or jointly with family members and other landowning individuals in contravention with Article 257, Clause 6 of the 1992 Constitution, which declares every mineral in its natural state found in any part of Ghana as belonging to the state and vests them in the President on behalf and in trust for the people of Ghana.

Much small-scale gold mining is in contravention of the relevant laws and is therefore deemed to be illegal. For instance, miners are mining on riverbanks or in forest reserves, they are not reclaiming the mined land after they have stopped mining, foreigners are involved in the mining²¹, and miners are using inappropriately mercury and other dangerous chemicals²².

Mercury is not produced in the country. It is imported mainly from Germany, the United Kingdom, Spain, Canada, and the Netherlands through the country's main ports of entry. Allegedly, mercury is imported by business people specialized in the trade.

The problems of the sector are multifaceted. It has negative impacts on water and air quality, biodiversity, livelihoods, women, the youth, and national security among other things.

The indiscriminate use of mercury requires particular attention because it is a high-risk pollutant with severe human health consequences, and Ghanaians have low awareness of the risks and the country has very modest technical capacity to deal with mercury pollution.

Small-scale gold refining is most often done by exposing the ore to mercury which will then bind to the gold and form an amalgam. The amalgam is heated in open air and the mercury evaporates leaving the gold behind. Mercury is highly toxic to human health, posing a particular threat to the development of the child in utero and early in life²³. The heating of mercury-gold amalgams leads to very high exposure levels, both of the miners themselves and of their families. This is because on many occasions amalgams are heated in the courtyards of houses where women cook and children play.

20 Snapira B., Simms D.M., Waiana T.W. (2017). *Mapping the expansion of galamsey gold mines in the cocoa growing area of Ghana using optical Remote Sensing*, Cranfield University, Cranfield, Bedfordshire, MK43 0AL, UK International Journal of Applied Earth Observation, and Geoinformation, Vol. 52, June 2017, PP 225-233

21 Small scale mining is the preserve of Ghanaian national. Foreign companies can only undertake industrial scale mining

22 IMCIM, *Road Map towards lifting of Ban on Artisanal and Small-scale Gold Mining*, (2018)

23 WHO, (2007) *Preventing Disease through Healthy Environments, Exposure to Mercury: A Major Public Health Concern*

Through the ASGM amalgamation process, miners release mercury in two forms: metallic mercury and mercury vapour. Metallic, elemental mercury (Hg^0) is discharged into the environment through tailings and released during burning; mercury vapour is both inhaled and deposited back onto the soils²⁴ thereby exposing the miners, people living in the mining communities, and indeed the whole Ghanaian population to the potential impacts of mercury. Mercury vapours in the air around amalgam burning sites can be alarmingly high and almost always exceed the WHO limit for public exposure of $1 \mu\text{g}/\text{m}^3$ ²⁵.

In 2004 the Joint FAO/WHO Expert Committee on Food Additives (JECFA) established a tolerable intake of $1.6 \mu\text{g}/\text{kg}$ bodyweight per week for methylmercury through food ingestion in order to protect the developing foetus from neurotoxic effects²⁶. Furthermore, in 2007 the WHO proposed a guideline level of $1 \mu\text{g}/\text{litre}$ for total mercury in water and $1 \mu\text{g}/\text{m}^3$ (annual average) for air.

Despite its being so toxic, access, handling, storage, use and disposal of mercury have been poorly controlled in Ghana over the years. There is also excessive use of mercury. The optimal mercury to gold ratio (Hg:Au) is about 1 (v/v), but galamsey miners add more mercury in order to be sure that they have amalgamated all the available gold. In Brazil, for instance, some researchers mention ratios of up to 6:1 or even 10:1. According to Ghanaian sources, Hg:Au ratios could be about 4:1²⁷.

The technology for recovering the mercury used is crude where it is used at all. One study has estimated that in 98% of cases the mercury-gold amalgam is simply heated in the open air to evaporate off the mercury. As a result, much of the mercury used is lost into the environment. It is estimated that one to two grams of mercury are lost for every gram of gold produced in ASGM²⁸.

In 2017, after several attempts by both central and local governments to sanitize the mining operations proved ineffectual, the Government placed a temporary ban on all small-scale mining activities and constituted an inter-ministerial committee to pave the way for a review and restructuring of the activities of the sector. The committee launched a roadmap on 16th August 2018 which led to the lifting of the temporary ban in December 2018. This intervention has led to a number of reforms including registration of miners, their concessions and equipment, training of about 3,000 ASGM miners in environmentally safe mining

24 Tschakert, P. and Singha, K. (2007). *Contaminated identities: Mercury and marginalization in Ghana's artisanal mining sector*, Science Direct Journal, Geoforum 38 (2007) 1304-1321

25 UNEP, (2012). *Reducing Mercury Use in Artisanal and Small-Scale Gold Mining: A Practical Guide: A UNEP Global Mercury Partnership document produced in conjunction with Artisanal Gold Council*. www.artisanalgoldcouncil.org

26 WHO, (2007) *Preventing Disease through Healthy Environments, Exposure to Mercury: A Major Public Health Concern*

27 UNIDO, (2000). *Assistance in Assessing and Reducing Mercury Pollution Emanating from Artisanal Gold Mining in Ghana-Phase I (US/GHA/99/128)*, Part1- General Introduction and Assessment of Human Health

28 Veiga, M.M., Baker, R., (2004) In Tschakert, P. and Singha, K. (2007). *Contaminated identities: Mercury and marginalization in Ghana's artisanal mining sector*, Science Direct Journal, Geoforum 38 (2007) 1304-1321

techniques²⁹, monitoring of miners using drone technology, and the formation of district mining committees to monitor the activities of the miners.

In line with efforts towards addressing mercury pollution from the ASGM sector and other sources, Ghana has also ratified the Minamata Convention on mercury. The Minamata Initial Assessment was completed in July 2018. It recommended among others, a revision of the Mercury Act 1986 (Act 216). With UNIDO support, MESTI and the Inter-ministerial Committee on the Minamata Convention are working on the National Action Plan (NAP) for Ghana's compliance with the with Article 7 of the Convention.

In addition to these interventions, UNIDO, WHO, UNDP and ILO are planning a joint intervention in collaboration with MESTI to holistically address the problems of the sector.

Although pollution from the ASGM sector was determined to be a high priority in the HPAP process, the TWG anticipated that the work programme of the development partners mentioned above will address the issues identified. To this end, since so much work is already ongoing on the use of mercury, no project proposal on this issue is presented in the HPAP document.

Indoor and Outdoor Air Pollution

Air pollution is another environmental pollution issue with which Ghana is confronted. According to the NDPC, EPA's ambient air quality stations indicate high levels of particulate matter (PM₁₀ and PM_{2.5}), particularly in urban centres, in excess of WHO and EPA-recommended thresholds. The MTNDPF states further that unpublished information from EPA indicates that emissions from poorly maintained vehicles, charcoal and wood stoves, factories, indoor and outdoor burning activities, and dust from exposed soil constitute the major sources of air pollution in Ghana.

According to the IHME 2016 GBD report, indoor air pollution contributed to over 14,000 deaths while outdoor air pollution contributed to about 12,000 deaths in Ghana. These figures combined accounted for approximately 14% of all Ghanaian deaths in that year alone.

WHO, which was a partner in the development of the HPAP, and the Steering Committee for the Urban Health Initiative (UHI) of the Climate and Clean Air Coalition (CCAC) have prioritized air pollution. WHO has been undertaking data collection as part of the implementation of a number of air pollution related interventions together with some government agencies, the International Council for Local Environmental Initiatives (ICLEI) and UN-Habitat under the Urban Health Initiative of the Climate and Clean Air Coalition (CCAC). The interventions under the UHI are deemed a composite part of the HPAP document and the TWG saw no need to include project concepts on this issue.

29 IMCIM, (2018); *Road Map towards lifting of Ban on Artisanal and Small-scale Gold Mining*

Waste Electrical and Electronic Equipment (WEEE)

Among other environmental issues, the revised NEP lists WEEE, otherwise known as e-waste, as one of the emerging environmental challenges that has gained prominence in the country. The policy describes e-waste as used equipment in the form of computers, copying machines, television sets, mobile phones and electronic equipment, imported into Ghana without regard to their age or degree of usefulness. It acknowledges that the burning of components of e-waste to retrieve useful materials releases emissions and toxins that cause detrimental impacts on human health and the environment.

Poor management of e-waste is one of the important sources of pollution in Ghana. This problem results from the previously poorly regulated import of obsolete Electrical and Electronic Equipment (EEE) and the generally poor municipal waste management system in the country. In 2013, the problem gained national attention when Agbogbloshie, a suburb of the capital, was reported to be among the top 10 most polluted places in the world³⁰. Since then, a number of interventions have been put in place to address the problem. These include the promulgation of the Hazardous and Electronic Waste Management and Control Act, 2016 (Act 917), to control and manage, inter alia, the transboundary movement, possession, storage, and disposal of these materials. In addition to this effort, a number of development organizations are undertaking various projects and interventions to address the problem. For instance, in 2014, Pure Earth under the UNIDO-EU TSIP project supplied cable-stripping equipment and trained the operators to avoid burning of electronic components. GIZ and other Non-Governmental Organizations are also undertaking various activities.

In addition to these specific efforts, the institution of an efficient and functioning municipal waste management system in Ghana will bring immense benefits to the efforts of addressing the e-waste problem. A project concept has therefore been developed to address municipal solid waste as a whole, which the TWG believed would also deal with the WEEE in these wastes.

Downstream Petroleum Companies (including oil refineries and fuel stations)

Petroleum products release Volatile Organic Compounds (VOCs) when they are exposed to the air. Benzene and some of its derivatives which form a part of such products have been labelled by the WHO as carcinogenic to humans, for which reason no safe level of exposure can be recommended for air exposure. In Ghana, young men and women are employed as attendants at the many petrol stations scattered around the country. These young people are potentially exposed to the pollutant on a daily basis as the number of petrol stations which use fuel nozzles with vapour capture capabilities is unclear. No data exists on the amount of benzene to which fuel station attendants are exposed, although the evidence suggests that it is not high. The Ghana Standards Authority recommends a maximum benzene

30 <http://science.time.com/2013/11/04/urban-wastelands-the-worlds-10-most-polluted-places/slide/dzerzhinsk-russia/>

concentration of 1.5%v/v in Ghanaian fuels. A 2015 study, however, found benzene levels in fuel sold in Ghana to be much lower than the standard, an average of 0.58%v/v³¹. This finding was consistent with the observation by the EPA in 1998 of benzene concentrations in fuel lower than 1.0%v/v. The correlation between benzene content in fuel and air emissions seems unsettled. A 1996 report stated that the emission of benzene from petrol-fuelled vehicles depends not only on the benzene content in the petrol, but also on the total content of aromatics³². However, a later study indicated that the influence of other aromatic compounds in petrol could not be detected and is probably not important³³. Furthermore, benzene concentrations in urban air are expected to decrease further in the coming years as the number of cars with catalysts increases³⁴.

In sum, although benzene was identified as a pollutant of potential interest to Ghana during stakeholder consultations, information on the volumes to which fuel attendants and other workers in the downstream petroleum value chain are exposed is unavailable but not expected to be large. The TWG therefore decided not to elaborate a project proposal on the topic at this time. They noted that in the interim the problem can be addressed using approaches such as reducing the benzene concentrations in fuel further, ensuring that fuel pumps use nozzles with vapour capture systems, and possibly introducing automated fuel dispensers. Further studies will have to be undertaken to better understand the impact of benzenes on fuel attendants in Ghana.

Medical Waste Management

Medical waste, otherwise known as Health Care Waste (HCW), includes all untreated solid and liquid waste (both hazardous and non-hazardous) generated during the administration of medical care or the performance of medical research involving human beings³⁵. These include pathological waste such as tissues and body fluid, pharmaceuticals e.g. expired or unused drugs, sharps (syringes, disposable scalpels, blades, etc.), non-sharps (swabs, bandages, disposable medical devices, etc.), and chemicals (solvents, disinfectants, etc.), as well as wastewater including effluents from mortuaries. These pose risks by being infectious, toxic, radioactive or causing injuries. According to the EPA, 10-25% of HCW is hazardous and requires special arrangements for its management. In

31 Ubeidalah, S. K., 2015. *Assessment of Gasoline Quality Marketed in Accra Metropolis*, A Thesis Submitted to the School of Graduate Studies in Partial Fulfillment of The Award of Degree of Master of Philosophy in Chemistry, College of Basic and Applied Sciences, Department of Chemistry, July 2015. University of Ghana <http://ugspace.ug.edu.gh>

32 Concawe, (1996). In Palmgren, F., Hansen, A. B., Berkowicz, R. & Skov, H (2000): *Benzene from traffic. Fuel content and ambient air concentrations*. National Environmental Research Institute, Roskilde, Denmark. 44 pp. - NERI Technical Report No. 309

33 Palmgren, F., Hansen, A. B., Berkowicz, R. & Skov, H (2000): *Benzene from traffic. Fuel content and ambient air concentrations*. National Environmental Research Institute, Roskilde, Denmark. 44 pp. - NERI Technical Report No. 309

34 Palmgren, F., Hansen, A. B., Berkowicz, R. & Skov, H (2000): *Benzene from traffic. Fuel content and ambient air concentrations*. National Environmental Research Institute, Roskilde, Denmark. 44 pp. - NERI Technical Report No. 309

35 Ministry of Health Policy and Guidelines for Health Care Waste Management, 2006

Ghana medical waste which is potentially hazardous in nature ends up in the municipal waste system.

The Health Care Waste Management Policy, 2006 explains the stages in Health Care Waste Management (HCWM) as involving production of waste, segregation of the waste, internal storage (in the wards and other departments), packaging/labelling and internal transportation to an external storage site, i.e. transit storage site such as an on-site central storage point³⁶. However, a recent performance audit of HCW in Ghana found that Health Care Facilities (HCFs) do not adhere to the segregation schemes outlined in the policy and poorly store the waste, which potentially exposes clients and health care workers to the risk of infections due to possible direct hand contact with the waste bins³⁷.

The audit found further that HCW was poorly treated before disposal because, for instance, infectious HCW was disposed directly into waste bins without any form of treatment at the various generation centres. Again, data on waste management was unavailable and monitoring and evaluation was inadequate, making it difficult for the Regional Directorates to identify lapses and rectify them³⁸.

A project concept has been developed to address Municipal Solid Waste as a whole, which the TWG believe will also deal with the medical wastes which they can contain.

HPAP Priority Pollution Sectors

The TWG decided to focus the in-depth work of the HPAP process on the following three issues:

1. Municipal Waste Management
2. Industrial Pollution
3. Toxic Pollutants of all forms at contaminated sites

PRIORITY ISSUE 1: POLLUTION FROM MUNICIPAL SOLID WASTE

Sources and characteristics

Municipal solid waste in Ghana is typically an unsegregated mixture of food waste, health care or medical waste (both hazardous and non-hazardous), e-waste, plastics, agricultural waste, and other forms of hazardous and non-hazardous waste materials, generated by both private and commercial activities.

36 M.O.H., 2006. *Health Care Waste Management Policy*, Ministry Of Health Policy and Guidelines for Health Institutions, March 2006

37 G.A.S., 2018. Performance Audit Report Of The Auditor On Management Of Health Care Waste In Ghana, Ghana Audit Service, website: www.ghaudit.org

38 Ibid 37.

Approximately 13,000 tons³⁹ of these wastes are generated every day, out of which an estimated 22%⁴⁰ is left uncollected and untreated within communities; including in drains, at street corners, in the underbrush and in uncompleted structures. Accra generates about 3,000 tons/day while Kumasi generates about 2,000 tons/day.

According to the MTNDPF (2018-2021), solid waste management remains inadequate in many places, with the proportion of solid waste properly disposed of having declined from 79% in 2014 to 70% in 2016. Among the key challenges outlined by the framework are:

- a. Limited capacity at the MMDA level to plan and manage sanitation services;
- b. Poor solid waste collection services;
- c. Poorly managed solid waste disposal sites;
- d. Low levels of material reuse and recycling;
- e. Poor waste disposal practices;
- f. High user fees for sanitation services;
- g. Poor hygiene practices;
- h. Inadequate hygiene education;
- i. Weak policy and institutional coordination.

The main challenge facing the effort to control environmental pollution from solid wastes is the weak institutional capacity for environmental management. This leads to ineffective enforcement of regulations; poor coordination among the key government institutions responsible for the sector; poor waste management practices; inability to sustain implementation of interventions from lack of the necessary financial and technological resources. Poor practices on the part of the population worsen the situation, with people engaging in open burning of all forms of waste and in some instances, creating illegal dumpsites.

39 Samwine T., Wu P., Lezhong Xu, Shen Y., Appiah M.E., Yaoqi W. 2017. Challenges and Prospects of Solid Waste Management in Ghana. *International Journal of Environmental Monitoring and Analysis*. Vol. 5, No. 4, 2017, pp. 96-102. doi: 10.11648/j.ijema.20170504.11.

40 Akufo-Addo, N. A. D., 2017. The Coordinated Programme of Economic and Social Development Policies (2017-2024): An Agenda for Jobs: Creating Prosperity and Equal Opportunity for All, presented by Nana Addo Dankwa Akufo-Addo, President of the Republic to the 7th Parliament of the 4th Republic, 20th October 2017.

Burden of disease from municipal solid waste

The poor management of plastic and e-waste is perhaps one of the most serious environmental pollution issues confronting the country. The negative impact of plastics on terrestrial, aquatic and marine ecosystems is evident in the form of litter⁴¹. Burning e-waste to extract materials for recycling exposes those who do it and nearby communities to toxic fumes and chemicals. Other health-related impacts from the poor management of municipal wastes come from leachate which drains from poorly managed landfills and other waste dumps to contaminate streams and other water bodies which are used for cooking, washing and drinking as well as for growing food and for grazing animals. Exposure to air pollution caused by the indiscriminate burning of all types of wastes as a way of destroying them, which leads to inter alia respiratory ailments; the proliferation of vermin which feed on wastes and are vectors of diseases such as cholera. Various other environmental impacts are caused by the poor management of solid wastes. Solid waste is a large source of methane, a powerful GHG that is particularly impactful in the short-term. In Ghana the waste sector contributes 13% of greenhouse gas emissions⁴². Locally, uncollected solid waste contributes to flooding, by blocking drains and waterways. Plastic waste has been the cause of deaths in farm animals, which ingest the plastic.

