
ENVIRONMENTAL HEALTH SITUATION ANALYSIS IN SOMALIA 2010



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ACRONYMS

AIDS	Acquired Immunodeficiency Syndrome
ART	Antiretroviral Therapy
CAP	Consolidated appeal process
CTC	Cholera treatment centre
DDT	Dichlorodiphenyl trichloroethane
DHIS	[untraced]
DRC	Danish Refugee Council
EMRO	WHO Regional Office for the Eastern Mediterranean
ESCWA	United Nations Economic and Social Commission for Western Asia
FAO	Food and Agriculture Organization of the United Nations
HIV	Human Immunodeficiency Virus
HP	Health Post
IAEA	International Atomic Energy Agency
IDP	Internally Displaced Person
IIDA	Somali women's development organization
IMO	International Maritime Organization
IUCN	International Union for Conservation of Nature and Natural Resources
MCH	Mother and Child Health
MDG	Millennium Development Goal
MICS	Multiple Indicator Cluster Survey
NRC	Norwegian Refugee Council
OCHA	United Nations Office for the Coordination of Humanitarian Affairs
SAACID	Somali women's development organization
SCPA	Somaliland Consumer Protection Agency
SOPHPA	Somali Public Health Professional Association
SRCS	Somali Red Crescent Society
UN	United Nations
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Social and Cultural Organization
UNFPA	United Nations Population Fund
UNHCR	Office of the United Nations High Commissioner for Refugees
UNICEF	United Nations Children's Fund
VCT	Voluntary Counselling and Testing
WASH	Water, Sanitation and Hygiene
WFP	World Food Programme
WHO	World Health Organization

Definitions

- **Medical waste** is waste generated by health care activities includes a broad range of materials, from used razor blades, needles and syringes (sharps) to soiled dressings, body parts, diagnostic samples, blood, chemicals, pharmaceuticals, medical devices and radio-active materials. www.who.int/topics/medical_waste/

- **Biohazardous agent** or infectious agent refers to an agent that is biological in nature, capable of self-replication and has the capacity to produce deleterious effects upon biological organisms. www.purdue.edu/rem/eh/biowaste

- **Sharps** are items that are capable of puncturing, cutting, or abrading the skin. www.purdue.edu/rem/eh/biowaste

- **Biological waste** is any material that contains or has been contaminated by a biohazardous agent. Biological waste includes, but is not limited to Petri dishes, glass and plastic pipettes, surgical wraps, blood contaminated materials, culture tubes, razor blades, syringes, needles (sharps), human and animal blood, and personal protective equipment. www.purdue.edu/rem/eh/biowaste and www.cmu.edu/ehs/biological/waste

EXECUTIVE SUMMARY

Introduction

Somalia's long-lasting civil strife, unrest and lack of a functioning government for the last 20 years have all contributed to the current worsening of the environmental conditions and the implications for public health. The absence of proper governance and a regulatory and legislative framework and its enforcement and control over access to and use of natural and environmental resources has consequences for the Somali population at large. Concerns expressed by the Government and health authorities about the implications of environmental neglect and degradation on public health have led to the launching of an environmental health assessment in Somalia, which was undertaken from 21 June to 20 September 2010.

Environmental health assessment

The World Health Organization (WHO) has commissioned an environmental health assessment in the three zones of Somalia: Somaliland, Puntland and South-Central Somalia.

The terms of reference of the four month assignment were to undertake a situation analysis and needs assessment for environmental health in all zones of Somalia; to draft a document, based on the needs assessment, setting out the environmental health priorities identified for each area which can be used for drafting environmental health action plans for the respective areas; to provide guidance on the establishment of public health laboratories with sections for health, water, and food; and to submit a final assignment report. The focus of the assessment is to document the current environmental situation in the areas of waste, water, sanitation and hygiene, food and agriculture, industrial pollution and energy.

The assessment is a first review of the Somali environmental health situation and it documented the current situation and practices observed in order to advocate and better address the environmental and public health findings.

Methodology

The methodology used for this assessment included a three-day training workshop, held from 23 to 25 June 2010, involving staff of WHO and health authorities, and the selected sanitarians to undertake the zonal assessments. The facilitator of the workshop provided general information on environmental health and the areas of interest. Discussions took place on the assessment tool, on guidelines to be followed for the assessment, on the kind of information and data to be collected from stakeholders, and on how to undertake an analysis. The listing of identified priorities and appropriate interventions was discussed, together with the timely submission of the zonal report.