Table 2: National Data on Diseases Caused by Unsanitary Conditions

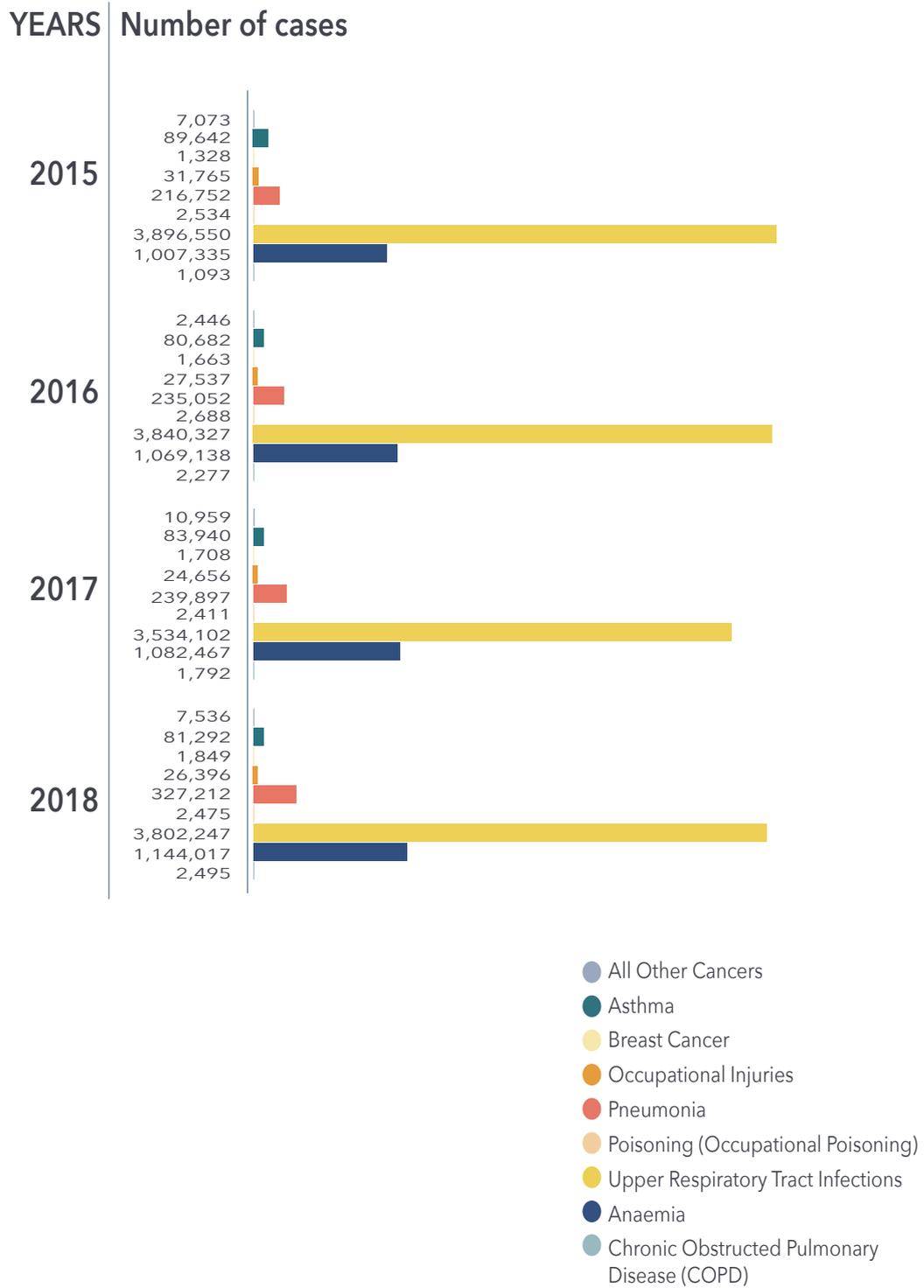
Year	Cholera			Diarrhoea with blood (Shigella)			
	Cases	Lab confirmed cases	Deaths	Cases	Lab confirmed cases	Deaths	
2015	767	138	12	15,593	907	36	
2016	897	340		14,348	1,117	10	
2017	57	11	1	11,457	640	20	
2018	36	9		11,553	785	21	
Year	Typhoid Fever			Acute watery diarrhoea			
	in < 5 years			in > 5 years			
	Cases	Lab confirmed cases	Deaths	Cases	Deaths	Cases	Deaths
2015	337,120	28,679	91	152,738	67	147,784	113
2016	384,704	33,158	183	164,853	151	159,018	129
2017	365,148	30,713	679	173,441	92	156,034	110
2018	398,102	52,094	1,025	187,704	307	179,812	204

Source: DHIMS2 (2018)

41 Akufo-Addo, N. A. D., 2017. "The Coordinated Programme of Economic and Social Development Policies (2017-2024): An Agenda for Jobs: Creating Prosperity and Equal Opportunity for All", presented by Nana Addo Dankwa Akufo-Addo, President of the Republic to the 7th Parliament of the 4th Republic, 20th October 2017.

42 Ibid 41.

Figure 8: Four-year data on respiratory disease, poisoning and occupational injuries



Source: DHIMS2, (2018)

Roles and responsibilities in addressing municipal solid waste

Institution	Responsibility
Ministry of Sanitation and Water Resources (MSWR)	<ul style="list-style-type: none"> Creation of sector strategic policies and plans for the enhancement of MSW management. Creation of sector strategic programmes and partnerships.
MLGRD	<ul style="list-style-type: none"> Policy support to enhance MMDAs' capacities for MSW management.
MMDAs	<ul style="list-style-type: none"> Issuance of permits for physical developments including MSW Collection and disposal of waste Abatement of nuisance-causing conduct such as open burning and indiscriminate disposal, through enforcement of by-laws or by use of the courts (especially sanitation courts). Spatial planning and amenity siting including designation of waste disposal and landfill sites Land use plan and approval of development plan
Ministry of Environment, Science, Technology and Innovation (MESTI)	<ul style="list-style-type: none"> Provision of policy support to enhance hazardous waste management.
EPA	<ul style="list-style-type: none"> Enforcement of environmental regulations and standards Issuance of permits and environmental performance monitoring Regulatory and technical support to MMDAs through issuance of guidelines and standards.
Ghana Statistical Service (GSS)	<ul style="list-style-type: none"> Provision of reliable data for decision-making and change monitoring.
Water Resources Commission	<ul style="list-style-type: none"> Regulatory and technical support to MMDAs through issuance of guidelines and standards. Enforcement of water regulations and standards
Factory inspectors	<ul style="list-style-type: none"> Promotion of good industrial housekeeping and waste management practices Enforcement of occupational health and safety standards regarding waste management
Ghana Health Service	<ul style="list-style-type: none"> Health education of the general public
CSIR	<ul style="list-style-type: none"> Research into how to put into practice MSW management strategies such as MiNT and into alternatives approaches Training of MMDAs and service providers on effective MSW approaches
Academia	<ul style="list-style-type: none"> Research into how to put into practice MSW management strategies such as MiNT and into alternatives approaches
Law Courts	<ul style="list-style-type: none"> Express adjudication of sanitation offenses Punishment of sanitation offenders
Private Service providers	<ul style="list-style-type: none"> Timely MSW collection and disposal
CSOs	<ul style="list-style-type: none"> Advocacy for MSW policy and regulatory environment improvements Innovation on solutions for addressing MSW management challenges

Actions taken to date to address municipal solid waste

1. “Let’s keep Ghana clean: Play your part”

This campaign was launched by the president Nana Addo Dankwa Akufo Addo in November 2017. It aims to create public awareness and mobilize practical actions for addressing the problems of the sanitation sector in Ghana. Among the interventions to be implemented under this campaign are:

- a. A re-zoning of concessions for environmental service providers.
- b. Construction of mini-transfer stations to facilitate the rapid collection and transportation of waste from cities.
- c. Equipping of tricycle operators.
- d. Deployment of automatic sweepers in main streets.
- e. Deployment of sanitation brigade personnel along the streets in major cities.
- f. Assignment of two officers in all MDAs, including the presidency, as Sanitation Marshals and Deputy Marshals to oversee compliance of their office and staff with the by-laws concerning sanitation in their respective offices.
- g. Access to credit facilities and tax incentives to enable environmental service providers to procure their needed logistics.
- h. Acquisition of three sites at Otinibi and Gbawe Mallam in the Greater Accra Region and Nsumia No. 3 in the Adoagyiri Municipality in the Eastern Region for integrated material recovery.

2. Draft National Plastics Management Policy

A plastics management policy has been drafted by MESTI. Among other things, it aims to support sustainable development, job creation, recycling and innovation. It hinges on reducing use, increasing reuse, and promoting replacement, such as replacement of plastic shopping bags by cotton materials or paper. It is also focusing on solutions such as progressive taxation and component disassembling services to ease material recovery and recycling. Furthermore, the policy is expected to have some strategic actions for behavioural change, planning collaborations, resource mobilization and governance. It will also set timelines for the achievement its goals.

3. Environmentally Sound Disposal and Recycling of Electronic Waste (E-Waste Programme)

This is a EUR 5 million project sponsored by the German Federal Ministry for Economic Cooperation and Development, facilitated by GIZ, and led by MESTI in partnership with EPA, the National Youth Authority, MLGRD, AMA, and the Greater

Accra Scrap Dealers Association. The broad objective of the project is to support MESTI in improving the conditions for sustainable management and disposal of e-waste in Ghana. Specifically, it aims at improving the political conditions at the macro level to create the appropriate legal and administrative basis for the proper collection and recycling of e-waste. It also aims to develop and introduce sustainable business models at the meso-level to initiate the establishment of a sustainable e-waste recycling industry. It further seeks to develop the capacities of the actors in the informal sector for appropriate management of the e-waste so as to enable them to avoid the health and environmental risks. Finally, the project intends to undertake the cross-cutting tasks of multi-stakeholder dialogue, communication and networking.

4. Ghana-Wide Multi Stakeholder “Waste” Resource Platform

The Ghana-wide multi-stakeholder waste resource platform is a UNDP-led initiative launched in 2018. The project aims first and foremost to create a multi-stakeholder platform to connect different stakeholders so as to facilitate resource recovery and exchange. The platform will be equipped with a number of complementary tools. Secondly, it intends to launch a business/project pitch competition where five innovative projects will be awarded seed capital to kick-start a positive-business-case for resource recovery businesses and/or a project to take waste recovery forward.

5. E-waste Management in Ghana (E-MAGIN Ghana)

E-MAGIN Ghana is a four-year (2018-2022), 1.2 million Euros project funded by the European Union and implemented by a consortium led by the University of Cape Coast (UCC) in partnership with the Ghana National Cleaner Production Centre (GNPCPC), City Waste Recycling Company Limited in Ghana, and Adelphi in Germany.

The project is being implemented across eight target regions, namely Greater Accra, Ashanti, Brong Ahafo, Western, Eastern, Central, Northern and Volta Regions. It aims to contribute to the effective implementation of the Hazardous and Electronic Waste Control and Management Act, 2016 (Act 917) and the Hazardous and Electronic Waste Control and Management Regulations (LI 2250) by fostering the formalization of informal Micro, Small and Medium-sized Enterprises (MSMEs), establishing a collection mechanism for e-waste, disseminating best practices through capacity-building, training of trainers, providing decision support and creating awareness among a wide range of stakeholders.

Additional proposed actions on municipal solid waste management during project consultations

The following additional actions on municipal solid waste management were proposed by various stakeholders during the project’s consultation activities, although they have not been included in the project proposals prepared as part of the HPAP process:

1. Provide public education and awareness on the effects of poor MSWM practices on health;
2. Promote waste-to-energy technologies;
3. Enhance law enforcement including enforcement of laws and regulations on the import and use of hazardous waste;
4. Review, gazette, and enforce MMDA by-laws on sanitation;
5. Develop innovative financing mechanisms and scale up investments in the sanitation sector;
6. Promote private sector participation in the provision of sanitation services;
7. Improve institutional capacity and coordination;
8. Create more waste transfer stations for handling waste;
9. Improve the management of Health Care Waste
10. Improve the management of waste disposal sites;
11. Create more engineered landfill sites and address the challenges of the Tema and Kumasi landfills;
12. Undertake a scientific assessment of the environmental and human health impact of e-waste management in Ghana.

Further details on the proposals above are provided in Annex 5.

Project proposals

A project proposal was developed for a project that pilots a value-chain based, community-led waste management system in the Kumasi Metropolis to create value from waste and address pollution from the Municipal Solid Waste. It will also engage stakeholders at all levels to sharpen and refocus the national Material in Transition (MiNT) strategy for waste management and other related policies:

Issues	Suggested Project Activities
<ul style="list-style-type: none"> ▪ Lack of adequate awareness on MiNT strategy ▪ Lack of incentive for waste segregation. 	<ul style="list-style-type: none"> ▪ Organise awareness-raising and training programmes for communities, implementing partners and policymakers ▪ Set up the collection points in remote communities for plastic, rubber, paper ▪ Install small-sized composting facilities and provide technical assistance to operate the facilities

Issues	Suggested Project Activities
<ul style="list-style-type: none"> ▪ Poor technical capacity for landfill management 	<ul style="list-style-type: none"> ▪ Provide on-site training on landfill operations including health and safety ▪ Monitor the water quality of the Oda Stream ▪ Provide assistance for formal establishment of the Association of Waste Recyclers, with a clear statement of purpose to attract more recyclers to join

PRIORITY ISSUE 2: POLLUTION FROM MANUFACTURING ACTIVITIES

Sources and characteristics

Like all economies worldwide, Ghana considers its industrial sector as the engine for economic growth. In line with this philosophy, the government has since 2017 embarked on a massive industrialization drive codenamed One District, One Factory (1D1F), with a view to enhancing value addition, generating jobs, and creating wealth so as to shore up the country's economic prospects.

Over the past few years, however, the contribution of the manufacturing sector to GDP has been declining. For instance, it declined from 10.2% in 2006 to 4.6% in 2016 while provisional figures for 2017 show a further decline to 4.5%. This has been attributed to a number of reasons including the use of obsolete production technologies, over-staffing, and limited skills. These challenges are coupled with an inefficient use of energy and a lack of support for the manufacturers to invest in cleaner technologies⁴³.

According to the MTNDPF, the industrial sector of Ghana has been identified as a major source of pollution for water bodies, air, and land stemming from their constant release of solid, liquid and gaseous waste into the environment. The country's main lagoons along the coast have been especially impacted. While comprehensive data on the level of pollution of these lagoons remain unavailable, initial findings are that they are grossly polluted with very high loads of biochemical, bacteriological, and nutrient matter, due to the location of several manufacturing industries, including fish canning, food processing, an oil refinery, textiles, metals and chemical industries in the catchment areas of these lagoons.

For monitoring purposes, the Environmental Quality Unit of the EPA groups the industrial sector in Ghana into Pharmaceutical Industry, Paint and Chemical Industry, Dairy industries, Alcoholic and Non-Alcoholic Beverage Industry, Textile Industry, Oil and Fat Processing Industries, Crude Oil Industries, and General Industry. According to the EPA's 2017 annual report, all but a few of the industrial groups monitored recorded effluent concentrations which exceeded the EPA guidelines. For instance, the report states that generally, the effluent

43 Kofi O. Nti, 2015, *Diagnostic study of light manufacturing in Ghana*

quality of the textile industry was unsatisfactory. The measured concentrations of key parameters including pH, BOD, COD, TSS, total phosphorus, TDS, colour, turbidity, nitrate-nitrogen, sulphide, chloride, chromium (VI), and conductivity were higher than their EPA recommended guidelines levels.

Roles and responsibilities in addressing pollution from manufacturing activities

Institution	Responsibility
Ministry of Environment, Science, Technology and Innovation (MESTI)	<ul style="list-style-type: none"> ▪ Provision of sector policy direction ▪ Creation of strategic sector programmes and building strategic partnerships
Ministry of Sanitation and Water Resources (MSWR)	<ul style="list-style-type: none"> ▪ Provision of sector policy direction ▪ Creation of strategic sector programmes and building strategic partnerships
MLGRD	<ul style="list-style-type: none"> ▪ Policy support to enhance MMDAs' capacities for abatement of industrial pollution
MMDAs	<ul style="list-style-type: none"> ▪ Abatement of nuisance-causing conduct such as disposal of untreated waste or other emissions into water bodies by industries, through enforcement of by-laws or by use of courts (especially sanitation courts) ▪ Land use planning and approval of development plans
EPA	<ul style="list-style-type: none"> ▪ Issuance of environmental permits as per EAR 1999 (LI 1652) ▪ Industrial environmental performance monitoring (e.g. effluents monitoring) ▪ Enforcement of environmental permit conditions, standards and regulations. ▪ Technical support to industries for the improvement of environmental performance through training on guidelines and standards and regulations. ▪ Provision of incentive schemes such as AKOBEN to motivate industries to improve their performance
Ghana Statistical Service (GSS)	<ul style="list-style-type: none"> ▪ Provision of reliable industrial performance data to enhance decision-making and change monitoring
Water Resources Commission	<ul style="list-style-type: none"> ▪ Enforcement of water regulations and standards
Factories Inspectorate	<ul style="list-style-type: none"> ▪ Promotion of good industrial housekeeping and waste management practices ▪ Enforcement of occupational health and safety standards regarding discharges
Ghana Health Service	<ul style="list-style-type: none"> ▪ Public health data collection and dissemination to support and enhance decision making ▪ Health education

Institution	Responsibility
CSIR	<ul style="list-style-type: none"> ▪ Research into industrial emissions control and management strategies such as waste-to-energy, waste stock exchanges, and other alternatives ▪ Research into industrial resource efficiency and cleaner production strategies ▪ Provision of training in resource efficiency and cleaner production technologies
Academia	<ul style="list-style-type: none"> ▪ Research into industrial emissions control and management strategies such as waste-to-energy, waste stock exchanges, and other alternatives ▪ Research into industrial resource efficiency and cleaner production strategies ▪ Provision of training in resource efficiency and cleaner production technologies
Law Courts	<ul style="list-style-type: none"> ▪ Express adjudication of industrial sanitation offenses ▪ Punishment of industrial sanitation offenders
Ghana Cleaner Production Centre (GNCPC)	<ul style="list-style-type: none"> ▪ Provision of training and guidance in resource efficiency and cleaner production practices and technologies
CSOs	<ul style="list-style-type: none"> ▪ Advocacy for industrial environmental policy and regulatory environment improvements ▪ Innovation of solutions for addressing industrial pollution challenges ▪ Naming and shaming of poor industrial performance and playing a watchdog role over the law enforcement agencies such as EPA
MOTI	<ul style="list-style-type: none"> ▪ Development of clean industrial production policies in collaboration with other ministries and promotion of industrial sectors
Standards Authority	Provision of standards

Actions taken to date to address Pollution from Manufacturing Activities

Partnership for Action on Green Economy

The Partnership for Action on Green Economy (PAGE) programme is a 7-year programme jointly implemented by ILO, UNDP, UNEP, UNIDO, and UNITAR. The programme's main objective is to create enabling conditions for national inclusive green economies. The specific objectives are to catalyse the formulation and adoption of green economy policies; implement green economy, including green industry initiatives at the national/sectoral level; and develop individual and institutional capacities to ensure long term sustainability. The project is, among others, promoting and building national institutional capacity in resource efficiency and cleaner production.

Additional proposed actions on pollution from manufacturing during project consultations

The following additional actions on pollution from manufacturing activities were proposed by various stakeholders during the project's consultation activities, although they have not been included in the project proposals prepared as part of the HPAP process:

1. Monitor industrial effluents and apply sanctions on defaulting companies.
2. Promote cleaner production and consumption technologies and practices.
3. Develop an Oil and Gas environment policy.
4. Promote industrial symbiosis through an industrial waste exchange programme.

Further details are provided in Annex 5.

Project proposal

A project proposal was developed for a project to support the industries within the Chemu lagoon catchment area by enhancing their operational productivity with RECP application, while at the same time reducing their impacts on the Chemu Lagoon and on other environmental media.

Issues	Suggested Project Activities
<ul style="list-style-type: none"> ▪ Lack of comprehensive national RECP policy ▪ Poor institutional capacity in RECP ▪ Lack of financial mechanisms for technology transformation 	<ul style="list-style-type: none"> ▪ Develop a draft of an upgraded RECP policy and strategies for review by stakeholders and set targets for reduction in energy, water, raw materials and other resources, by sub-sectors ▪ Create national level awareness for the upgraded RECP policy and strategies ▪ Mainstream the RECP policy and strategies into the operations and guidelines of regulatory bodies ▪ Train national RECP experts to enable them offer RECP-related services required by enterprises and other organizations ▪ Identify and recommend RECP incentives (subsidies, tax relief) for adoption by government ▪ Establish procedures for technology assessment

PRIORITY ISSUE 3: POLLUTION FROM CONTAMINATED SITES

Sources and characteristics

In Ghana, both the formal and informal sectors discharge various forms of pollutants into the environment, sometimes knowingly and in some instances unknowingly. The artisanal and small-scale mining (ASM) sector, for instance, releases tons of heavy metals and other toxic chemicals, while automobile repair shops spill spent engine oils containing cadmium, chromium and other hazardous components into the environment on a daily basis. The agricultural sector is also faced with the challenge of indiscriminate handling and use of pesticides, which is contaminating agricultural lands. The findings of the TSIP project indicate that in many cases workers and the people living in the adjoining communities, including children may be exposed to such pollutants without knowing it.

Burden of disease from pollution at contaminated sites

Widespread pollution may lead to adverse health effects, including damage to the brain, lungs, and other organ systems, for large numbers of people⁴⁴. These impacts may result in direct medical costs, opportunity costs reflecting the diminished productivity of populations damaged by pollution, and costs to health care systems⁴⁵.

In spite of these facts, pollution of various forms as sources of disease and public health concern has particularly been overlooked in both the international development and the global health agendas⁴⁶ due in part to the fragmentation of the sources of pollution into soil, air and water and also due to the difficulty of attributing a particular health condition to exposure to a particular pollutant.

Data on burden of diseases of contaminated sites is therefore scarce. However, data from the GHS DHIMS2 suggests that cases of occupational poisoning annually hovers around 2,500 annually; many of these could be due to informal work in contaminated sites. In addition, cancers, aside the commonly known cancers averaged 5,500 cases per annum, with the highest figure of 10,900 recorded in 2017.

44 Suk, W. A., Ahanchian, H., Asante, K. A., Carpenter, D.O., Diaz-Barriga, F., Ha E., Huo, X., King M., Ruchirawat, M. da Silva, E. R., Sly, L. Sly, P. D., Stein, R. T., van den Berg, M. Zar, H., and P. J. Landrigan; (2016) *Environmental Pollution: An Under-recognized Threat to Children's Health, Especially in Low- and Middle-Income Countries Environmental Health Perspectives*, volume 124, number 3, March 2016 • <http://dx.doi.org/10.1289/ehp.1510517>. Date accessed: 4th November 2018.

45 Ibid 44

46 [https://www.thelancet.com/pdfs/journals/lancet/PIIS0140-6736\(17\)32345-0.pdf?code=lancet-site](https://www.thelancet.com/pdfs/journals/lancet/PIIS0140-6736(17)32345-0.pdf?code=lancet-site) free account registration required.

Table 3: National Data on Occupational poisoning and Cancers

All Other Cancers	7,073	2,446	10,959	7,536
YEARS	2015	2016	2017	2018
Poisoning (Occupational Poisoning)	2,534	2,688	2,411	2,475

Roles and responsibilities in addressing pollution at contaminated sites

Institution	Responsibility
Ministry of Environment, Science, Technology and Innovation (MESTI)	<ul style="list-style-type: none"> Provision of sector policy direction for addressing pollution. Creation of strategic sector programmes and building strategic partnerships
Ministry of Sanitation and Water Resources (MSWR)	<ul style="list-style-type: none"> Providing policy support to efforts by MESTI for combating pollution
MLGRD	<ul style="list-style-type: none"> Policy support to enhance MMDAs' capacities for abatement of all forms of pollution
MMDAs	<ul style="list-style-type: none"> Abatement of nuisance-causing conduct with potential to cause pollution Land use planning and approval of development plans
EPA	<ul style="list-style-type: none"> Issuance of environmental permits as per EAR 1999 (LI 1652) Industrial environmental performance monitoring (e.g. effluents monitoring) Enforcement of environmental permit conditions, standards and regulations. Technical support to SMEs for the improvement of their environmental performance through training on guidelines and standards and regulations. Provision of incentive schemes such as AKOBEN to motivate industries to improve their performance
Ghana Statistical Service (GSS)	<ul style="list-style-type: none"> Provision of reliable industrial performance data to enhance decision-making and change monitoring.
Water Resources Commission	<ul style="list-style-type: none"> Enforcement of water regulations and standards
Factories Inspectorate	<ul style="list-style-type: none"> Promotion of good industrial housekeeping and waste management practices Enforcement of occupational health and safety standards regarding discharges

Institution	Responsibility
Ghana Health Service	<ul style="list-style-type: none"> Public health data collection and dissemination to support and enhance decision making Health education
CSIR	<ul style="list-style-type: none"> Research into industrial emissions control and management strategies Provision of training in resource efficiency and cleaner production technologies
Academia	<ul style="list-style-type: none"> Research into industrial emissions control and management strategies Research into the activities of SMEs Provision of training to SMEs
Law Courts	<ul style="list-style-type: none"> Express adjudication of sanitation offenses Punishment of sanitation offenders
CSOs	<ul style="list-style-type: none"> Advocacy for industrial environmental policy and regulatory environment improvements. Innovation on solutions for addressing pollution challenges Playing a watchdog role over the law enforcement agencies such as EPA
MOTI	<ul style="list-style-type: none"> Development of clean industrial production policies in collaboration with other ministries and promotion of industrial sectors

Actions taken to date to address pollution at contaminated sites

Intervention by Pure Earth

Since 2012, Pure Earth has been working in Agbogbloshie with the support of local government officials and the Ghana Health Service to investigate reports of pollution at the site and to train local recyclers on methods to prevent lead and toxics pollution.

First, an assessment of the health status and effects of exposure to chemicals was undertaken as a collaborative effort by Pure Earth, GHS, EPA, and a team from Hunters College, New York, to determine exposure levels of chemicals. The study was an exploratory cross-sectional one in which air and soil samples were collected and analysed at two sites in Accra: Agbogbloshie, where e-waste dumping and recycling activities occur, and the Makola market which is generally free of such activities.

A pilot project intervention was subsequently undertaken to eliminate burning from the material processing, formalise the business operations at Agbogbloshie; and enhance the value of metal recovery. The specific activities undertaken included provision of technical training for the recyclers on the use of the wire-stripping machines, awareness-raising on the negative impacts of burning, construction and piloting of a movable wire-stripping unit, and installation of perimeter fencing.

Through the education initiatives, workers have begun to understand the risks of their activities. Various improvements to wire stripping operations have given them an alternative method to strip wires instead of burning them. While the hand strippers initially introduced were a necessary first step to changing recyclers' behaviour, the construction of a movable/mechanized unit proved to be a better alternative for copper recovery and to reduce exposure risks.

Additional proposed actions for pollution at contaminated sites during project consultations

The following additional actions for addressing pollution at contaminated sites were proposed by various stakeholders during the project's consultation activities, although they have not been included in the project proposals prepared as part of the HPAP process:

1. Enforce national laws and regulations on the import of hazardous and other waste in line with the Basel Convention.
2. Improve management of waste disposal sites to control greenhouse gas emissions (GHGs).
3. Monitor and prevent imports of unregistered and banned chemicals.
4. Intensify enforcement of regulations on noise and air pollution, including from open burning.
5. Enforce environmentally sound management of chemicals and all waste throughout their life cycle.
6. Implement mercury control and management programmes to fulfil Ghana's obligations under the Minamata Convention.
7. Implement air pollution control and management programmes to abate the health impacts of indoor and outdoor air pollution.

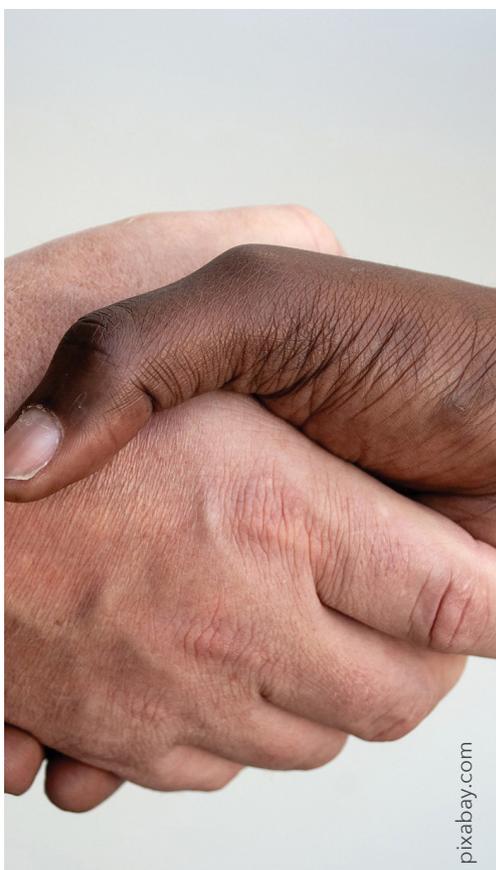
Further details are provided in Annex 5.

Project proposal

A project proposal was developed for a project to expanding the TSIP by updating the existing database as well as identifying and screening additional sites. It will also generate a national pollution map and pilot remediation of selected contaminated sites.

Issues	Suggested Project Activities
<ul style="list-style-type: none"> ▪ Inadequate national database on contaminated sites ▪ Lack of awareness on toxic pollution and its health and environmental impacts ▪ Inadequate national capacity for clean-up of contaminated sites 	<ul style="list-style-type: none"> ▪ Review, update and validate existing pollution database ▪ Sample and assess various media (soil, water, etc) at new contaminated sites across Ghana ▪ Develop Information, Education and Communication (IEC) materials to build consensus on the need to prevent exposure to toxic chemicals ▪ Disseminate IEC materials to relevant stakeholders at national and local levels ▪ Establish criteria for selecting sites for clean up. ▪ Undertake clean-up at selected site(s) as pilot for national capacity building

POSSIBLE SUPPORT FROM GAHP MEMBERS AND DEVELOPMENT PARTNERS



While the achievement of HPAP goals relies primarily on the political will and actions of the government, some GAHP members and development partners may be willing to assist with the formulation of full proposals for funding based on the HPAP project proposals, to identify calls for proposals that match the proposed programmes, to provide technical advice on the design of nationally-funded activities, and to facilitate communications with development partners that may be able to provide financial support to programmes outlined in the HPAP. The specific role of GAHP members following the HPAP development process will depend on the requests of the government and on the interest and comparative advantage of relevant development partners.



PROJECT PROPOSALS

SUSTAINABLE WASTE MANAGEMENT PILOT IN KUMASI

PROJECT SUMMARY

In Ghana, Municipal Solid Waste (MSW) is not segregated. Food, medical, electronic and plastics waste end up in one waste stream. Though the local governments have oversight responsibility for waste management, they do not have the financial and technological capability to fully meet their obligations. 20-30%⁴⁸ of the national daily waste generation of 13,000 MT/day⁴⁹ is left uncollected and untreated within communities; including drains and street corners. While limited capacity exists for material

48 Desmond Appiah, Personal communication, Sustainability Manager, Accra Metropolitan Assembly, 16 November 2018.

49 Samwine T., Wu P., Lezhong Xu, Shen Y., Appiah M.E., Yaoqi W. 2017. *Challenges and Prospects of Solid Waste Management in Ghana*. International Journal of Environmental Monitoring and Analysis. Vol. 5, No. 4, 2017, pp. 96-102. doi: 10.11648/j.ijema.20170504.11.

Project title:	Sustainable Waste Management Pilot in Kumasi
Location(s):	Kumasi, Ashanti Region
Planned start date:	January 2020, subject to availability of funding
Duration:	3 years
Government coordinating agency and partner agencies	Kumasi Metropolitan Assembly, in partnership with Ministry of Local Government and Rural Development, Ministry of Sanitation and Water Resources, Ministry of Environment Science Technology and Innovation, and a technical assistance provider, e.g. UNIDO ⁴⁷
Budget (in EUR):	2,601,000 EUR

47 Subject to availability of funding.

AS WITH OTHER MUNICIPAL, METROPOLITAN AND DISTRICT ASSEMBLIES (MMDAs), THE KUMASI METROPOLIS, FORMERLY KNOWN AS THE GARDEN CITY, PRODUCES BETWEEN 1,500 AND 2,000 MT OF WASTE DAILY.

recovery and recycling, engineered municipal landfills are underfunded and poorly managed. People therefore engage in open burning of all forms of waste and in some instances create illegal dumpsites. This situation results in poor public health outcomes notable among which is cholera outbreaks.

As with other Municipal, Metropolitan and District Assemblies (MMDAs), the Kumasi Metropolis, formerly known as the garden city, produces between 1,500 and 2,000 MT of waste daily. Of this amount, approximately 1,200 to 1,300 MT is disposed of at the Metropolis's sole, poorly managed, Oti landfill. The Metropolis owes over GHC 70 million to its landfill management company due to its inability to raise enough revenue to settle its debt. Plans are underway to generate energy from the landfill but have yet to materialize⁵⁰.

50 Osei Asibey, Personal Communication, Deputy Director, Waste Management Department, Kumasi Metropolitan Assembly, 12th November 2018.

Project will be implemented in Kumasi to serve as a pilot for national roll-out of successful results.

In addition to engaging relevant stakeholders from Kumasi, this project will engage national level stakeholders in sharpening and refocusing the national Material in Transition (MiNT) strategy for waste management and other related policies. It will also pilot a value-chain based, community-led waste management system in the Kumasi Metropolis to create value from waste and address pollution from the Municipal Solid Waste.

RELEVANT BACKGROUND

Introduction

Proper waste management is an important part of the urban infrastructure as it ensures the protection of human health and the environment⁵¹. The rapid increase in human population, along with its associated increases in urbanization and economic activities, has made the negative impact of solid waste management very noticeable in towns and cities around the world⁵².

Like many developing countries, Ghana continues to struggle with the management of the increasing amounts and complexity of the solid waste mix as it threads the path of economic development and urbanization.

Presently, Ghana generates about 13,000 MT of solid waste daily⁵³. Of this amount, it is estimated that 22%⁵⁴ is not disposed of properly. The 2010 Housing and Population Census observed that in 9.1% of dwelling units, solid waste disposal was done indiscriminately and the proportion of dwellings that burnt their solid waste had increased from 7.8% in 2000 to 10.7% in 2010⁵⁵. This has led to the practice of uncontrolled dumping of solid waste in open spaces. Among other things, this constantly blocks both primary and secondary drainage networks. Consequently, many cities and towns experience annual flooding during the rainy season. The most tragic was in June 2015 when flooding in Accra, the capital city, led to an explosion at a fuel station killing about 150 people and injuring approximately 60 persons⁵⁶. During similar floods in 2016, plastic waste

51 ISWA and UNEP, 2002.

52 Douti, N.B., Ab-anyie, S.K. and Ampofo, S. (2017) *Solid Waste Management Challenges in Urban Areas of Ghana: A Case Study of Bawku Municipality*. International Journal of Geosciences, 8, 494-513.

<https://doi.org/10.4236/ijg.2017.84026>

53 Desmond Appiah, Personal communication, Sustainability Manager, Accra Metropolitan Assembly, 16 November 2018.

54 Akufo-Addo, N. A. D., 2017. The Coordinated Programme of Economic and Social Development Policies (2017-2024): *An Agenda for Jobs: Creating Prosperity and Equal Opportunity for All*, presented by Nana Addo Dankwa Akufo-Addo, President of the Republic to the 7th Parliament of the 4th Republic, 20th October 2017.

55 GSS, 2010. Population and Housing Census, 2010

56 UNCT Ghana, 2015. Ghana - Floods Situation Report, UNCT Humanitarian Support Unit in Ghana. June 08, 2015.

covered the surface of the floods⁵⁷. Moreover, the dump sites, which are normally located in close proximity to residential facilities, result in the constant outbreaks of cholera, acute respiratory infections and malaria, etc.

Ghana has a comprehensive list of policies, laws and strategies governing municipal waste management. Notable among them are the national environmental Policy 1999, revised in 2000 and in 2010, the National water policy 2007, The National Environmental Policy 2012, the Public Health Act 2012 (Act 851), and the Local Governance Act 2016 (Act 936). Unfortunately, many of the policies and laws are barely implemented.

The MMDAs are mandated under the local Governance Act 2016 (Act 936) and other related laws to implement the policies and strategies and enforce the laws on sanitation and environmental health. Metropolitan and Municipal Assemblies (MMAs), which are responsible for large urban areas, have set up Waste Management Departments. All MMDAs usually have Environmental Health Units⁵⁸.

In 2010, the National Environmental Sanitation Strategy and Action Plan (NESSAP) was prepared as a logical follow-up to the revision of the Environmental Sanitation Policy (1999) within the new framework of national planning that required comprehensive sector policies and strategic plans and investment costs⁵⁹. The NESSAP introduced the concept of waste as Materials in Transition (MiNT) and facilitated the development of District Environmental Sanitation Strategy and Action Plans (DESSAPs). MiNT was about raising awareness for changing the sanitation behaviour of people by changing attitudes towards all types of wastes as life-styles and waste streams underwent inevitable change⁶⁰.

In an attempt to fulfil their responsibility and, in particular, to respond to the proposals of the NESSAP, which among others included the establishment of sanitation courts, the Accra Metropolitan Assembly (AMA) established sanitation courts⁶¹ in September 2010 for the express hearing of sanitation offences and to prosecute sanitation offences as a deterrent to irresponsible environmental sanitation behaviour. Other city authorities such as the Kumasi Metropolitan Authority (KMA) have also begun the process of setting up ⁶² a similar court. It is, however, unclear whether the ones established by the AMA have achieved

57 Myjoyonline, 2016. 30 dramatic photos as Accra sinks in floods again <https://www.myjoyonline.com/news/2016/June-9th/30-dramatic-photos-as-accra-sinks-in-floods-again.php>.

58 USRI, 2017. Urban Sanitation Research Initiative 2017-2020. Driving sector change in urban sanitation, Urban Sanitation Research Initiative. Water and Sanitation for the Urban Poor.

59 MLGRD, 2010, NESSAP, <https://www.ircwash.org/sites/default/files/MLGRD-2010-National.pdf>

60 Ibid 58.

61 GNA, 2010. First sanitation and motor courts inaugurated. <http://ghananewsagency.org/human-interest/first-sanitation-andmotor-courts-inaugurated-20284>

62 <http://www.ghananewsagency.org/social/kma-to-set-up-sanitation-court-141350>

their objective of enhancing enforcement, in their bid to keep the city clean⁶³. More broadly, even though several national policies, strategies and laws exist, it is not clear how they are being coordinated and what results they are achieving. For instance, after several years of implementing the NESSAP, Ghana's waste management practices still fall at the bottom of the waste management pyramid, being largely disposal oriented.

In his medium term programme, the Coordinated Programme of Economic and Social Development Policies (2017-2024), presented to parliament in August 2017, the President stated that the menace of plastic and electronic waste is perhaps one of the most serious environmental pollution issues confronting the country and that its negative impact is evident on terrestrial, aquatic and marine ecosystems⁶⁴. Recent urban growth has averaged 3.5%, with some cities experiencing higher levels of growth (e.g., 4.8% in Kumasi)⁶⁵.

Waste Management in Kumasi

Kumasi, formerly known as the garden city of West Africa, has the highest population growth rate of the country. It is also the most populous city in Ghana, with a population of over 1.8 million as of 2013, followed by the capital Accra which at that time had a population of over 1.7 million⁶⁶. The waste management Department of the Kumasi Metropolitan Assembly has responsibility for waste management in the metropolis. Its vision is to make Kumasi one of the top five cleanest cities in Africa by 2025. However, progress on the ground has been slow and capacity development of stakeholders is clearly needed.

Kumasi is inundated by the challenges of its waste management sector. It generates 1,500-2,000 metric tonnes of waste daily. Although a number of companies have been contracted by the KMA to collect and dispose of the waste, their capacities seem to have been stretched to their limits as they are only able to collect an estimated 80% of the waste generated. The influx of tricycle operators otherwise known as "aboboyaa", which should have enhanced collection and disposal, seems instead to have compounded the problems. Many of the operators overload their tricycles, which leads to further littering of streets as they transport the waste and in the worse cases, the toppling over of the tricycles in the middle of busy streets.

63 GNA, 2010. First sanitation and motor courts inaugurated. <http://ghananewsagency.org/human-interest/first-sanitation-andmotor-courts-inaugurated-20284>

64 Akufo-Addo, N. A. D., 2017. The Coordinated Programme of Economic and Social Development Policies (2017-2024): *An Agenda for Jobs: Creating Prosperity and Equal Opportunity for All*, presented by Nana Addo Dankwa Akufo-Addo, President of the Republic to the 7th Parliament of the 4th Republic, 20th October 2017.

65 USRI, 2017. Urban Sanitation Research Initiative 2017-2020 Driving sector change in urban sanitation, Urban Sanitation Research Initiative. Water and Sanitation for the Urban Poor.

66 Ibid 64.

Since 2011, when the Duase and Ohwimase open dump sites were closed, the Oti Sanitary Landfill Site, located at Oti, near Dompooase, a suburb of the metropolis⁶⁷, has been the only final landfill for KMA. Approximately 1,200-1,300 MT of the total daily amount generated in the city is disposed of at the landfill. The KMA owes over GHC 70 million to its landfill management company - it has been unable to raise the needed revenue to settle this debt. In addition, the landfill is poorly controlled and managed. This has led to a situation where leachate flows freely into the nearby Oda stream, which is a source of water for farming, fishing and washing. Plans are underway to generate energy from the landfill but have yet to materialize⁶⁸.

Waste recovery in the Kumasi metropolis seems to be generally low. A 2014 study, which assessed the characteristics of diverted solid waste in Kumasi, concluded that an insignificant fraction of the total waste stream ending up at communal collection points was diverted for recycling and reuse purposes. It stated further that the diverted waste was largely comprised of plastics (50%) and metals (29%) due to readily available market for these fractions. Meanwhile, biodegradable fraction, which had the capacity to halve landfilled waste if diverted, had no market value in the study area. As a result, it was disposed of without being used⁶⁹. A private material recovery company, Kumasi Compost and Recycling Plant (KCARP), acquired over 100 acres of land for the construction of a material recovery plant at Adagya in the Bosomtwe District⁷⁰; construction has been ongoing since 2013. When KCARP comes into operation, the company should be capable of processing about 600 MT of mixed waste per day, separating the waste inputs into organics (for compost production), plastics (for secondary plastic pellets and products from recycled-plastics), metals, paper, etc.⁷¹. Even with the operation of this facility, KMA will still need a long-term MSW management strategy to cope with the rest of MSW waste the city generates.