The zonal situation assessments in Somalia were carried out by national health officers (sanitarians). They made site visits to relevant locations, such as industrial workshops, sanitary facilities, small-scale factories, slaughterhouses and communal food markets to make first-hand observations of the current situation of environmental and public health. Further, they collected and analysed existing environmental health data, listed the main priorities, and suggested appropriate interventions. A number of consultations were held with various stakeholders involved in environmental health areas in Somalia. They include representatives of health ministries, United Nations agencies, local and international non-governmental organizations, and the private commercial sector.

A desk review was conducted to extrapolate relevant information from published documents on main areas of environmental and public health over the last five years in relation to the findings of the assessment. These included annual reports and communications from line ministries, reports of research studies and multi-indicator cluster surveys.

Major challenges were encountered in collecting reliable data and in obtaining relevant and up-to-date information for an environmental health assessment. As a result, the assessment may not cover all the components for a comprehensive situation analysis. The assignment report was used to draft the environmental health situation analysis, which will form the basis for the development of a Somali environmental health strategy

General findings and conclusions

The situation analysis is a first attempt to assess the Somali environmental health situation after a joint assessment in 1986. For various reasons in relation to the political situation of the country, no up-to-date or specific data could be collected from local governmental institutions due to lack of systematic reporting; hence visual images were collected to complement the situation analysis.

The analysis does not claim to be complete or comprehensive but it documented the various key areas which should be further addressed in a Somali environmental health strategy applicable to the three zones.

The situation analysis brought to light the current efforts invested in environmental health activities by various stakeholders in both public and private sectors, and the local communities. Public-private partnership initiatives in water or waste management demonstrated a way of collaboration with potential outcomes in support of sustainable development.

The challenges observed with regard to public and environmental health, arising from inadequate water supply and waste management, poor sanitation, and unhygienic living conditions appear to be applicable across the three zones and for the country as a whole. In particular, solid and liquid waste management and control, food safety and control, water safety and control, energy (charcoal use), residential and institutional environmental sanitation and control remain at a very rudimentary level in the three zones.

Although shortage of funds was indicated, there was a general lack of any effective strategy and commitment on the part of the local governments to enforce regulations or to conduct any sort of analysis of how well their related measures were working. This failure is attributable to a general lack of environmental policies or of any effective vision.

The alarming situation in Somalia calls for urgent and effective regulatory measures that can address the issues of both environmental health and public health. Environmental laws and regulations are becoming necessary to manage the sustainable use of natural resources and to safeguard the environment. Regulatory strategies should include prevention-oriented environmental policies as well.

There is a critical need for all three zones to initiate the development of environmental health strategies, to establish infrastructure and government institutions for necessary

exposure-mitigation and response strategies in order to safeguard the environment and to improve the level of people's health.

Given that public health problems in the three zones are mainly infectious diseases due to insufficient disease management and control, poor sanitation and lack of hygienic living conditions, there is an urgent need for immediate and effective interventions to scale up, contain and control some of the health problems and to introduce new initiatives, policies and guidance for better water supply and waste management and control systems in urban and rural areas. A holistic approach should be adopted to bring about effective coordination of WASH activities to reduce the impact of water-borne diseases.

Waste disposal system for solid and liquid wastes should be put in place either in the public or municipality, slaughterhouses, food catering and processing facilities, and communal markets or in the private sector which meets the minimum sanitary and hygiene standards or complies with the public health and safety regulations on the design, construction and operation of these entities.

The absence of adequate biohazard and biological waste management procedures in health institutions in both public and private sectors allows for uncontrolled outbreaks of contagious diseases and is a threat to public health. In particular, there is no adequate incineration system in place in any of the health facilities.

Rainwater harvesting is of the first importance in increasing the water supply. Efforts should be made to set in place rainwater harvesting systems, including water redevelopment plans for boreholes and shallow wells for rainwater harvesting.

There is a multitude of international and local non-governmental organizations that, while providing a certain amount of support and guidance to local environmental and public health projects, they have not made sustainable environmental health impact due to lack of long-term commitment from authorities and local communities.

Main recommendations

In the light of the findings and conclusions, the following main recommendations have been formulated in an endeavour to address gaps, shortcomings and other deficiencies identified and to guide interventions for remedial action to address environmental issues in the three zones of Somalia.