Justification

The NESSAP of 2012 proposed a shift in both the philosophical and practical approaches to waste, considering it not as something that merely needs to be thrown away but as a resource which is only moving from one stage to another, in other words it is a Material in Transition (MiNT). Among other things, NESSAP identified waste segregation, reuse, recycling etc. as some of the practical means by which wastes can be dealt with to minimize their environmental impacts,

67 Osei Asibey, Personal Communication, Deputy Director, Waste Management Department, Kumasi Metropolitan Assembly, 12th November 2018.

68 Osei Asibey, Personal Communication, Deputy Director, Waste Management Department, Kumasi Metropolitan Assembly, 12th November 2018.

69 Adam Wahab, Sampson Oduro-Kwarteng, Isaac Monney, Prosper Kotoka. Characteristics of Diverted Solid Waste in Kumasi: A Ghanaian City. *American Journal of Environmental Protection*. Vol. 3, No. 5, 2014, pp. 225-231. doi: 10.11648/j.ajep.20140305.13

70 Mawutor K. Attah, Personal communication, Project Manager, Accra Compost and Recycling Plant, 13th November, 2018

71 Kumasi Compost and Recycling Plant Limited - KCARP, 2018, Company Profile document.

create “green jobs”, as well as reduce MMDAs’ cost for waste management⁷². Going by the MiNT approach the NESSAP aimed to prepare the grounds for achieving “total sanitation” as a logical next step beyond 2015⁷³.

While a number of achievements have been recorded by the NESSAP in general, uptake of the MiNT concept, which would have addressed the practical challenges of the increasing waste generation with its concomitant public health and financial burden, is still lagging. The volumes of waste fractions recovered from landfills remain insignificant while the volumes of waste indiscriminately disposed of continue to grow. The President also recognizes this situation, which he presented to Parliament in his 2017-2024 medium term programme as follows:

“The main challenges confronting sanitation improvement in the country include inadequate financing of sanitation; poor sanitation and waste management systems; inadequate policy and institutional coordination; high prevalence of open defecation; limited capacity at MMDA level to address sanitation concerns adequately; and ineffectiveness of environmental health officers⁷⁴”

The Government therefore recognizes that it is imperative for the stakeholders in the MSW management sector to evaluate the implementation of the NESSAP and draw the necessary lessons with which to retune the applicable national policies and laws so as to push the MiNT agenda for the benefit of the country.

By implication, the KMA, a critical element in the country’s MSW management because of the Metropolis’ large population and high population growth rate, will also be required to reassess its current waste management approach. Specifically, it could adopt the MiNT approach so as to reap the benefits locked up in the 1,200-1,300 MT of MSW received daily at the Oti landfill site. The key to any effective management of solid waste is the adoption of waste minimization efforts upstream of treatment and disposal, because this helps to reduce the amount of waste materials to be disposed of. Waste minimization includes:

- Preventing and/or reducing the generation of waste at source;
- Improving the quality of waste generated, such as reducing the hazard, and,
- Encouraging re-use, recycling and recovery⁷⁵.

72 MLGRD, 2010, NESSAP, <https://www.ircwash.org/sites/default/files/MLGRD-2010-National.pdf>

73 MLGRD, 2010, NESSAP, <https://www.ircwash.org/sites/default/files/MLGRD-2010-National.pdf>

74 Akufo-Addo, N. A. D., 2017. The Coordinated Programme of Economic and Social Development Policies (2017-2024): An Agenda for Jobs: Creating Prosperity and Equal Opportunity for All, presented by Nana Addo Dankwa Akufo-Addo, President of the Republic to the 7th Parliament of the 4th Republic, 20th October 2017.

75 Oteng Ababio 2014. Rethinking waste as a resource

The management of the Kumasi landfill also needs to be supported with technology and know-how to enable them to effectively execute their mandate in order to achieve the purpose for which the site was constructed. This will extend the life of the landfill and also curtail the contamination of the Oda stream by the leachate from the site. There is also the need to put into place a health monitoring regime for the people living in the Oti Township and other communities along the banks of the Oda stream.

Most importantly, to put into practice the sweeping proposal of adopting MiNT options, it is critical for the waste management sector's stakeholders, including Government, NGOs, research institutions and the private firms, to fashion out efficient management services which are not only environmentally friendly but also economically viable and socially acceptable⁷⁶. At the household level, there is a need for capacity-building on ways to reduce the amount of waste generated by recycling and re-using products⁷⁷.

PROJECT DESCRIPTION

A. *Project beneficiaries*

1. **Communities in the vicinity of the Oti landfill** will benefit in terms of reduced exposure to hazardous pollutants, reduced burden of diseases and the negative economic impact of the landfill.
2. **The Oti stream** will potentially benefit in terms of reduced pollution load.
3. **Government and its agencies at national and sub-national levels** including the Ministry of Sanitation and Water Resources (MSWR), Ministry of Local Government and Rural Development (MLGRD), Ministry of Environment, Science, Technology and Innovation (MESTI), The Kumasi Metropolitan Assembly, Environmental Protection Agency, Water Resources Commission, Ghana Health Service (GHS), National Development Planning Commission (NDPC), Water Resources Commission (WRC) among others, will benefit in terms of policy improvement and capacity enhancement.

B. *Overall project objective*

To contribute to sustainable municipal waste management in the Kumasi metropolis as a model for nationwide replication.

C. *Intervention strategy*

The main way the project aims to reduce pollution from Kumasi's MSW is through a city-wide adoption of the MiNT approach. It will do this in three ways.

76 Tchobanoglous G, Hilary H and Samuel V (1993), in Owusu-Sekyere E., Bagah, D. A. and J. Y. D. Quansah (2015). The Urban Solid Waste Management Conundrum in Ghana: Will It Ever End? *World Environment*, 5(2): 52-62 DOI: 10.5923/j.env.20150502.02

77 Oteng Ababio, 2014. Rethinking waste as a resource

Through education at all levels in the city, the project will promote a change of mind-set in the population, from simply seeing waste to seeing materials in transition. Part of this change of mind-set will be an emphasis on the material benefits which households, collectors, and recyclers can derive from turning waste into a Material in Transition. With this will come practical education on the behavioural changes required to turn MiNT into a reality. At the waste generator level (households and small businesses), the awareness on the need for waste separation at source will be increased and the tools with which to separate wastes at source will be made available. To aid in this, the project will test the use of financial incentives to encourage waste separation practices in selected communities. Along the rest of the chain, with training and coaching by international and national MSW experts, the necessary logistical, technological and technical capacities of the agents in the chain will be upgraded.

At the same time, to systematically boost more sustainable waste management practices along the whole chain, the project will establish better links between residents and other solid waste generators, and the waste collectors and transporters to ensure that the wastes separated at source get picked up separately and with the desired level of frequency. At the same time, better links will be established between collectors and transporters, recyclers (compost producers as well as other recyclers) and landfill operators to ensure that the separated materials reach the correct final destination. To aid in this and recognizing that the organic fraction of Kumasi's waste stream is very large, the project will support the establishment of small-sized composting facilities in remote communities. It will also establish an association for recyclers.

Finally, the project will facilitate a national dialogue to review and refocus policies and regulations governing MSW management to promote the adoption / putting into practice of the MiNT policy both nationally and in Kumasi.

Project Management and Stakeholder Involvement

The project will be managed by a project team the Kumasi Metropolitan Assembly (and relevant Departments) and the technical assistance provider, for instance, UNIDO subject to securing of funding. Partnerships with the Ministry of Local Government and Rural Development, Ministry of Sanitation and Water Resources, Ministry of Environment Science Technology and Innovation and Ghana Health Service, representatives of which will be invited to join the project's Steering Committee. Other relevant agencies may also be invited to the Steering Committee. The project team will be supported by a Steering Committee, which will have oversight responsibility for setting the strategic direction of the project with respect to the national and metropolitan policy priority areas and reviewing project performance and achievements periodically.

D. Implementation partnership(s)

Partner Institutions	Expected roles and responsibilities
Ghana Health Service	<ul style="list-style-type: none"> Baseline health data, Periodic community health monitoring, hospital records
Environmental Protection Agency (EPA)	<ul style="list-style-type: none"> Environmental quality monitoring Support the promotion of the MiNT policy Enforcement of environmental obligations of the industries
Kumasi Metropolitan Assembly	<ul style="list-style-type: none"> Enforce the Assembly's waste management by-laws
Min. of Local Government and Rural Development	<ul style="list-style-type: none"> Support the promotion of the MiNT policy in the KMA
Council for Scientific and Industrial Research -Soil and Water Research Institutes	<ul style="list-style-type: none"> Undertake continuous monitoring of the water quality of the Oda river
Ministry of Sanitation and water resources	<ul style="list-style-type: none"> Support the promotion of the MiNT policy in the KMA

E. Project outputs

To reach the objective via the implementation strategy, the following outputs will be reached:

1. An educational strategy and relative materials have been created
2. Awareness has been raised at community level and at all levels of education on the MiNT approach
3. Programmes to financially incentivize community-based waste separation practices have been tested and technical solutions for composting have been applied
4. Technical support for the proper management of the Oti landfill has been provided
5. An Association of Waste Recyclers has been established
6. National waste management policies, laws, and strategies have been assessed and refocused

F. Key project activities

Activities	Locations	Timing	Partners ⁷⁸
Output 1: An educational strategy and relative materials have been created			
1.1. Review the current waste management education programs, identify and agree on recommended actions	Accra and Kumasi	Q1, Y1 - Q3, Y1	MSWR, ML-GRD, KMA, EPA
1.2. Through improvement of existing materials or creation of new ones, design new MiNT programs and materials suitable for communities and students at all levels of education	Accra and Kumasi	Q2, Y1 - Q1, Y2	MSWR, ML-GRD, KMA, EPA
Output 2: Awareness has been raised at community level and at all levels of education on the MiNT approach			
2.1. Integrate and implement a newly-created MiNT programme at all educational levels	Kumasi	Q4, Y1 - Q4, Y2	MSWR, ML-GRD, KMA, EPA
2.2. Run awareness-raising and training programmes for communities, implementing partners and policymakers	Kumasi	Q4, Y1 - Q4, Y2	MSWR, ML-GRD, KMA, EPA
Output 3: Programmes to financially incentivize community-based waste separation practices have been tested and technical solutions for composting have been applied			
3.1. Test various incentive solutions (subsidies, vouchers, etc.) for waste separation at source in selected communities and evaluate the results	Communities in Kumasi	Q3, Y1 - Q2, Y3	KMA
3.2. Set up the collection points in remote communities for plastic, rubber, paper	Communities in Kumasi	Q3, Y1 - Q2, Y3	KMA
3.3. Install small-sized composting facilities and provide technical assistance to operate the facilities	Communities in Kumasi	Q1, Y2 - Q3, Y3	KMA, Gratis Foundation, Rural Technology Facility
Output 4: Technical support for the proper management of the Oti landfill has been provided			
4.1. Provide on-site training on landfill operations including health and safety	Oti landfill	Q4, Y1 - Q1, Y2	EPA, GHS
4.2. Monitor the water quality of the Oda Stream	Oda Stream	Q2, Y1 - Q3, Y3	EPA, CSIR- Soil Research Institute, CSIR-Water Research Institute
4.3. Monitor the health impacts of the Oti landfill on surrounding communities	Communities around Oti landfill	Q1, Y1 - Q4, Y3	GHS

78 Technical assistance providing agency, e.g. UNIDO or another development partner will provide technical inputs and advice for each output and key activities.

Output 5: An Association of Waste Recyclers has been established			
5.1. Encourage the recyclers to get involved in the project	Kumasi	Q1,Y2 - Q3,Y3	KMA
5.2. Set up the mechanism to financially support the Association (e.g. via prices for materials, transportation cost)	Kumasi	Q4,Y2 - Q2,Y3	KMA, MOF
5.3. Assist to formal establishment of the Association of Waste Recyclers, with a clear statement of purpose to attract more recyclers to join	Kumasi	Q2,Y3 - Q4,Y3	KMA
Output 6: National waste management policies, laws, and strategies have been assessed and refocused			
6.1. Review current national waste management policies and create synergies for promotion of MiNT	Accra	Q1,Y1 - Q3,Y1	MSWR, ML-GRD, MESTI, MMDAs, EPA
6.2. Promote the lessons from the Kumasi test case for national adoption	Accra	Q2, Y2 - Q3,Y3	MSWR, ML-GRD, MESTI, MMDAs, EPA

G. Gender mainstreaming

A gender analysis will be undertaken during the project design phase to understand the roles, rights, needs, challenges, expectations, concerns and opportunities of the different gender groups. This will inform the project's gender strategy. A gender expert will be recruited to serve throughout the project duration.

H. Indicative budget, in EUR

Budget line	TOTAL	Year 1	Year 2	Year 3
Project staff:	516,000	172,000	172,000	172,000
- International	120,000	40,000	40,000	40,000
- National	396,000	132,000	132,000	132,000
Project consultants:	395,000	105,000	140,000	150,000
- International	245,000	55,000	90,000	100,000
- National	150,000	50,000	50,000	50,000
Sub-contracts	450,000	150,000	150,000	150,000
Meetings	340,000	100,000	120,000	120,000
Travel & DSA	300,000	100,000	100,000	100,000
Other direct costs	600,000	250,000	200,000	150,000
Total	2,601,000⁷⁹	877,000	882,000	842,000

79 Only direct costs, total budget will also include indirect costs of the technical assistance partner.

I. Sustainability of project results

As the project aims to facilitate sustainable waste management for Kumasi, the aspects of reviewing and refocusing national policy and promoting the adoption of the MiNT will be taken into account. Moreover, educational activities at all levels, in combination with awareness raising for operational staff and communities will last beyond the project period. Thanks to the creation of community-based waste management practices with financial incentives, and the establishment of an Association of Recyclers, environmental, economic and social results are expected to be sustainable. Once a financial link has been formed between waste generators and recyclers, it is believed that the system, in which the valuable fraction of MSW will be sorted, collected and sold to recyclers, will operate by itself.

J. Risks to project implementation

<i>Project assumptions</i>	<i>Risk of failure</i>	<i>Mitigation action(s)</i>
Assumption 1: That the stakeholders will buy into the project	Low. There may be competing interests between the project's aims and those of some stakeholders	Action 1- High level sensitization and involvement at a very early stage of the project
Assumption 2: That other assemblies in Ghana will be willing to upscale the lessons from this pilot phase	Low. MMDAs are already looking for sustainable solutions to their waste management problems as it is a strain on their budgets	Action 1- Periodic national level engagements will be organized with the MMDAs for sharing the project's progress and lessons
Assumption 3: That the project will lead to an improvement in public health and environment	Medium. If stakeholder ownership is weak and requisite budgetary resources are not allocated by MMDAs	Action 1-The project will ensure that stakeholders take responsibility for the project results by involving them in all project activities

K. Monitoring, reporting and evaluation

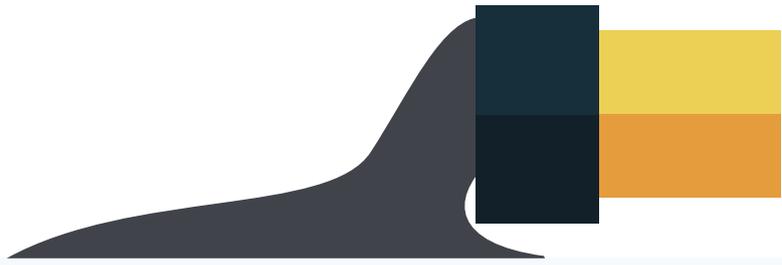
- I. A project baseline study will be conducted to assess the existing situation of all project beneficiaries and areas of intervention.
- II. All project staff and consultants will be required to write reports on their executed activities.
- III. A Monitoring, Evaluation and Communications (MEC) Officer will be employed. S/he will also be responsible for the capitalization and communication of project activities and achievements, including results of gender mainstreaming, in collaboration with the gender expert.

- IV. A project mid-term evaluation will be conducted to assess the feasibility of project's design, assumptions, and the extent of achievement of results relative to the project baseline, as well as a final independent evaluation to learn lessons.

L. Communication and visibility

Support from donor(s) will be highlighted and emphasized during all relevant project activities. The project anticipates the following communication and visibility activities: issuing press releases, distributing factsheets/brochures and newsletters, publicizing project activities on websites, making presentations at workshops, conferences and/or other events, and education/awareness campaigns

All communication and visibility activities will be conducted in accordance with the donor(s)' communications and visibility manual (if any). For example, awareness about the project will be promoted at different levels (national, local, etc.). All workshops and training courses will be made aware of the donor financing. Their logos, along with those of major partner and associates, will be noticeably visible on all printed materials and presentations. Reports will prominently feature all logos. Press releases or other media products will reference project partner names and logos, including source and amount of funding.



PROJECT PROPOSALS

RESOURCE EFFICIENT CLEANER PRODUCTION IN THE CHEMU CATCHMENT AREA

PROJECT SUMMARY

In Ghana, the contribution of the industrial sector to GDP has gradually decreased over the years. Manufacturing enterprises are domestic market oriented and lag behind those in other countries due to inefficient operations due to use of obsolete technologies, over-staffing, and workers with limited skills, in combination with high input costs and taxes⁸¹. In view of the mentioned operational inefficiencies, the industries have also over the years been a major source of pollution for water bodies and other habitats.

81 Kofi O. Nti, 2015, *Diagnostic study of light manufacturing in Ghana*.

Project title:	Resource efficient cleaner production (RECP) in the Chemu catchment area
Location(s):	Greater Accra Region
Planned start date:	January 2020, subject to availability of funding
Duration:	4 years
Government coordinating agency and executing agencies:	Ministry of Trade and Industry/ Ghana National Cleaner Production Centre (GNCPC), and technical assistance partner, e.g. UNIDO ⁸⁰
Budget (in EUR):	4,745,000 EUR

80 Subject to availability of funding.

THIS PROJECT AIMS TO SUPPORT THE INDUSTRIES WITHIN THE CHEMU LAGOON CATCHMENT AREA BY ENHANCING THEIR OPERATIONAL PRODUCTIVITY WITH RECP APPLICATION, WHILE AT THE SAME TIME REDUCING THEIR IMPACTS ON THE CHEMU LAGOON AND ON OTHER ENVIRONMENTAL MEDIA.

The Chemu Lagoon in Tema, Ghana, a typical casualty of such industrial (as well as municipal) pollution has become a threat to public health. There are about 200 industrial operations within the catchment of the lagoon releasing chemical and biological effluents of various compositions and concentrations into the water body with little or no form of treatment⁸². These effluents ultimately end up in the Atlantic Ocean.

To address the dual challenges of improving productivity while reducing environmental impacts, industries around the world are resorting to Resource Efficient Cleaner Production (RECP). RECP is a widely-accepted, well-proven and effective approach applied as

82 Lambert Faabeluon, Personal communication, Director, Ghana National Cleaner Production Centre, (15th November 2018)

a continuous, integrated, preventive environmental and competitiveness strategy to processes, products and services to increase productivity, while reducing risks to humans and the environment. As such, it supports the optimization of the use of resources (materials, energy and water), the minimization of the impact on environment and nature and the reduction of risks to people and communities from the operations of industries and enterprises.

This project aims to support the industries within the Chemu lagoon catchment area by enhancing their operational productivity with RECP application, while at the same time reducing their impacts on the Chemu Lagoon and on other environmental media. This support will be used to build up national RECP capacities so that RECP activities elsewhere in the country can be supported after the project's end. The project will also support the government in revising and establishing industrial support policies and strategies with focus on promoting widespread uptake by industry of RECP practices.

RELEVANT BACKGROUND

The Ghanaian industry⁸³ is the second largest contributor to GDP after services at 24.3% in 2016 and 25.5% (provisional) in 2017⁸⁴. The manufacturing sector within the broader industry has been constantly declining in its share of GDP, from 10.2% in 2006 to 4.6% in 2016 and to a provisional figure of 4.5% in 2017. In terms of value addition in 2013, the top manufacturing sub-sectors were food and beverages, paper and paper products, chemical and chemical products, other non-metallic mineral products, textiles and basic metals by percentage at 30, 19, 12.9, 9.3, 9 and 4.5%, respectively.

The last industrial census was conducted in 2014. The data from Ghana Statistical Survey⁸⁵ shows that at that time, there were about 100,736 manufacturers and most of them, about 90%, were micro, small and medium sized enterprises. Among 4,400 registered manufacturing establishments who took part in a UNIDO survey in 2012, 93.5% were micro, small and medium sized enterprises⁸⁶.

The distribution of industrial subsectors provided in the survey consisted of 22.7% enterprises belonging to wearing apparel, dressing and dyeing of cotton; 21.5% associated with food products and beverages. The rest were furniture (14%), fabricated metal products (8.6%), wood and products of wood and cork (8.5%), other non-metallic mineral products (4.2%), etc.

83 Ghana Statistical Service clusters mining and quarrying, oil and gas production, manufacturing, electricity generation, water and sewerage, and construction activities under the broad category "industry" for the purposes of national accounts.

84 Ghana Statistical Service, 2018, Provisional 2017 Annual Gross Domestic Product

85 GSS (2014) Integrated business establishment survey, Regional spatial business report, Ghana Statistical Survey. Ghana Statistical Service: Accra.

86 UNIDO, 2012. Africa Investor Report 2011: *Towards evidence-based investment promotion strategies*.

Most of the manufacturing establishments are located in Greater Accra (oil refineries, paper processing, fish processing, breweries, cocoa processing, metal processing, soft drink production, dairy products, textiles, chemical, plastic and rubber, pharmaceutical among others) and the Ashanti Region (breweries, chemical, wood processing). Other industries are located in the Western Region (palm oil processing, cocoa processing, paper, wood processing), Eastern Region (fruit processing), etc.⁸⁷.

A number of the industries use obsolete production technologies, they are over-staffed and have workers with limited skills. These challenges, coupled with inefficient use of energy as well as lack of incentives to support manufacturers to invest in cleaner technologies, mean that Ghana-made products are significantly less competitive than imported goods⁸⁸.

Again, the industries pollute water bodies, air, and land as a result of the release of solid, liquid and gaseous waste into the environment. Comprehensive data on the level of pollution of the country's main lagoons remain unavailable. However, initial findings are that lagoons in Ghana are grossly polluted with very high loads of biochemical, bacteriological and nutrient matter, due to the location of several manufacturing industries - including fish canning, food processing, oil refinery, textiles, metals and chemical industries - in the catchment areas of these lagoons⁸⁹. Predominantly, industries located in the catchment of rivers, lagoons and other water systems discharge their untreated wastewater directly to those systems⁹⁰.

Problem Statement

The Chemu Lagoon, located in Tema, is one of the most polluted water bodies in Ghana⁹¹. Municipal wastewaters, largely untreated, are discharged into the lagoon's catchment area⁹². Industrial discharges, which are believed to have been released into the lagoon since the 1960s⁹³, add to these pollution loads. Currently, there are about 200 industrial operations within the catchment of the lagoon.

87 UNIDO, 2012. Africa Investor Report 2011: Towards evidence-based investment promotion strategies.

88 Kofi O. Nti, 2015, *Diagnostic study of light manufacturing in Ghana*

89 NDPC, 2018. Medium-term national development policy framework: an agenda for jobs: creating prosperity and equal opportunity for all (first step) 2018 Government of Ghana December 2017-2021

90 Ibid 85.

91 Doku, T. E., 2015. Indigenous fungi in bioremediation of heavy metals in the Chemu lagoon, Ghana, a thesis submitted to the Kwame Nkrumah University of Science and Technology, Department of Theoretical and Applied Biology, in partial fulfillment of requirement for the award of degree of Master of Philosophy (Microbiology)

92 Ibid 87.

93 Tema Development Corporation, Doxiadis Plan, 1962

Such discharges are responsible for the high levels of BOD in these lagoons⁹⁴. A 1982 study described the Chemu lagoon as grossly polluted and stated that hypoxia in the lagoon was due to excessive discharges into them of organic pollutants from both raw domestic and industrial effluents⁹⁵.

The 1988 National Environmental Action plan further described the lagoon as “virtually dead”⁹⁶.

In addition to organic water pollutants, toxic chemicals are also discharged into the lagoon’s catchment area. The dominant chemical pollutants have been found to be metals such as mercury, chromium, lead, zinc, nickel, copper and cadmium, discharged by surrounding industries⁹⁷. The lagoon has also suffered from thermal pollution in the past. In 2002, the Tema Oil Refinery (TOR) alone was estimated to be releasing over 50 million gallons of hot water (at 60°C) into the lagoon on a daily basis⁹⁸. TOR has, however, since modified its effluent management system and presently recycles and reuses the cooling water⁹⁹.

Efforts to ameliorate the pollution level over the years have yielded no substantial results. Indeed, the levels of pollution keep rising as new industries emerge every year within the catchment area of the water body¹⁰⁰. In 2010, the cost of dredging of the lagoon was estimated at USD 2million by the Tema Metropolitan Assembly.

Unfortunately, there is no up-to-date data on the volumes of wastewater generated and disposed by industry in the Chemu lagoon catchment area. An estimate of industrial wastewater discharges was provided in the Partnership for Action on Green Economy (PAGE) consultation report based on data from 1996. This report also includes an estimation of non-hazardous industrial solid waste generated, which was about 50,000 tons per year, although it gives no estimate of hazardous industrial waste generated¹⁰¹. The EPA concluded in its

94 Essumang, D. K., C. K., Adokoh 1, J. Afriyie and E. Mensah, (2009). Source Assessment and Analysis of Polycyclic Aromatic Hydrocarbon (PAH’s) in the Oblogo Waste Disposal Sites and Some Water Bodies in and around the Accra Metropolis of Ghana , Scientific Research Journal, J. Water Resource and Protection, 2009, 1, 456-468 doi:10.4236/jwarp.2009.16055 Published Online December 2009 (<http://www.scirp.org/journal/jwarp>)

95 Biney, C. A., 1982. Preliminary survey of the state of pollution of the coastal environment of Ghana Institute of Aquatic Biology, P.O. Box 38, Achimota, Ghana, Oceanologica Acta. 1982. N° Sp , Proceedings International Symposium on coastal lagoons, SCOR/ IABO/UNESCO, Bordeaux. France. 8-14 September 1981, 39-43.

96 National Environmental Action Plan 1988

97 Doku, T. E., 2015. Indigenous fungi in bioremediation of heavy metals in the Chemu lagoon, Ghana, a thesis submitted to the Kwame Nkrumah University of Science and Technology, Department of Theoretical and Applied Biology, in partial fulfillment of requirement for the award of degree of Master of Philosophy (Microbiology)

98 Lambert Faabeluon, Personal communication, Director, Ghana National Cleaner Production Centre, (15th November 2018)

99 Emmanuel Appoh, Personal Communication, Deputy Director, Environmental Quality Unit, Environmental Protection Agency, (15th November 2018)

100 Ibid 95.

101 PAGE, 2015, Ghana: Green Industry and Trade Assessment

2016 annual report that “the results for other pollution indicators revealed that industries in the Accra-Tema metropolitan area discharge untreated or partially treated effluent with high pollution loads into the external environment contrary to the requirements of the Agency’s permitting conditions and the sector specific effluent quality guidelines”¹⁰².

Ghana does have laws and regulations which in principle should limit and control such discharges. These include the Environmental Assessment Regulation 1999 (LI 1652), the Environmental Protection Agency Act 1994, and guidelines for industrial discharges. These deal with the requirement to undertake Environmental Impact Assessments (EIAs), the permitting of industrial operations, requirements to meet prescribed discharge standards, as well as environmental management and reporting. The Environmental Protection Agency is mandated to enforce all of these laws and regulations. The Tema Metropolitan Assembly also has by-laws on environmental sanitation in line with the Local Governance Act 2016 (Act 936) and the Public Health Act 2012 (Act 851). Unfortunately, the regulations have been poorly enforced over the years due to capacity constraints. The Environmental Protection Agency, Tema Metropolitan Assembly and other law enforcement agencies find it very difficult to meet their enforcement duties because of inadequacies in logistics and technology for environmental quality monitoring and standards enforcement. Additionally, a number of these companies have neither the technical capacity nor the technology to be able to comply with their environmental obligations¹⁰³. Thus, they discharge their waste into the lagoon without any form of treatment, resulting in the current levels of pollution in the catchment of the Chemu Lagoon.

Aside from the health and environmental impacts which this pollution is causing, these discharges of water pollutants and waste represent inefficiencies on the part of industry. This is part of a broader pattern where companies’ inefficiencies in the use of material and energy resources mean not only that unnecessary waste and pollution is generated but also that the companies have higher operating costs and thus lower profit margins. The need for higher material and energy efficiency is becoming ever more critical for Ghanaian industry. For instance, an energy assessment done by PAGE¹⁰⁴ showed that since 2003, the manufacturing industry has increased its share of national electricity consumption and has become the largest consumer, larger even than Valco (an aluminium smelter based in Tema) and the mining sector. As of 2011, the industrial sector as a whole consumed 48.9% of the total national electricity generated. Within the sector, electricity consumption by manufacturing was 51.3% while that for Valco and the mining industry were 15.4% and 33.3%, respectively. The industrial sector was the most critically affected by load shedding from electricity shortages and unreliable supply. Consequently, more manufacturers acquired power

102 Environmental Protection Agency (EPA), (2017). Environmental Quality Monitoring, Annual Report on Industrial Effluent Quality Monitored in Accra and Tema Metropolis, by Effluent Monitoring Team, EQD, 2017

103 Lambert F., Director, Ghana National Cleaner Production Centre, Personal communication, November 12, 2018.

104 PAGE, 2015, Ghana: Green Industry and Trade Assessment

generators, reduced operational hours for staff or relocated to neighbouring countries¹⁰⁵.

The Government has recognized that an effective resource efficient cleaner production (RECP) programme would enhance both industry's environmental stewardship and compliance and its productivity. As a contracting party to the 2012 Land Based Sources and Activities Protocol to the Abidjan Convention for Cooperation in the Protection, Management and Development of the Marine and Coastal Environment of the Atlantic Coast of the West, Central and Southern Africa Region, Ghana has committed to the adoption of Environmentally Sound Technologies (ESTs) and Cleaner Production Technologies (CPTs) for waste minimization and productivity enhancement in industrial production for the reduction of discharges of wastes/effluents into receiving waters¹⁰⁶.

Furthermore, in 2010 the Ministry of Trade and Industry (MOTI) published the Ghana Industrial Policy and the Industrial Policy Support Program (2011-2015), whose objective is to support industrial sectors to improve their technology, finance, innovation, etc. The industrial policy specifically commits to RECP. Its policy objective is "to ensure environmentally sustainable industrial production"¹⁰⁷. In line with the policy, the government aims to:

1. Facilitate the development of programmes that promote the efficient use of raw materials, energy and water in industry;
2. Support industry to adopt cleaner production technologies and improved manufacturing processes;
3. Strengthen the capacity of regulatory bodies to enforce environmental regulations as well as effectively monitor manufacturing processes;
4. Ensure the promotion within industry of relevant ISO standards on environmental management; and
5. Encourage industry to develop and implement self-regulatory measures on environmental management.

However, the achievements made in the area of RECP as a result of the implementation of the industrial policy are unclear due to the lack of clarity on targets and specific policy actions. In addition, neither document clearly indicates the required activities, funding requirements or sources of funds.

The Government established the Ghana National Cleaner Production Centre (GNCPC) in 2012 with UNIDO's support. Its mandate was to become the focal

105 Lambert F., Director, Ghana National Cleaner Production Centre, Personal communication, November 12, 2018.

106 Ukwe, C.N. and Ibe, C.A. (2010). A regional collaborative approach in transboundary pollution management in the guinea current region of western Africa, *Science Direct Journal, Ocean & Coastal Management* 53 (2010) 493e506 Published online on 30 July 2010 Journal homepage: www.elsevier.com/locate/ocecoaman

107 Ghana Industrial Policy

point for providing the required technical know-how to the industries, consultants, researchers and others towards the realization of the Government's industrial policy objective. However, it is currently unable to satisfy this mandate in full. The Centre needs to have its technical, technological and logistical capacity upgraded if it is to take its rightful place as the nationally recognized focal point for RECP.

In summary, the manufacturing sector plays an important role in the economy. It is the largest consumer of energy and other resources and equally a big polluter. The Government has recognized that a long-term RECP programme is the most appropriate approach to achieve the twin objectives of increasing industrial efficiency and productivity while at the same time reducing industry's negative health and environmental impacts. The way is therefore open to move from policy statements to action on the ground. Given the high concentration of industries in the Chemu lagoon catchment area and the significant impacts they are having on the lagoon's ecosystems and surrounding population, this will be an ideal starting point for the development of a long-term national RECP programme.

PROJECT DESCRIPTION

A. Project beneficiaries

The ultimate beneficiaries will be the communities within the catchment of Chemu lagoon who use and interact with the Chemu water system. Reducing pollution loads will benefit them in terms of reduced exposure to industrial pollutants and reduced risk of disease. It will also give those who have lost livelihood as a result of the pollution a chance to regain their livelihoods.

More generally, the ecosystems in the Chemu lagoon system will benefit from reduced pollution loads and the potential regeneration of the lagoon.

Industrial enterprises located in the Chemu lagoon catchment area will be another ultimate beneficiary, benefiting from the savings in resource and energy use, the improved process efficiency, the reductions in the amounts of waste and pollution which they have to treat, and ultimately the increases in their overall profitability, which adoption of RECP will bring. The capacities and skills built up in the initial focus on the Chemu lagoon can then be applied to industrial enterprises in other parts of the country.

Other stakeholders will benefit from seeing their skills and capacities increased by the project:

- Government and its agencies at national and sub-national levels including the Ministry of Trade and Industry (MOTI), Ministry of Environment, Science, Technology and Innovation (MESTI), the National Development Planning Commission (NDPC), Environmental Protection Agency (EPA), Ghana Health Service (GHS), Tema Municipal Assembly (TMA), Kpone Katamanso Municipal Assembly, Tema Development Corporation

(TDC), the Ghana National Cleaner Production Centre (GNCPC), Gratis Foundation, CSIR-IIR and CSIR-WRI among others will benefit in terms of policy improvement and capacity enhancement.

For instance, the programme will facilitate national dialogue on the cleaner production objective of the industrial policy and result in an enhancement of the expected deliverables of the policy. It will also give the law enforcement agencies the impetus to demand higher environmental compliance standards from the industrial sector.

- Other stakeholders including Non-Governmental Organizations (NGOs) such as Green Advocacy, Friends of rivers and water bodies and Friends of the Earth, as well as educational, consulting, training and professional institutions in the industrial sector will benefit from the training they can receive through the project. This will increase their capacity and enable them to integrate RECP concepts, methods and information into their activities and strategies.

B. Overall project objective

The overall objective of the project is:

- To reduce pollution and waste generation from manufacturing enterprises located in the Chemu catchment area by application of resource productivity increasing RECP solutions.

C. Intervention strategy

The project design will build on the general RECP methodology which UNIDO has been implementing successfully in many developing countries since 1994. The methodology is based on the following six steps:

- Project activities on the ground focus on an area or on a sector that the Government has decided is particularly important. In this case, on-the-ground activities will focus on the enterprises located in the Chemu lagoon catchment area.
- In the focus area or sector, the project team works with selected enterprises, which have been prioritized by a needs assessment and which have committed in writing to working with the project and to implementing, where financially feasible, the RECP options which this joint work will identify. In this case, one important criterion in the needs assessment will be the type of pollution and waste which the enterprises are discharging into the Chemu lagoon catchment area.
- The selected enterprises are trained and coached, both in the classroom and on the ground, by both local and international RECP experts, who guide them through the UNIDO RECP methodology to achieve the expected results (RECP options identification and start of RECP options implementation). The enterprises are encouraged to start implementation with RECP options which require low or no investment, such as good

housekeeping, improved process controls, monitoring of materials, water, energy, other resources used and waste generation. Even with those options, it is expected that the enterprises will observe the benefits of RECP application, which will encourage them to move to the next level of RECP options; these will require some investment to achieve them. In this case, while there will be a strong focus on identifying RECP options reducing wastewater discharges in addition to other resource productivity increasing options. Companies will be encouraged to also look for other RECP options with strong returns on investment, to encourage their buy-in to RECP principles.

- A critical part of this training and coaching programme is that it is also used to build the necessary logistical, technological and technical capacities of the relevant local partners, in order to make available a broad base of technical and technological support system to the country as a whole. This will allow the local partners to continue RECP activities after the project is finished. This is an important task for the international RECP experts, and is fundamental to ensuring the sustainability of the project results. In this case, it is expected that the NCPC, government agencies with a mandate to offer technical support to industry, consultants, etc., will be the subjects of this capacity-building.
- Samples of the RECP “success stories” from the selected enterprises are disseminated in the most appropriate manner. The objective is to encourage other enterprises in the country to adopt RECP practices, showing them that RECP can work in the local context and showing what could be the benefits for them.
- In parallel, the project supports the Government to put in place the necessary policy framework to ensure that the RECP effort is sustained in the future, after the project is completed. In this case, the project will assist the Government to review and upgrade existing RECP policies and strategies, as well as other policies and strategies with strong links to RECP, for instance access to green finance for investments. A national RECP policy will then be developed with the support of stakeholders and promoted among the industries. Specifically, the project will support the government in the revision and updating of some of its previous industrial support programs such as Best Available Technologies and Best Environmental Practice (BAT/BEP) in industrial and domestic processes¹⁰⁸ and the Waste Stock Exchange initiated under the Guinea Current Large Marine Ecosystem (GCLME) project¹⁰⁹ with the potential of some incentives to be also considered.

108 Ukwe C.N. and C.A. Ibe (2010). A regional collaborative approach in transboundary pollution management in the guinea current region of western Africa, *Science Direct Journal, Ocean & Coastal Management* 53 (2010) 493e506 Published online on 30 July 2010 Journal homepage: www.elsevier.com/locate/ocecoaman

109 UNEP, (2012) Terminal Evaluation of the UNDP-UNEP GEF Project: Combating Living Resources Depletion and Coastal Area Degradation in the Guinea Current LME through Ecosystem-based Regional Actions (GCLME)

Project Management and Stakeholder Involvement

- The project will be managed by a project team constituted by MOTI and the Ghana National Cleaner Production Centre. The project team will be supported by a Steering Committee of stakeholders and partners which will have oversight responsibility for setting the strategic direction of the project with respect to the national policy priority areas and periodically reviewing project performance and achievements.

D. Implementation partnership(s)

Partner Institutions	Expected roles and responsibilities
Ministry of Trade and Industry (MOTI)	<ul style="list-style-type: none"> • National RECP Policy revision and updating
Ministry of Environment Science and Technology (MESTI)	<ul style="list-style-type: none"> • National RECP Policy revision and updating
Ministry of Sanitation and Water Resources	<ul style="list-style-type: none"> • National waste management policy review and updating
Ghana Health Service	<ul style="list-style-type: none"> • Baseline health data, periodic community health monitoring • Provide health records for ongoing health monitoring
Environmental Protection Agency (EPA)	<ul style="list-style-type: none"> • Industrial reports validation with effluent quality monitoring data • Assess performance of industries against both the project and EIS baseline data; EMP (AKOBEN) • Enforcement of environmental obligations of the industries
Council for Scientific and Industrial Research (CSIR)-Water Research Institute (WRI)/ IIR	<ul style="list-style-type: none"> • Conduct water and effluent quality assessment for EPA guidelines compliance • Provide training on environmental monitoring for the industries
Tema Metropolitan Assembly	<ul style="list-style-type: none"> • Curtail the encroachment of developments within the catchment area of the lagoon
Kpone Katamanso District Assembly	<ul style="list-style-type: none"> • Curtail the encroachment of developments within the catchment area of the lagoon
Ghana National Cleaner Production Centre	<ul style="list-style-type: none"> • Provide training to industry and other stakeholders on RECP • In-plant RECP assessment and implementation
CSIR- Science and Technology Policy Research Institute (STEPRI)	<ul style="list-style-type: none"> • Provide technical support for RECP policy and strategies reform
Association of Ghana Industries	<ul style="list-style-type: none"> • Provide industrial perspective to policy and generate industry support and interest for the interventions

E. Project results/outputs

The project is expected to deliver the following outputs:

1. The existing national RECP policy and strategies have been upgraded.
2. RECP institutional capacity has been developed.
3. RECP options have been implemented, and the results from a sample of these have been disseminated.
4. Appropriate financial mechanisms for technology transformation have been established.