Adequate investment should be made in public and environmental sanitation and high priority should be given to the establishment of environmental health, sanitation and hygiene infrastructure and the introduction and strengthening of public health, sanitation and environmental inspection services in urban, rural and remote areas.

The necessary regulatory framework and law enforcement measures should be set in place and strengthened.

Zonal environmental agencies and regional environmental health units should be established to provide expertise and know-how on risk management and assessment.

Appropriate public health inspection services should be set in place and maintained.

Capacity-building and training should be arranged for public health and environmental inspectors, sanitation officers and supervisors. Retraining should be provided for public health and environmental inspectors working at municipality level and dealing with public premises, industries, borders, coastal areas and airports.

Coordination and cooperation should be established between relevant government bodies involved in public and environmental health: the ministries of health, education, veterinary services, agriculture, minerals, water, planning, internal affairs and labour; local authorities; and with the private sector, UN agencies, and international and local non-governmental organizations in order to establish partnerships for sustainable development in environmental health.

Zonal cooperation should be established and maintained and efforts should be made to encourage the regions to join efforts, share knowledge and work together for a better environment.

Key area 1: Health

A comprehensive legal framework should be developed by taking into consideration relevant laws and regulations in support of enforcement to protect the public from the adverse effects of contaminants in food, water and air.

An environmental agency should be established to provide expertise and know-how on risk management and assessment. Such an agency should develop exposure-assessments and response strategies, including environmental sample testing, analysis and response, and the development of guidelines and protocols for these exposure assessments. Quality assurance and control is a critical element in exposure investigation and must be part of the strategy.

Zonal public health laboratories should be established to investigate adverse health effects of contaminants in food, water and air and to perform quality control testing of food stuff, water and air samples.

The health care delivery system in all zones of Somalia should be improved and strengthened.

Key area 2: Waste

A comprehensive waste management strategy should be developed, supported by a regulatory and legislative framework and its enforcement at zonal, regional and district levels.

Zonal public health laboratories for integrated quality control should be set in place and appropriate low-cost sanitation technology options introduced into the integrated management and control of solid and liquid wastes.

Municipal departments should receive support to enable them to run effective refuse collection and disposal operations. National and international agencies should be encouraged to support sustainable programmes for refuse collection.

Adequate and structured solid and liquid waste management systems conforming to the latest management standards should be established.

Public-private partnerships should be considered for sustainable waste management and control as well as for funding of market development to promote waste recycling and sanitation and hygiene services, including solid and liquid waste management.

Land use plans should be developed for the disposal of solid waste at dumpsites and for the disposal of liquid waste in constructed ponds for liquid waste processing.

Systems should be put in place for the management and control of biohazard and biological waste from all health facilities, laboratories, and pharmacies in both public and private sectors in order to protect public health.

Key area 3: Water

Access to safe drinking water should be prioritized. A proper water management strategy should be developed based on research findings and options for desalination to be explored. The treatment of surface and groundwater should be actively encouraged as a means of protecting public health.

Public-private partnerships should be considered for sustainable water supply management and control.

A water quality control unit as part of a zonal public health laboratory should be established in each zone, as a matter of priority, to train personnel in the fields of health, water and sanitation and there should be an overall strategy for the control of water-borne diseases.

Rainwater harvesting systems and water redevelopment plans, including boreholes and shallow wells for rainwater harvesting, should be widely deployed.

Aid programmes should support the provision of sufficient drinking water and adequate sanitation facilities for IDPs. WASH services for the benefit of IDPs and other affected target groups of the population should be rehabilitated and protected.

Key area 4: Food and agriculture

The necessary legal and policy framework should be set in place for the conservation of habitats and biodiversity, both in terrestrial and aquatic ecosystems.

An effective environmental surveillance and response system should be put in place to reduce any further degradation of both terrestrial and aquatic ecological systems that are currently under great stress or threat.

Sufficient resources should be allocated for the protection of all ecological systems that would guarantee the protection of biodiversity.

Capacity-building efforts must be stepped up at all levels and training initiated at local and regional levels in the conservation of habitats and biodiversity.

The use of pesticides as a form of medicine for the treatment of cattle should be further investigated.

Key area 5: Industrial Pollution

The industrial pollution generated by the small-scale industries and the public health consequences thereof should be mapped and appropriately addressed.

Key area 6: Energy

The necessary environmental protection measures must be set in place and the development of alternative fuel generation and use options explored.

New cooking fuel and solar methods should be introduced with community involvement to reduce the use of charcoal.

Way forward

A comprehensive environmental health strategy should be developed with involvement of main stakeholders. Additional operational research may be needed to further investigate key areas.

A multisectoral approach should be adopted to address issues of water and waste management and control in order to reduce health-related events and incidences. FAO, UNEP, UNHABITAT, UNICEF and WHO should closely collaborate together and support a multisectoral approach for addressing issues raised in this situation analysis.

The international community and donors should provide adequate investment and technical assistance for addressing the critical environmental issues mentioned in this document.

1. BACKGROUND

1.1 CHARACTERISTICS OF SOMALIA: GEOGRAPHY, ENVIRONMENT AND RECENT HISTORY

Somalia, with a total of 637 540 square kilometres, occupies the tip of the Horn of Africa. Its coastline of 3025 km, the longest in Africa, ranges from the Gulf of Aden in the north (1000 km) to the Indian Ocean in the east and south (2000 km). Somalia's physical area extends 1550 km from north to south and 1090 km from west to east. Most parts of the country are flat, with the southern and central regions near the Ethiopian border rising to a few hundred metres above sea level. Shimer Berris in the Sanaag region, at 2407 metres, is the country's highest peak.

The inter-tropical convergence zone influences climate changes. Elevation is high in some areas, particularly in the north. Most parts of Somalia range from semi-arid to arid, and are hot and dry throughout the year, with low and erratic precipitation. Droughts occur every two to three years, followed by heavy rainfall and devastating floods. These seasonal changes are the primary determinants governing the lives of the Somalis, especially for the timing and quantity of the seasonal rains and the adequacy of the grazing in given seasons. There are four recognized seasons, two of which are rainy (Gu and Deyr) and two dry (Jiilaal and Hagaa). The Gu rains begin in April and last until June, accounting for 60% of the total rainfall. The Hagaa season (July–September) is followed by the Deyr (October–November), which is in turn followed by the Jiilaal (December–end of March). The annual rainfall ranges from as little as 50 to 500 mm. Average daily maximum temperatures range from 30°C to 40°C and average daily minimum temperatures vary between 20°C and over 30°C.

In 1986, at the request of the Government of the Democratic Republic of Somalia, a multi-agency mission¹ led by UNEP investigated the coastal and marine environmental health problems of the country. The mission that undertook the assessment concluded that there was no major pollution of the marine environment and no threat posed to the economy of Somalia. Deballasting and tank-cleaning operations by tankers were the only significant forms of oil pollution at sea reported at the time. Furthermore, marine life was not threatened in any significant way by land-based sources of pollution. Industrial development was limited and the majority of Somalia's installed manufacturing plants were located within urban centres in the southern coastal area. The discharge of industrial wastes along the shore or directly into the sea was estimated to be relatively small in terms of the total marine and coastal environment. The major source of environmental pollution at that time was the use of pesticides, including DDT.

The long-lasting civil strife and unrest in Somalia and the lack of a functioning government for the last 20 years have contributed to the current worsening of the environmental conditions and the implications on public health. The absence of a State regulatory and legislative framework and its enforcement and control over access to and use of natural and environmental resources has consequences for the Somali population at large. Concerns expressed by the health authorities about the implications of environmental neglect and degradation on public health have led to the launching of this environmental health assessment in Somalia.

¹ The mission involved the following agencies: United Nations Environmental Programme (UNEP), Economic and Social Commission for Western Asia (ESCWA), Food and Agriculture Organization of the United Nations (FAO), United Nations Educational, Scientific and Cultural Organization (UNESCO), International Maritime Organization (IMO), International Atomic Energy Agency (IAEA) and International Union for Conservation of Nature (IUCN).

1.2 CURRENT SITUATION IN SOMALIA

After 20 years of armed conflict and violence in some areas, particularly South-Central Somalia, most of the government institutions and infrastructure have been destroyed. Somalia is now experiencing its worst environmental abuses ever. The environment has been neglected and greatly damaged. The country's current environmental health situation reflects a deepening crisis due to the absence of a strong government, proper governance, a regulatory and legislative framework, and inspectorate and monitoring systems.

As a result of the neglect of environmental and natural resources, both the environmental and public health status of all populated regions has been disproportionately affected. The country faces many challenges in meeting the daily living and livelihood conditions, and basic health needs of the Somali people.