F. Key project activities

Activities	Locations	Timing	Partners
Output 1: The existing national RECP policy and strategies have been upgraded			
1.1. Analyse the existing RECP policy and strategies as well as other relevant national policies, regulations, and support programs affecting the different industrial sectors for their support to RECP, identify gaps, and where necessary make recommendations for improvements	Accra	Q1, Y1 - Q2, Y1	MOTI, MESTI, MSWR, EPA, GNCPC, AGI
1.2. Map industrial sectors with the most resource consumption and/or with the highest environmental impacts, and build up industrial sector benchmarks as baselines	Accra	Q1, Y1 - Q2, Y1	MOTI, MESTI, EPA, GNCPC, AGI
1.3. Develop a draft of an upgraded RECP policy and strategies for review by stakeholders	Accra	Q2, Y1 - Q4, Y1	MOTI, MESTI, MSWR, EPA, GNCPC, AGI
1.4. Set targets for reduction in energy, water, raw materials and other resources, by sub-sector	Accra	Q4, Y1 - Q1, Y3	MOTI, MESTI, EPA, GNCPC
1.5. Establish the institutional arrangements for RECP policy implementation	Accra	Q3, Y1 - Q4, Y1	MOTI, MESTI, MSWR, EPA, GNCPC, AGI
1.6. Create national level awareness for the upgraded RECP policy and strategies	Accra	Q1, Y1 - Q2, Y4	MOTI, MESTI, MSWR, EPA, GNCPC, AGI
1.7. Mainstream the RECP policy and strategies into the operations and guidelines of regulatory bodies	Accra	Q3, Y1 - Q4, Y2	MOTI, MESTI, EPA, GNCPC
Output 2: RECP institutional capacity has been developed			
2.1. Map the national and sub-national public and private institutions which (a) could benefit from RECP awareness and (b) could offer RECP services to enterprises	Accra	Q2, Y1 - Q3, Y1	MOTI, MESTI, MSWR, EPA, GNCPC, AGI
2.2. Run awareness-raising activities for the identified institutions about RECP opportunities and benefits for them	Accra	Q2, Y1 - Q3, Y1	MOTI, MESTI, MSWR, EPA, GNCPC, AGI

<i>Activities</i>	<i>Locations</i>	<i>Timing</i>	<i>Partners</i>
2.3. Organize training programs for national experts in order to put them in a position where they can offer RECP-related services valuable to enterprises and other organizations	Accra	Q3, Y1 - Q4, Y2	GNCPC, EPA, MOTI
2.4. Develop a monitoring programme for energy, materials, water efficiency and waste management	Accra	Q1, Y2 - Q3, Y2	MOTI, MESTI, MSWR, EPA, GNCPC, AGI
Output 3: RECP options have been implemented, and the results from a sample of these have been disseminated			
3.1. Through a needs assessment, identify potential demonstration enterprises in the Chemu lagoon catchment area based primarily on the quantity and/or toxicity of their wastewater discharges, using recommendations from government agencies where relevant	Tema	Q2, Y2 - Q3, Y2	MOTI, MESTI, MSWR, EPA, GNCPC, AGI
3.2. Run awareness-raising activities for the identified enterprises about RECP opportunities and benefits for them to participate in the project	Tema	Q3, Y2 - Q2, Y4	MOTI, MESTI, EPA, GNCPC, AGI
3.3. Identify 40 enterprises whose management agree in writing to commit to the project	Tema	Q2, Y2 - Q3, Y2	EPA, GNCPC, AGI
3.4. Carry out in-depth RECP assessments at the 40 demonstration enterprises (classroom training and on-site coaching)	City, Country	Q3, Y2 - Q2, Y4	EPA, GNCPC, AGI
3.5. Implement identified RECP options and develop waste management plans at each demonstration project (target: at least 20% of RECP options will be implemented by project end; at least 1 RECP option requiring investment will be supported by the project at each pilot project)	Tema	Q3, Y2 - Q2, Y4	Demonstration enterprises
3.6. Monitor the results of RECP application	Tema	Q3, Y4 - Q4, Y4	EPA, GNCPC, AGI
3.7. Disseminate to the rest of Ghanaian industry in the most appropriate way RECP "success stories" from at least 50% of the demonstration enterprise	Accra, elsewhere	Q2, Y4 - Q3, Y4	MOTI, MESTI, MSWR, EPA, GNCPC, AGI
Output 4: Appropriate financial mechanisms for technology transformation have been established			
4.1. Identify and recommend RECP incentives (subsidies, tax relief) for adoption by government	Accra	Q3, Y3 - Q4, Y4	MOTI, MESTI, MSWR, EPA, GNCPC, AGI
4.2. Establish procedures for technology assessment and build capacity of independent consultants to carry out the assessment	Accra	Q3, Y3 - Q2, Y4	EPA, GNCPC, AGI

G. Gender mainstreaming

A gender analysis will be undertaken during the project design phase to understand the roles, rights, needs, challenges, expectations, concerns and opportunities of the different gender groups. This will inform the project's gender strategy. A gender expert will be recruited to serve throughout the project duration.

H. Indicative budget, in EUR

Budget line	TOTAL	Year 1	Year 2	Year 3	Year 4
Project staff:	1,245,000	360,000	360,000	260,000	265,000
- International	400,000	150,000	150,000	50,000	50,000
- National	845,000	210,000	210,000	210,000	215,000
Project consultants:	1,000,000	150,000	350,000	300,000	200,000
- International	350,000	50,000	100,000	100,000	100,000
- National	650,000	100,000	250,000	200,000	100,000
Sub-contracts	0				
Meetings	400,000	100,000	100,000	100,000	100,000
Other direct costs	2,100,000	800,000	800,000	500,000	
Total	4,745,000¹¹⁰	1,410,000	1,610,000	1,160,000	565,000

I. Sustainability of project results

The following outcomes will ensure sustainability of results achieved within the project duration:

1. A revised national policy will provide a renewed national strategic direction for RECP. It will positively impact on industrial resource consumption and resource use efficiency and potentially lead to national savings.
2. A number of national consultants and government officials will be trained under the project. These trained personnel will become national experts who will continue to carry out RECP interventions with industries in the medium to long term.
3. The National Cleaner Production Centre will be well equipped with both technological and technical knowhow to become the nerve centre for national capacity-building through training of consultants and other government officials and the provision of support to industry.

¹¹⁰ Only direct costs; total budget will also include indirect costs of the technical assistance provider.

J. Risks to project implementation

Project assumptions	Risk of failure	Mitigation action(s)
<p>Assumption 1:</p> <p>Industries are willing to collaborate with the project team and to implement RECP practices</p>	<p>Medium</p> <p>Challenges with accessing enterprise level data</p>	<p>Action 1- create extensive awareness in industries on the benefits of RECP programme to their productivity and environmental performance</p> <p>Action 2- Sign agreements with interested industries to protect their company's confidential information</p>
<p>Assumption 2:</p> <p>National Cleaner Production Centre has officers with requisite capacity to be trained on RECP</p>	<p>Low</p> <p>The centre already has personnel of requisite capacity, although additional staff would need to be recruited as workload increases</p>	<p>Action 1 - Encourage GNCPC to recruit and/or get access to additional seconded staff with the requisite capacity to be trained</p>
<p>Assumption 3:</p> <p>Beneficiaries of RECP training are willing to remain in their organization and transfer RECP knowledge</p>	<p>Medium</p> <p>Personnel may leave because of their enhanced capacity and market value</p>	<p>Action 1- Train adequate numbers of personnel and external consultants</p>

K. Monitoring, reporting and evaluation

- I. A project baseline study will be conducted to assess the existing situation of all project beneficiaries and areas of intervention.
- II. All project staff and consultants will be required to write reports on their executed activities.
- III. A Monitoring, Evaluation and Communications (MEC) Officer will be employed to track project results. S/he will also be responsible for the communication of project activities and achievements, including results of gender mainstreaming, in collaboration with the gender expert.
- IV. A project mid-term evaluation will be conducted to assess the feasibility of project's design, assumptions and progress achieved with respect to baselines, while an independent terminal evaluation will be conducted to learn lessons for future interventions.

L. Communication and visibility

Support from donor(s) will be highlighted and emphasized during all relevant project activities. The project anticipates the following communication and visibility activities: issuing press releases, distributing factsheets/brochures and newsletters, publicizing project activities on websites, making presentations at workshops, conferences and/or other events, and education/awareness campaigns.

All communication and visibility activities will be conducted in accordance with the donor(s)' communications and visibility manual (if any). For example, awareness about the project will be promoted at different levels (national, local, etc.). All workshops and training courses will be made aware of the donor financing. Their logos, along with those of major partner and associates will be noticeably visible on all printed materials and presentations. Reports will prominently feature all logos. Press releases or other media products will reference project partner names and logos, including source and amount of funding.



PROJECT PROPOSALS

NATIONAL CONTAMINATED SITE IDENTIFICATION AND ASSESSMENT PROJECT



PROJECT SUMMARY

Pollution is one of the major causes of mortality in low- and middle-income countries. According to the Lancet Commission, diseases caused by pollution were responsible for an estimated 9 million premature deaths in 2015¹¹¹. Pollution sources may range from industrial operations and vehicular exhausts to other toxic chemical generating activities. Pollutants such as mercury, lead, cadmium, Polychlorinated biphenyls (PCBs), Brominated Flame Retardants (BFRs) and particulate emissions have been identified as some of the major causes of death, disease and other human health issues of various magnitudes.

¹¹¹ [https://www.thelancet.com/pdfs/journals/lancet/PIIS0140-6736\(17\)32345-0.pdf?code=lancet-site](https://www.thelancet.com/pdfs/journals/lancet/PIIS0140-6736(17)32345-0.pdf?code=lancet-site) free account registration required.

Project title:	National Contaminated Site Identification and Assessment Project
Location(s):	Nationwide
Planned start date:	Second Quarter 2020
Duration:	Three years
Government coordinating agency and Executing agency/cooperating agency:	EPA, Ministry of Environment, Science, Technology, Pure Earth (INGO)
Budget (in EUR):	1,673,000.00

THE PROPOSED PROJECT AIMS AT EXPANDING THE TSIP BY UPDATING THE EXISTING DATABASE AS WELL AS IDENTIFYING AND SCREENING ADDITIONAL SITES. THE PROJECT WILL ALSO GENERATE A GHANA POLLUTION MAP AND PILOT REMEDIATION AT 2 PILOT SITES.

In 2012, Pure Earth, in collaboration with the United Nations Industrial Development Organization (UNIDO), initiated a global project titled the Toxic Sites Identification Program (TSIP). The program identified and screened 221 sites in Ghana.

The proposed project aims at expanding the TSIP by updating the existing database as well as identifying and screening additional sites. The project will also generate a Ghana pollution map and pilot remediation at 2 pilot sites. This will involve, inter alia, a national level awareness-raising and advocacy on pollution, the training of consultants, researchers and government officials for identification and rapid assessment as well as auditing and detailed analysis of contaminated sites.

RELEVANT BACKGROUND

Pollution kills almost nine million people worldwide every year; 8.4 million of those live in the developing world – that is 35% more than deaths from smoking, almost three times more deaths than malaria¹¹². Generally, pollution caused by industrial emissions, vehicular exhausts, and toxic chemicals has increased sharply in the past 50 years, and the largest increases today are seen in low-income and middle-income countries (LMICs)¹¹³.

This is because rapid industrialization, population growth, and exploitation of natural resources have potentially resulted in significant environmental degradation in many LMICs¹¹⁴. For instance, of the e-waste produced in high-income countries (e.g., Europe and North America), 80% ends up being shipped (often illegally) for recycling to LMICs such as India, Ghana, Nigeria, and many countries in Latin America. It is therefore not surprising that the levels of PCBs in Africa are rising¹¹⁵.

Further similarities among LMICs are the characteristics of limited governmental capacity and limited incentives to formally regulate environmental impacts. Even in cases where regulations exist, the capacity to enforce laws can be limited due to lack of duly paid, sufficient quantity and quality of staff and equipment, including transport means for successful inspections¹¹⁶.

The widespread pollution in a number of rapidly industrializing LMICs can result in adverse health effects, including damage to the brain, lungs, and other organ systems, for large numbers of persons¹¹⁷. Children are at an even higher risk of pollution related diseases, and even extremely low-dose exposures to pollutants during windows of vulnerability in utero and in early infancy can result in disease and disability across their lifespan and death in childhood¹¹⁸.

112 Aulakh R. (2015). Toxic pollution success stories, <http://www.thestar.com/news/world/2015/01/27/10-.print.html>. Date accessed: 04/11/2018

113 [https://www.thelancet.com/pdfs/journals/lancet/PIIS0140-6736\(17\)32345-0.pdf?code=lancet-site](https://www.thelancet.com/pdfs/journals/lancet/PIIS0140-6736(17)32345-0.pdf?code=lancet-site) free account registration required.

114 Alam S. In Dowling, R. Caravanos, J., Grigsby P., Rivera, A., Ericson, B., Amoyaw-Osei, Y., Akuffo, B. and R. Fuller. (2016) Estimating the Prevalence of Toxic Waste Sites in Low- and Middle-Income Countries

115 Gioia R., Akindede A. J., Adebusoye S. A., Asante, K. A. Tanabe, S. Buekens, A. and A. J. Sasco (2014). Polychlorinated biphenyls (PCBs) in Africa: a review of environmental levels, *Environmental Science and Pollution Research*, ISSN 0944-1344, Volume 21, Number 10, *Environ Sci Pollut Res* (2014) 21:6278-6289, DOI 10.1007/s11356-013-1739-1 Published online: 1 May 2013. # Her Majesty the Queen in Right of United Kingdom 2013.

116 Caravanos, J., R. Dowling, Grigsby P., Rivera, A., Ericson, B., Akuffo, B. and R. Fuller. (2015) Estimates of Heavy Metals Exposure from Toxic Waste Sites: A Ghanaian Case Study

117 Suk, W. A., Ahanchian, H., Asante, K. A., Carpenter, D.O., Diaz-Barriga, F., Ha E., Huo, X., King M., Ruchirawat, M. da Silva, E. R., Sly, L. Sly, P. D., Stein, R. T., van den Berg, M. Zar, H., and P. J. Landrigan; (2016) Environmental Pollution: An Under-recognized Threat to Children's Health, Especially in Low- and Middle-Income Countries *Environmental Health Perspectives*, volume 124, number 3, March 2016, <http://dx.doi.org/10.1289/ehp.1510517> Date accessed: 4th November 2018.

118 Ibid 108..

These impacts may result in direct medical costs, opportunity costs reflecting the diminished productivity of populations damaged by pollution, and costs to health care systems¹¹⁹.

In spite of these facts, pollution of various forms, as sources of diseases and public health concern, has particularly been overlooked in both the international development and the global health agendas¹²⁰ due in part to the fragmentation of the sources of pollution into soil, air and water as well the high standard of proof that is required to establish the link between a pollutant and its health outcome.

A source of pollution which is particularly overlooked in the LMICs is the pollution of soil. With respect to Ghana specifically, there are a number of known sources of soil pollution which put Ghanaians at risk of exposure to toxic chemicals.

Like many LMICs, several categories of waste are imported into Ghana for the purpose of - mostly informal - recycling. One such category is waste electrical and electronic equipment (WEEE) including electronic gadgets like computers, television sets, and CD players. According to the World Bank, about 109,650 tons of WEEE were processed at Agbogbloshie in Accra, the capital of Ghana, in 2014¹²¹. This was mainly done without any regard for the hazard that they pose to the environment or for the health risk they pose to people living in the area. A study by Yu et al. (2016) conservatively estimates that about 215,000 tons per year of second-hand consumer items are imported into the country, which results in 129,000 tons of e-waste per year. This number is expected to double by 2020¹²². Processing of e-waste can lead to the release of a number of toxic chemicals to which humans can be exposed: polychlorinated biphenyls (PCBs) and brominated flame retardants (BFRs) such as polybrominated diphenyl ethers (PBDEs) and hexabromocyclododecanes (HBCDs). Exposure to such chemicals was evaluated in Ghana using breast milk samples collected in 2004 and 2009. The observed levels of PBDEs (mean: 4.5 ng/g lw; range: 0.86-18 ng/g lw) and PCBs (mean: 62 ng/g lw; 15-160 ng/g lw) were unexpectedly high, in spite of the fact that Ghana is a non-industrialized country when compared with many of the Asian and European countries¹²³. Many of these chemicals can contaminate the soil where the recycling

119 Isuk, W. A., Ahanchian, H., Asante, K. A., Carpenter, D.O., Diaz-Barriga, F., Ha E., Huo, X., King M., Ruchirawat, M. da Silva, E. R., Sly, L. Sly, P. D., Stein, R. T., van den Berg, M. Zar, H., and P. J. Landrigan; (2016) Environmental Pollution: An Under-recognized Threat to Children's Health, Especially in Low- and Middle-Income Countries Environmental Health Perspectives, volume 124, number 3, March 2016, <http://dx.doi.org/10.1289/ehp.1510517> Date accessed: 4th November 2018.

120 Ibid 107.

121 World Bank, (2015) Technical Report on the Sustainable Management of E-Waste in Ghana Final

122 Yu E. A., Akormedi, M., Asampong, E., Meyer, C. G., and J. N. Fobil (2016): Informal processing of electronic waste at Agbogbloshie, Ghana: workers' knowledge about associated health hazards and alternative livelihoods Global Health Promotion 1757-9759; Vol 0(0): 1- 9; DOI: 10.1177/1757975916631523

123 Asante, K. A., Adu-Kumi, S., Nakahiro, K., Takahashi, S., Isobe, T., Sudaryanto, A., Devanathan, G., Clarke, E., Ansa-Asare, O.D., Dapaah-Siakwan, S. and Tanabe, S. (2011) Human exposure to PCBs, PBDEs and HBCDs in Ghana: temporal variation, sources of exposure and estimation of daily intakes by infants. *Environment International*, 37, 921-928 pp.

activities take place. Another category of waste which is often processed in Ghana is Used Lead Acid Batteries (ULABs). Their processing can lead in particular to exposure to excessive levels of the heavy metal lead. Here, too, the soils of sites where ULAB recycling is occurring can become heavily contaminated with lead.

Artisanal and small-scale mining (ASM) can also lead to significant exposures to toxic chemicals, many of which also contaminate the soils in and around the mining sites. The toxic chemical of most concern in the ASM sector is mercury. Globally, the sector releases somewhere between 500 and 1,300 tonnes of mercury a year into the environment¹²⁴. Studies have shown that mercury in ASM mining sites is often stored where children can have easy access, it is nearly always handled without gloves¹²⁵, the amalgam is heated in open air and no measures are taken to manage spillages in the course of mining operations. In 2012, 343 small-scale gold miners at Prestea, Ghana were tested for the presence of elemental mercury in their body. Of these, 160 (46.65%) had urine mercury above the recommended exposure limit (<5.0µg/L). Complaints of numbness were significantly associated with mercury exposure among those who had previously worked at other small-scale gold mines. A large proportion of small-scale gold miners in Prestea were found to be exposed to mercury in excess of occupational exposure limits¹²⁶.

Another source of exposure and concomitant soil contamination is automobile repair shops. There are many of these scattered across the country, and they barely have any environmental awareness. They therefore spill spent engine oils containing cadmium, chromium and other hazardous components onto the soil and into the environment more generally on a daily basis.

The agricultural sector is yet another source of human exposure and soil contamination. The sector has been bedevilled with the indiscriminate handling and use of pesticides. In addition to this, a 2012 study carried out in the Upper East region by the Northern Presbyterian Agricultural Services and Partners (a Tamale based NGO), observed that four banned or restricted chemicals (DDT, aldrin, lindane and dieldrin) were on sale in local agro-dealer shops¹²⁷. High levels of cadmium were also detected in soils at Ahafo Kenyasi¹²⁸ in the Brong Ahafo Region of Ghana.

124 Kocman D., et al, Toward an Assessment of the Global Inventory of Present-Day Mercury Releases to Freshwater Environments, *International Journal of Environmental Research and Public Health*, 14(2):138-February 2017

125 Amegbey and Eshun, (2003) In Tschakert, P. and Singha, K. (2007). Contaminated identities: Mercury and marginalization in Ghana's artisanal mining sector, *Science Direct Journal, Geoforum* 38 (2007) 1304-1321

126 Mensah E. K., E. Afari, F. Wurapa, S. Sackey, A. Quainoo, E. Kenu, K. M. Nyarko (2016). Exposure of Small-Scale Gold Miners in Prestea to Mercury, Ghana, *The Pan African Medical Journal* 2016; 25 (Supp 1):6.- ISSN 1937-8688.

127 NPASP, (2012); Ghana's pesticide crisis: The need for further Government action, Northern Presbyterian Agricultural Services and Partners

128 Amoyaw Osei, Country Coordinator, Pure Earth, Personal communication, 12 November 2018

The foregoing illuminate the pervasiveness of exposure to toxic chemicals in Ghana: most Ghanaians may be exposed to toxic chemicals at one point or another of their lives. Coupled with this risk is the lack of awareness of this exposure and associated severity of impact.

Another exacerbating factor is the poor enforcement of existing national laws and regulations. Ghana has regulations such as the Environmental Assessment Regulation 1999 (LI 1652), the Environmental Protection Agency Act 1994, and guidelines for industrial discharges. These regulations deal with Environmental Impact Assessments (EIAs), permitting of industrial operations as well as environmental management and reporting which the Environmental Protection Agency is mandated to enforce. The Metropolitan, Municipal and District Assemblies (MMDAs) also have by-laws on environmental sanitation in line with the Local Governance Act 2016 (Act 936) and the Public Health Act 2012 (Act 851).

In 2012, Pure Earth, a United States based International Non-Governmental Organization (INGO), in collaboration with the United Nations Industrial Development Organization (UNIDO), and with funding from the European Commission (EC), Asian Development Bank (ADB), United States Agency for International Development (USAID), World Bank (WB), and Green Cross Switzerland, initiated the Toxic Sites Identification Program (TSIP) in 50 countries worldwide. One of these was Ghana. The TSIP aims at identifying and screening contaminated sites in low- and middle-income countries where public health was at risk.

In Ghana, the TSIP programme assessed 221 sites (including the Agbogbloshie site) in all the regions except the Upper West Region¹²⁹. The sources of pollution identified included: mining, agriculture, used lead acid battery (ULAB) recycling, and dumpsites. Various key pollutants included lead, arsenic, cadmium, chromium, mercury, PCBs, pesticides, and VOCs.

These sites are yet to be fully adopted and integrated into a National Pollution Action Plan for mitigation, and remediation action has yet to be taken on those which were observed to be highly contaminated.

Additionally, some of the sites identified and assessed by the TSIP may have changed ownership or have been converted to other forms of land use, potentially passing on the risk of pollution to new, unsuspecting users. The adoption and integration of the existing database will therefore require that all 221 sites be updated.

It is also noteworthy that the 221 existing sites identified under the TSIP represent just a fraction of the actual number of contaminated sites in Ghana.

129 Pure Earth, UNIDO and EU, (2018); Final Report Toxic Sites Identification Program (TSIP), Ghana

A 2015 study, which employed a cluster random sampling analysis that relied on a 50% weighted mixture of area and population statistics and an analysis involving simple random sampling relying on the mean number of sites found per sample, concluded as follows:

“Our current extrapolation shows that there are an estimated 1,561 to 1,944 heavy metals contaminated sites within Ghana, excluding the transition metal mercury (CIs: 812 to 3,075). This is approximately nine times the number of contaminated sites previously documented by the Pure Earth Toxic Sites Identification Program”¹³⁰.

There are still new sites, therefore, that need to be identified, assessed and included in the database to support ongoing national planning for pollution action while a national pollution map will support the process by providing readily accessible and discernible context for development planning, health monitoring among others.

With respect specifically to e-waste, as a party to the Basel Convention on the Transboundary Movement of Hazardous Waste, the Stockholm Convention on Persistent Organic Pollutants, and the Minamata Convention on Mercury, Ghana enacted the Hazardous and Electronic Waste Control and Management Act 2016 (Act 917). The collection of an eco-levy promulgated by the Act under section 23, to be paid into an electrical and electronic waste (EEW) management fund, commenced on November 1, 2018¹³¹. The fund is targeted, under section 24, “to provide finance for the management of electrical and electronic waste and reduce the adverse impacts of electrical and electronic waste on human health”¹³². The emphasis of the fund is mainly on e-waste, detailing in section 24 (2) (a)-(i) specific interventions such as the provision of support for the construction and maintenance of e-waste recycling and treatment plants, support to research in e-waste control, prevention and recycling, public education, monitoring and compliance as well as education. In order to provide evidential basis for the activities to which the EEW fund may apply and also to ensure that the resources are properly allocated towards the highest priority issues while addressing the country’s pollution challenges in a systematic and cost-effective manner, there is the need for MESTI/EPA to fully adopt and integrate the existing TSIP database in Ghana’s national pollution action planning.

For other forms of hazardous waste there is no financial arrangement or mechanism with legal backing for addressing their potential impacts. Stakeholders may therefore need to engage to design arrangements for addressing the impact of such wastes.

130 Caravanos, J., R. Dowling, Grigsby P., Rivera, A., Ericson, B., Akuffo, B. and R. Fuller. (2015) Estimates of Heavy Metals Exposure from Toxic Waste Sites: A Ghanaian Case Study

131 GNA (2018): Ghana to start e-waste tax in November <https://www.ghanabusinessnews.com/2018/10/15/ghana-to-start-e-waste-tax-in-november/> Date Assessed 10/11/2018

132 Hazardous and Electronic Waste Control and Management Act 2016 (Act 917)

In line with the need for the integration of pollution into national plans, there is also the need to integrate pollution monitoring and reporting in MMDAs' annual planning and reporting. This is because the MMDAs have various mandates under the Local Governance Act 2016 (Act 936), the Public Health Act 2012 (Act 851) and allied regulations for public health and pollution management. Such an approach will give true meaning to the decentralization of governance as provided for under article 240 of the 1992 constitution and bring local-level action to bear in identifying and addressing all forms of pollution around the country.

Additionally, the need for extensive public awareness creation on pollution cannot be over-emphasised. Although millions of Ghanaians are potentially exposed to various forms of pollution, they are usually barely aware or may underestimate the severity of risks posed by the various sources of pollution to which they may be exposed.

PROJECT DESCRIPTION

A. Project beneficiaries

General population

The ultimate beneficiaries of the project include all residents who live near identified contaminated sites and are impacted by the chemical contamination at these sites. In similar site assessment programmes implemented by Pure Earth in other countries, the mean population at risk of exposure to toxic chemicals at each contaminated site was approximately 3,000 individuals. The project will bring national attention to their pollution exposure risk.

In addition, there will be beneficiaries of the skills training and logistical support which will be delivered by the project. They will also benefit from their ability through the project to obtain access to the data collected to enhance their work. These beneficiaries can be categorized as follows:

State Institutions

These are the national stakeholders with mandates or interests in pollution prevention and management. These institutions include MESTI, MMDAs, EPA, CSIR-SRI, WRI, Ministry of Food and Agriculture (MOFA), GHS, MSWR, Universities and other Research institutions.

Non-State Entities (consultancy firms, NGOs and individuals)

The technical capacities of NGOs and consultants who will be involved in the project will be enhanced.

B. Overall project objective

To contribute to the identification of contaminated sites in Ghana and to the assessment of their impacts on human health and the environment

C. *Intervention strategy*

The project's intervention strategy will rest on seven pillars.

1. Work will be undertaken to update and validate the data and information which have been collected under the TSIP program on the 221 contaminated sites already identified and assessed. This will involve site visits, data collection and laboratory analysis of samples from some of the old sites.
2. In parallel, the work of identifying 200 new contaminated sites will continue, using the methodologies and practices already elaborated under TSIP. This will involve capacity-building among other things.

Technical training will be provided for site investigators who will conduct the site identification and assessments. Officials from the EPA, MMDAs, CSIR-SRI and CSIR-WRI, and academic and research institutions responsible for the verification of the sites will also be trained. Additionally, the logistical and technological needs of stakeholders will be upgraded.

3. For the data and information collected from the known contaminated sites and any new ones identified to continue to be useful to policy makers and others, they will need to be housed in an appropriate database management system. An online database will therefore be constructed to store all relevant site assessment data. The database will be designed to also be able to generate relative risk scores based on an algorithm that analyses the type and toxicity of the contaminants, the concentration of the contaminants in soil and water samples, the exposure pathway to humans, the population at risk of exposure, and other geographic and demographic data relevant to estimating environmental health risks. EPA will act as the custodian and administrator of this database, along with the necessary funding for it to be maintained and expanded.
4. Another tool which the project will create to aid policy-makers in their decision-making will be a national pollution map. This map will indicate all known contaminated sites in Ghana, the population affected, and the scale of exposure severity. It will be developed from the field data. The map will assign different colour codes for different pollution risks to aid national level pollution prioritization and action. It will inform national pollution action and be a pillar for national land use planning.
5. Recognizing that clean-up of contaminated sites is the ultimate goal but recognizing also that the expense of site clean-up is a major barrier for LMICs like Ghana, the project will undertake three pilot demonstrations to show how exposure risks could be mitigated at contaminated sites at reasonable cost.
6. The results of all these previous activities will feed into a policy dialogue aimed at assessing and consolidating the general national strategy for managing soil contamination. Taking a cue from Act 917 previously

mentioned, the process may result, among other things, in the institution of financial mechanisms or other arrangements for addressing chemical pollution from non-WEEE sources as has been the case for WEEE by Act 917. To assist the policy dialogue, a research report will be prepared, analysing national policies and strategies on management of exposure to toxic chemicals in general to reveal the best practices, gaps and needs.

7. Finally, recognizing that there is a generalized lack of awareness among the Ghanaian population of the impacts on their health of exposure to toxic chemicals, the project will undertake extensive awareness-raising activities. This will involve the development and dissemination of Information, Education and Communication (IEC) materials at national and local levels to build consensus on the need to prevent exposure to toxic chemicals. These materials may include brochures, fliers and leaflets handed out to beneficiaries at community and district level fora, production of radio and television documentaries, and participation in live radio and television programmes.

Project Management and Stakeholder Involvement

The project will be jointly facilitated by the EPA, Pure Earth and its local partners such as the Green Advocacy and others, with a project management team. The project team will be supported by a Steering Committee whose members will consist of representatives from various government agencies such as MESTI, EPA, GHS, CSIR-SRI, CSIR-WRI etc., NGOs and other stakeholders.

D. Implementation partnership(s)

Partner Institutions	Expected roles and responsibilities
Ghana Health Service	<ul style="list-style-type: none"> • Baseline health data, hospital records • Periodic community health monitoring • Community education
Environmental Protection Agency (EPA)	<ul style="list-style-type: none"> • Training field officers • Developing sampling framework/ guidelines in collaboration with project stakeholders • Validation of sampling results • Site identification and selection
Pure Earth	<ul style="list-style-type: none"> • Site Identification • Training field officers • Selection of site investigators • Sampling using the XRF equipment
CSIR	<ul style="list-style-type: none"> • Field sampling • Mapping of sites • Laboratory analysis of samples

Partner Institutions	Expected roles and responsibilities
MMDAs	<ul style="list-style-type: none"> • Site identification • Community entry and consultation • Facilitate execution of the project in their districts • Awareness creation • Ownership of the process and results in the districts
MESTI	<ul style="list-style-type: none"> • Lead national agency giving policy direction to the project

E. Project outputs

The project will have the following outputs:

1. Contaminated sites have been identified and mapped
2. A national pollution map of all known contaminated sites has been created
3. The necessary database management system has been put in place
4. Awareness has been created
5. A policy review has been undertaken
6. Three pilot clean-ups have been undertaken

F. Key project activities

Activities	Locations	Timing	Partners
Output 1: Contaminated sites have been identified and mapped			
1.1. Establish research team	Accra, Ghana	Q1, Y1 - Q1, Y1	Green Advocacy, Pure Earth, EPA, CSIR, GHS
1.2. Review and update existing database	Accra, Ghana	Q1, Y1 - Q1, Y1	CSIR, Pure Earth-GreenAd, EPA, MMDAs
1.3. Validate existing sites	Districts, Ghana	Q1, Y1 - Q4, Y1	CSIR, Pure Earth-GreenAd, EPA, MMDAs
1.4. Prepare a research report, analysing existing information about contaminated sites and associated human and environmental health impacts, and establishing a list of preliminary sites targeted for initial screening assessments	Accra, Ghana	Q1, Y1 - Q2, Y1	Green Advocacy, Pure Earth, EPA, CSIR, GHS

Activities	Locations	Timing	Partners
1.5. Produce a site screening protocol, which uses the best available methods from other national and international programmes and is modified to address the needs of the government and the types of contamination challenges present in the country.	Accra, Ghana	Q1, Y1 - Q2, Y1	Green Advocacy, Pure Earth, EPA, CSIR, GHS
1.6. Sample and assess various media (soil, water, etc) at 200 new contaminated sites across Ghana	District, Ghana	Q1, Y1 - Q4, Y2	CSIR, Pure Earth-GreenAd, EPA, MMDAs Consultants
1.7. Subject the collected data to the necessary QA/QC	District, Ghana	Q1, Y1 - Q4, Y2	EPA, GSA, GHS
Output 2: A national pollution map of all known contaminated sites has been created			
2.1. Input the necessary data from output 1	Kumasi, Ghana	Q1, Y1 - Q3, Y3	EPA
2.2. Generate the pollution map	Kumasi, Ghana	Q1, Y1 - Q3, Y3	EPA
Output 3: The necessary database management system has been put in place			
3.1. Create a national platform to host the data on contaminated sites (activity 1.3)	Accra, Ghana	Q1, Y1 - Q2, Y1	EPA, GHS
3.2. Appoint custodians/administrators of the platform	Accra, Ghana	Q1, Y1 - Q2, Y1	EPA, GHS
3.3. Maintain the platform	Accra, Ghana	Q1, Y1 - Q4, Y3	EPA, GHS, MMDAs
Output 4: Awareness has been created			
4.1. Develop Information, Education and Communication (IEC) materials to build consensus on the need to prevent exposure to toxic chemicals	Accra, Ghana	Q1, Y2 - Q2, Y2	EPA, GHS, Green Advocacy, Pure Earth
4.2. Disseminate IEC materials to relevant stakeholders at national and local levels	All levels	Q1, Y2 - Q3, Y3	EPA, GHS, Green Advocacy, Pure Earth, CSIR, MMDAs
Output 5: A policy review has been undertaken			
5.1. Prepare a research report analysing national policies and strategies on pollution management in general to reveal the best practices, gaps and needs.	Accra, Ghana	Q1, Y1 - Q3, Y1	EPA, GHS, Green Advocacy, Pure Earth, CSIR
5.2. Use the report for policy dialogue on national pollution management.	Accra, Ghana	Q1, Y1 - Q3, Y1	EPA, GHS, Green Advocacy, CSIR, MMDAs
5.3. Undertake the necessary policy advocacy	All levels	Q1, Y2 - Q3, Y3	EPA, GHS, Green Advocacy, CSIR, MMDAs

<i>Activities</i>	<i>Locations</i>	<i>Timing</i>	<i>Partners</i>
Output 6: Three pilot clean-ups have been undertaken			
6.1. Establish criteria for site selection	Accra, Ghana	Q1, Y3 - Q1, Y3	EPA, GHS, Green Advocacy, Pure Earth, CSIR, MMDAs
6.2. Choose three sites to clean up	District, Ghana	Q4, Y2 - Q1, Y3	EPA, GHS, Green Advocacy, Pure Earth, CSIR, MMDAs
6.3. Review the possible interventions to use at the three sites and choose the most appropriate	District, Ghana	Q1, Y3	EPA, GHS, Green Advocacy, Pure Earth, CSIR, MMDAs
6.4. Undertake clean-up at three selected site(s)	Districts, Ghana	Q1, Y3 - Q2, Y3	EPA, GHS, Green Advocacy, Pure Earth, CSIR, MMDAs

At project end, a report will be prepared on the findings of the National Contaminated Site identification and Screening Program that contains a summary of the data collected, a list of high-priority sites that require detailed assessments, and recommendations to address specific sites and common sources of contamination.

G. Gender mainstreaming

A gender analysis will be undertaken during the project design phase to understand the roles, rights, needs, challenges, expectations, concerns and opportunities of the different gender groups. This will inform the project's gender strategy. A gender expert will be recruited to serve throughout the project duration.

H. Indicative budget, in EUR

Budget line	TOTAL	Year 1	Year 2	Year 3
Project staff:	378,000	126,000	126,000	126,000
- International	90,000	30,000	30,000	30,000
- National	288,000	96,000	96,000	96,000
Project consultants:	195,000	65,000	65,000	65,000
- -International	45,000	15,000	15,000	15,000
- -National	150,000	50,000	50,000	50,000
Sub-contracts	250,000	50,000	50,000	150,000
Sample analysis	200,000	65,000	80,000	55,000
Travelling and DSA	100,000	25,000	50,000	25,000
Meetings/training	300,000	100,000	100,000	100,000
Other direct costs	250,000	100,000	100,000	50,000
Total	1,673,000¹³³	531,000	571,000	571,000

I. Sustainability of project results

The EPA will be the eventual custodian and primary user of the data, and will have primary responsibility to validate the data. They will also have administrative control over the national platform for storing the data. The EPA will also lead the identification and selection of the sites which will be cleaned up by the project. By involving EPA from the start in the project, sustainability of its results will be supported.

J. Risks to project implementation

Project assumptions	Risk of failure	Mitigation action(s)
Assumption 1: stakeholders will buy into the objectives of the project	Medium. Some stakeholders may be unaware of the presence of toxics in the environment and their adverse impacts	Action 1- Create extensive awareness for the stakeholders (e.g. MMDAs) on the adverse impacts of hazardous substances
Assumption 2: Project partners will collaborate effectively to achieve project objectives	Low. The identified project partners have worked together on some past projects e.g. TSIP	Action 1- Agreed workplans will be signed among the relevant project implementing partners as basis for requisite resource allocations to be made
Assumption 3: The project will contribute to the sound management of chemicals in Ghana	Low. It is part of the obligations under the chemicals related conventions so national level commitment exists	Action 1- Need to update existing institutional action plans to accommodate the project

¹³³ Only direct costs; total costs will also include indirect costs

K. Monitoring, reporting and evaluation

A Monitoring, Evaluation and Communications (MEC) Officer will be employed on the project. S/he will be responsible for guiding site investigators and the validation exercise by the EPA on the type of data to capture in their reports based on the project logical framework. S/he will also be responsible for the collation of all project reports and aggregation of project achievements, including results of gender mainstreaming, in collaboration with the gender expert.

In collaboration with other project consultants and stakeholders, the MEC Officer will prepare articles, publications and other communication materials for publication on social media, TV or other platforms.

A mid-term evaluation will be conducted half way through the project's implementation to review the project's progress and to inform the remaining period of project implementation. A final independent project evaluation will also be conducted to assess the lessons of the project.

L. Communication and visibility

Support from donor(s) will be highlighted and emphasized during all relevant project activities. The project anticipates the following communication and visibility activities: issuing press releases, distributing factsheets/brochures and newsletters, publicizing project activities on websites, making presentations at workshops, conferences and/or other events, and education/awareness campaigns.

All communication and visibility activities will be conducted in accordance with the donor(s)' communications and visibility manual (if any). For example, awareness about the project will be promoted at different levels (national, local, etc.). All workshops and training courses will be made aware of the donor financing. Their logos, along with those of major partner and associates will be noticeably visible on all printed materials and presentations. Reports will prominently feature all logos. Press releases or other media products will reference project partner names and logos, including source and amount of funding.



ANNEX 1 LISTS OF CONTACTS AND PARTICIPANTS

Annex 1a: Technical Working Group Members

Institution	Name	Email/Telephone
Council for Scientific and Industrial Research	Dr Francis M. Tetteh	fmarthy2002@yahoo.co.uk/ 0244622124
Soil Research Institute (SRI)	Principal Research Scientist	
Environmental Protection Agency (EPA)	Dr Sam Adu-Kumi	adukumisam@yahoo.com/
Chemicals Control and Management Unit	Director	0244635213
Environmental Protection Agency (EPA)	Mr Emmanuel Appoh	eeappoh@yahoo.com/
Environmental Quality Unit	Unit Head	0501301466
Council for Scientific and Industrial Research	Dr Kwadwo Ansong Asante	kaasante@chemist.com/
Soil Research Institute (SRI)	Principal Research Scientist	0208404949
Green Advocacy, Ghana	Yaw Amoyaw-Osei	wayom59@hotmail.com/ 0243223864
Pure Earth Country Coordinator		
Ghana Health Service, Occupational Exposure Unit	Dr Carl Stephen Osei	oseicska@yahoo.com/ 0208164872
Ghana Health Services	Mr Caesar Nyadedzor	Caesar.nyadedzor@ghsmail.org/
National Poison Control Centre		0243646758
UNIDO Health and Pollution consultant/ Environment Focal Person	Mr Joseph Yeboah	jozit78@yahoo.com/ 0201 364 346
World Health Organization	Mr. Gordon Dakuu	dakuug@who.int
	National Programme Officer	0244 250 074

Annex 1b: HPAP inception, scoping and consultation meetings and workshops participants

Institution	Name	Position
Ministry of Environment, Science, Technology and Innovation		
	Professor Frimpong Boateng	Minister of State
	Madam Patricia Appiagyei	Deputy Minister of State
	Mr. Oliver Boachie	Special Advisor to the Minister
	Madam Levina Owusu	Chief Director
	Mr. Nasir A. Yartey	Communications Officer
Ministry of Health		
	Madam Tina Mensah	Deputy Minister
	Mr. E. A. Odame	Director, Policy Planning, Monitoring and Evaluation
Ministry of Trade and Industry		
	Hon. Robert Ahomka-Lindsay	Deputy Minister of State
	Mrs. Janet A. Mensah-Onumah	Industrial Officer
Environmental Protection Agency (EPA)		
Environmental Protection Agency	Dr. Sam Adu-Kumi	Director, Chemical Control and Management Centre
	Mr. Emmanuel Appoh	Head, Environmental Quality Unit
Ghana National Cleaner Production Centre	Mr. John Nyante	Programme Officer
	Mr. Lambert Faabeluon	Director
Ghana Health Service		
	Dr. Badu Sarkodie	Director, Public Health Directorate
	Dr. Asiedu Bekoe	Deputy Director, Public Health Directorate
	Dr. Carl Osei	Project Manager, Occupational Exposure Unit
	Mr. Caezer Nyadedzor	Head, Poison Control Unit
Other MDAs		
Ghana Standards Authority	Dr. Paul Osei-Fosu	Director, Food and Agriculture
Energy Commission	Mr. Prosper Amuquandoh	Inspector, Renewable Energy
MMDAs		
Tema Municipal Assembly	Engr. Solomon Noi	Head, Waste Management Department
Kumasi Metropolitan Assembly	Mr. Prosper Kotoka	Director, Waste Management Department
	Mr. Osei Asibey	Deputy Director, Waste Management Department

Institution	Name	Position
UN Agencies and Donor community		
UNIDO	Mr. Fakhruddin Azizi	UNIDO Representative in Ghana & Liberia
	Mr. Edward Clarence Smith	High Level Advisor on Health and Pollution
	Dr. Chung Duc Tran	Industrial Development Consultant
	Mr. Joseph Yeboah	Consultant, Health and Pollution/ Environment Focal Person
	Mrs. Gifty Kyei-Boateng	Senior Programme Officer
WHO	Paul Tommy	National Service Personnel
	Dr. Owens Laws Kaluwa	WHO Representative for Ghana
FAO	Mr. Gordon Daaku	Programme Officer
UNDP	Mr. Kofi Afakye	Deputy Country Director
World Bank Group	Beverly Barnor	National Service Personnel
	Asferachew Abate Abebe	Senior Environment Specialist
GIZ	Alexander Batteiger	Technical Advisor
Academia and Research Institutions		
Water Research Institute	Dr. K. A. Asante	Principal Research Scientist
CSIR- Soil Research Institute	Dr. F. M. Tetteh	Principal Research Scientist
	Dr. Grace Bolfrey-Arku	Senior Research Scientist
CSIR- Crop Research Institute	Dr Moses Brandford Mochiah	Entomologist
	Mr Stephen Arthur	Research Technologist (Weed Scientist)
CSIR- Building and Road Research Institute	Dr. Mark Bediako,	Researcher
	Mad. Winefred Prempeh	Head of Marketing
	Mr. Yaw Peprah Boateng	Head of Commercialization
Kwame Nkrumah University of Science and Technology	Mr Collins Opoku Gyan	Pozzolana (Factory) Manager
	Dr. Godfred Darko	Lecturer
School of Public Health- UG	Prof. Theophilus Adjei Kumi	Lecturer
	Prof. Julius Fobil	Associate Professor
	Dr. John Arko-Mensah	Lecturer
Private Sector		
Momentum FAF Ltd	Mr. Frank Fosuhene	Managing Consultant
	Miss Dzifah Agbefu	Junior Consultants
Accra Compost and Recycling Plant (ACARP)	Mr. Mawutor K. Attah	Project Manager
Kumasi Compost and Recycling Plant (KCARP)	Dr. Glenn Kwabena Gyimah	Research and Quality Assurance Manager
Nfensi Ventures (Bricks and Tiles)	Mr. Kumah Boakye	Managing Director
Vicalex Bricks and Tiles Co. Ltd., Nfensi	Mr Frank Fosu Mensah	General Manager
Design Network Architecture	Michael Bortei Donkor	Manager
NGOs		
Pure Earth	Mr. Yaw Amoyaw-Osei	Country Coordinator
Green Advocacy, Ghana	Mr. Nana Bennet Akuffo	Programme Officer
Friends of The Nation	Mr. Solomon Kusi Ampofo	Programme Officer
Ghana Alliance for Clean Cook Stoves	Mr. Mohammed Aminu Lukumanu	Chief Executive Officer

Annex 1c: HPAP validation workshop participants

Institution	Name	Position
Ministries		
Ministry of Environment, Science, Technology and Innovation	Mr. Oliver Boachie	Special Advisor to the Minister
Ministry of Local Government and Rural Development	Dorcas Essandoh	
MDAs		
Ghana Health Service	Mr. Caezer Nyadedzor	Head, Poison Control Unit
Ghana Standards Authority	Dr. Paul Osei-Fosu	Director, Food and Agriculture
National Development Planning Commission	Edward Bruce-lyle	Policy Officer
MMDAs		
Kumasi Metropolitan Assembly	Mr. Prosper Kotoka	Director, Waste Management Department
UN Agencies and Donor community		
UNIDO	Mr. Fakhruddin Azizi	UNIDO Representative in Ghana & Liberia
	Mr. Joseph Yeboah	Consultant, Health and Pollution/ Environment Focal Person
	Mrs. Gifty Kyei-Boateng	Senior Programme Officer
WHO	Biagne Keussy	UN Volunteer
	Paul Tommy	National Service Personnel
UNOPS	Dr. Owens Kaluwa Metro	WHO Representative for Ghana
UNDP	Mr. Gordon Daaku	Programme Officer
US Embassy	Linda Agbesi	
	Joel Ayim Darkwa	UN Volunteer
	Jonathan Kelsey	First Secretary, Regional Environment Office
	Luslienoi Isiah	Environment Officer
Academia and Research Institutions		
Water Research Institute	Dr. K. A. Asante	Principal Research Scientist
CSIR- Soil Research Institute	Dr. F. M. Tetteh	Principal Research Scientist
School Of Public Health, UG	Dr. John Arko-Mensah	Lecturer
NGOs		
Pure Earth	Mr. Yaw Amoyaw-Osei	Country Coordinator
Association of Ghana Industries	Mr. Seth Akwaboah	Chief Executive Officer
European Union		
Delegation of the European Union to Ghana	Mr. Zoltan Agai	Head of Cooperation

ANNEX 2 ABOUT THE GLOBAL ALLIANCE ON HEALTH AND POLLUTION

The Global Alliance on Health and Pollution (GAHP). GAHP is a global collaborative body that assists low- and middle-income countries to take concrete action to reduce the impacts of pollution on health. GAHP members include more than 40 national ministries of health and environment, development banks, United Nations organizations, other bilateral and multilateral groups, universities, non-governmental organizations, and other actors working on pollution. The current GAHP Secretariat is the New York-based non-profit organization, Pure Earth (also known as the Blacksmith Institute).

More information about GAHP is available at www.gahp.net.

ORIGIN AND DESIGN OF THE HPAP PROGRAM

The global Health and Pollution Action Plan (HPAP) program is an initiative of the GAHP. It emerged from the recommendations of the Lancet Commission on Pollution and Health and from the expertise and guidance of GAHP members. The Commission report makes six core recommendations, including:

“In addition to increased funding, international technical support for pollution control is needed in prioritization and planning of processes to tackle pollution within rapidly industrializing cities and countries; in development of regulatory and enforcement strategies; in building technical capacity; and in direct interventions, in which such actions are urgently needed to save lives or can substantially leverage local action and resources. Financing and technical assistance programmes need to be tracked and measured to assess their cost-effectiveness and to enhance accountability.”

GAHP has received requests from over 20 low- and middle-income country governments to facilitate research, prioritization, planning, project selection



and design, and the development of funding strategies to address pollution challenges. Although GAHP is not a funding agency, the expertise and experience of its member organizations can be highly valuable for countries where national institutions face limitations related to funding and technical capacity. In response to these requests for assistance, the GAHP developed the global HPAP program, aimed at low- and middle- income countries.

The goals of the HPAP program are to:

1. Assist governments to identify, evaluate and prioritize existing pollution challenges based on health impacts
2. Establish pollution as a priority for action within national agencies and development plans
3. Define and advance concrete interventions to reduce pollution exposures and related illnesses

The HPAP is a pollution prioritization and planning process. It differs from other planning processes in that it is structured to bring together different agencies and parties that may not frequently work closely together. It is intended to promote collaboration. It is therefore driven by national agencies – Ministries of Environment, Health, Production/Industry, Transport, Energy, Mining, Agriculture and others – with facilitation and support by GAHP. The process can be tailored to the needs of an individual country, and aims to assist governments in identifying, prioritizing and accelerating national interventions to reduce pollution-related illness and death. It is designed to develop and implement well-defined and practical outcomes, with commitments by all the participants, including international partners and donors, to undertake specific short- and medium-term actions to improve environmental health. In countries where a National Environmental Health Action Plan (NEHAP) has already been developed with the support of WHO, the HPAP is intended to support the practical implementation of the key priorities.

Depending on the national context, the scope of the HPAP can include indoor and outdoor air pollution, unsafe water and inadequate sanitation, chemical contamination of soil, and occupational exposures to pollutants.

The HPAP process is flexible and can be tailored to the needs of each country, but generally includes the following steps:

- **PHASE 1.** Collection, compilation and analysis of available information on health impacts from pollution and existing pollution management programs by the Ministries of Health, Environment and Industry/Production, with assistance of the GAHP.
- **PHASE 2.** Inception meeting to prioritize pollution issues, define next steps, including roles and responsibilities of stakeholders through a participatory process.
- **PHASE 3.** Preparation of a draft Health and Pollution Action Plan describing priority pollutants, pollution sources, health impacts, cost-effective interventions to reduce exposures, resources needed and potential sources of funding by a joint National Working Group with participants from the Ministries of Health, Environment, Transportation, Agriculture, Energy, Industry, Mining and with support from the GAHP.
- **PHASE 4.** Circulation of the draft Action Plan to national and international stakeholders, which are invited to provide comments. The National Working Group integrates stakeholder comments and a final Health and Pollution Action Plan is created. Stakeholders reconvene to officially endorse and validate the Action Plan and discuss next steps toward implementing suggested actions.
- **PHASE 5.** Dissemination, promotion, fund raising, implementation, monitoring and review of the HPAP through domestic and international initiatives, in collaboration with GAHP, under the guidance of a joint coordinating team between the Ministries of Health and Environment.

ANNEX 3 AVAILABLE NATIONAL DATA

Available data sources

Organization	Nature of data available	Comments
Ghana Health Service	Real time health data from all health facilities in the 257 districts in Ghana	<p><i>The data is held in an online based system with controlled access referred to as DHIMS2- District Health Information Management System.</i></p> <p><i>It is managed by the Centre for Health Information Management (CHIM) of Ghana Health Service. Data is input on regular basis.</i></p>
Environmental Protection Agency	Environmental Quality Monitoring Data	<i>The data includes air and water quality, noise levels from industries, major roads and residential areas. The data is available at the Environmental Quality Unit of the EPA</i>
Ghana Statistical Services	<p>Industrial Survey</p> <p>Ghana housing survey</p> <p>Ghana population census data</p>	

ANNEX 4 GLOBAL BURDEN OF DISEASE DATA

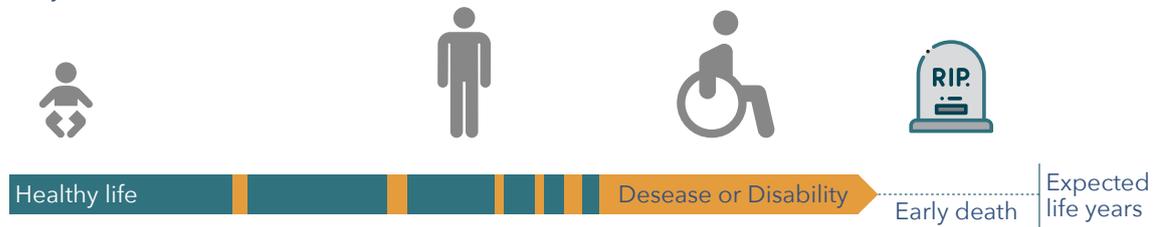
Agencies such as the World Health Organization (WHO) and the Institute for Health Metrics and Evaluation (IHME) have conducted increasingly sophisticated global burden of disease studies that use data from government agencies, universities and other research groups to reveal the rates of death and disease associated with different risk factors, including exposures to various forms of pollution. These studies show that pollution is now responsible for between nine million and thirteen million deaths annually, and is one of the leading risk factors causing premature death in the world.

The HPAP analysis relies primarily on data from the IHME Global Burden of Disease (GBD) study. The GBD quantifies health loss from hundreds of diseases, injuries, and risk factors, so that policy-makers can fully understand their country's health challenges - and how those challenges are shifting over time. Data from ministries of health and other research organizations are collected and analyzed by a consortium of more than 2,300 researchers in more than 130 countries. The data capture premature death and disability from more than 300 diseases and injuries in 195 countries, by age and sex, from 1990 to the present, allowing comparisons over time, across age groups, and among populations.

DALY

Disability Adjusted Life Year is a measure of overall disease burden, expressed as the cumulative number of years lost due to ill-health, disability or early death.

$\text{YLD} + \text{YLL} = \text{DALY}$
 YLD Years lived with Disability
 YLL Years of Life Lost



The GBD allows decision-makers to compare the effects of different diseases and risk factors, such as malaria versus cancer, or pollution versus malnutrition, and then use that information to make policy in their home country.

DISABILITY ADJUSTED LIFE YEAR (DALY)

The GBD study cites its data in the form of Disability Adjusted Life Years (DALYs). A DALY is a measure of overall disease burden, expressed as the number of years lost due to ill-health, disability or early death. The DALY is increasingly used in the field of public health. It extends the concept of years of life lost due to premature death, to include equivalent years of healthy life lost due to poor health or disability. In so doing, mortality and morbidity are combined into a single, common metric.

ANNEX 5 ADDITIONAL PROPOSED ACTIONS DURING PROJECT CONSULTATIONS

Activities	Lead agency	Partner Agency/ies	Time frame	Deliverables
Municipal Solid Waste				
Provide public education and awareness on the effects of poor MSWM practices on health	MSWR	MLGRD, MMDAs, UNIDO	2019-2022	Awareness creation materials
Promote waste-to-energy technologies	MSWR	MLGRD, MMDAs, EPA, GNCPC, Energy Commission, CSIR-IIR, UNIDO, UNDP	2019-2021	Resilience Strategy developed for AMA, scalable for Ghana
Enhance law enforcement on the import and use of hazardous waste	MMDAs	Ghana Police, EPA, Sanitation Courts	N/A	Capacity building assistance to implementing institutions (e.g. equipment, transport means, training, etc.)
Review, gazette, and enforce MMDA by-laws on sanitation	MMDAs	AGs Department, Ghana Police, Sanitation Courts	N/A	Revised and gazetted MMDA sanitation by-laws
Develop innovative financing mechanisms and scale up investments in the sanitation sector	MSWR	MLGRD, MMDAs, Private Sector, Banks, UNIDO	2019-2022	Policy framework for sanitation sector financing

Activities	Lead agency	Partner Agency/ies	Time frame	Deliverables
Promote private sector participation in the provision of sanitation services	MSWR	MLGRD, MMDAs, Private Sector, Banks, UNIDO	2019-2021	Policy for Public Private Partnership in sanitation management
Improve institutional capacity and coordination	MSWR	MLGRD, MMDAs,	2019-2022	Training manuals
Create more waste transfer stations for handling waste	MSWR	MLGRD, MMDAs	2019-2022	Waste transfer stations created at designated locations
Improve the management of Health Care Waste	GHS	EPA, MMDAs, Service Providers,	2019-2022	Records on HCW
Improve the management of waste disposal sites	MMDAs	Service Providers, EPA, UNIDO, WHO	2019-2022	Resilience Strategy developed for AMA scalable for Ghana
Create more engineered landfill sites and address the challenges of the Tema and Kumasi landfills	MSWR	MLGRD, MMDAs, UNIDO, UNOPS	2019-2022	Identification, formulation and funding of investment projects
Undertake a scientific assessment of the environmental and human health impact of e-waste management in Ghana	MESTI	CSIR, Pure Earth, UNIDO	2016-2021	Commission researches /reports on the health impact of e-waste management in Ghana

Pollution from Manufacturing Activities

Activities	Lead agency	Partner Agency/ies	Time frame	Deliverables
Monitor industrial effluents and apply sanctions on defaulting companies	EPA	CSIR, MMDAs	2019-2022	Measures to reduce the number of offending industries by at least half
Promote cleaner production and consumption technologies and practices	MESTI, MOTI	EPA, GNCPC, AGI, UNIDO	2019-2022	National industrial policy updated Report on industrial success stories on cleaner production
Develop an Oil and Gas environment policy	MESTI	EPA, UNDP	2019-2021	Oil and Gas environment policy
Promote an industrial symbiosis program for waste exchange	EPA	EPA, GNCPC, AGI, UNIDO	2019-2022	Report on industrial waste stock exchange success stories
Pollution from Contaminated Sites				
Enforce national laws and regulations on the import of hazardous and other waste in line with Basel Convention	EPA	MESTI, CEPS, Ghana Police, GSA, Energy Commission	N/A	Capacity development
Improve management of waste disposal sites to control GHG emissions	MMDAs	MESTI, EPA, WHO, UNDP	2019-2022	Resilience Strategy developed for AMA scalable for Ghana
Monitor and prevent imports of unregistered and banned chemicals	EPA	MOFA, CEPS, Ghana Police, FDA, GSA	2019-2022	Capacity development
Intensify enforcement of regulations on noise and air pollution, including from open burning	EPA	AGs Department, Ghana Police, Courts	2019-2022	Capacity development

Activities	Lead agency	Partner Agency/ies	Time frame	Deliverables
Enforce environmentally sound management of chemicals and all waste throughout their life cycle	EPA	MSWR, MLGRD, MMDAs, GNCPC, MESTI, Service Providers	N/A	Capacity development
Implement mercury control and management programmes to fulfil Ghana's obligations under the Minamata convention	MESTI	EPA, GHS, UNIDO, ILO, UNDP, WHO, UNITAR, NRDC	2019-2022	NAP developed to reduce the use of mercury and mercury compounds Collaborative interventions developed to address mercury pollution
Implement air pollution control and management programmes to abate the health impacts of indoor and outdoor air pollution	MESTI/ MoH	EPA, GHS, MMDAs, WHO, UN-Habitat, ICLEI	2016-2020	Air pollution tracking platform developed and installed at designated locations around Greater Accra Metropolitan Area (GAMA) Air Quality Management Plan and Communications Strategy developed for GAMA SLCP Action Plan Developed for GAMA





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