In addition, the lack of awareness of the general public and the presence of groups and individuals taking advantage of the current situation in the country have contributed to the continued exploitation of the already fragile situation of environmental and natural resources for personal and monetary gains.

Tree cutters and charcoal producers are focused on survival and feeding their families. Among others, business people, *khat retailers*, small-scale industrialists, and industrial workshop owners dump their waste in streets, on empty plots of land, or even in rivers. This is the cheapest way to dispose of their waste, as alternative options may be more expensive and will decrease their profits.

Over the last 20 years no significant environmental assessment has been conducted to document the situation of the Somali ecosystems, habitats and human and animal health. The worsening environmental situation is not only a threat to public health but also indicates progressive environmental contamination, destruction of biodiversity, and loss of beaches and coral reefs.

There has been no use either of environmental risk assessment or risk management approaches, which are important ways of identifying whether communities and habitats may be at risk, as there are no environmental health institutions in place to conduct these threat and risk assessments. Nor are there any inspectorate departments in place to carry out environmental inspection and control, or public health laboratories to undertake sample testing and analysis or to monitor international standards set for food contaminants, and for soil, air and water pollutants.

It is known that investment in environmental health rather than in public health per se will produce more sustained and rapid improvements in the overall health status of the Somali people. In the context of Somalia, the threats posed to public health by environmental health-related hazards are numerous and include: polluted environment; poor sanitation; contaminated drinking water; unhygienic living conditions; unsafe food production; and proliferation of disease-transmitting vectors. All these factors contribute to high incidences of disease among the Somali people at large, and children in particular.

Thus, it is important to screen all types of pollutants existing in the environment (water, air, land and sea) and adequately to dispose of all kinds of waste in a manner that is

seen as ecologically sound, economically productive and socially conducive, in order to sustain healthy living conditions and habitats for humans and animals, and to protect biodiversity, environmental and natural resources by involving local communities in management and preservation activities.

1.3 WORLD HEALTH ORGANIZATION RESPONSE – ENVIRONMENTAL HEALTH ASSESSMENT

The World Health Organization (WHO) has commissioned an environmental health assessment in the three zones of Somalia: Somaliland, Puntland and South-Central Somalia. The terms of reference of the four-month assignment were the following:

- To undertake a needs assessment for environmental health in all zones of Somalia;
- To draft a document, based on the needs assessment, setting out the environmental health priorities identified for each area which can be used for drafting environmental health action plans for the respective areas;
- To provide guidance on the establishment of public health laboratories (health, water and food); check available laboratory equipment; identify missing equipment and supplies for the proper functioning of public health laboratory services;
- To submit a final assignment report.

The two underlying principles considered in the assessment relating to environmental and public health were:

- Protection of the human population from the effects of adverse environmental health-related risk factors;
- Protection of the environment from the potentially damaging effects of human activities and the overall improvement of the environment for the benefit of human health, well-being and development.

The environmental health assessment took place in Somalia from 21 June to 20 September 2010 with the aim of documenting persistent problems and practices related to environmental health, examining the underlying causes and effects and demonstrating linkages between environmental degradation and human health. This assessment was conducted against the background of the chronic civil conflict that has affected the country for the last 20 years, particularly South-Central Somalia.

The methodology used for this assessment included a three-day training workshop in Hargeisa, held from 23 to 25 June 2010, involving WHO staff and health authorities, and the sanitarians selected to undertake the zonal assessments. The workshop provided general information on environmental health and the areas of interest. Discussions took place on the assessment tool, on guidelines to be followed for the assessment, on the kind of information and data to be collected from stakeholders, on how to undertake an analysis, on the listing of identified priorities and appropriate interventions, and on the timely submission of the zonal reports. In addition, agreement was reached on the timeline for the assessments.

The zonal assessments in Somalia were carried out by different health officers (sanitarians). They collected existing environmental health data (primary data collection), listed the main findings, and suggested relevant recommendations.

A desk review (secondary data collection) was conducted to extrapolate relevant information from published documents on main areas of environmental and public health over the last five years in relation to the findings of the assessment. These included annual reports and communications from line ministries, reports of research studies and multi-indicator cluster surveys (MICS) conducted by UNICEF, and reports of the healthy city initiative and of an assessment for developing the Hargeisa city health profile.

A number of consultations were held with various stakeholders involved in environmental health areas in Somalia. They included representatives of health ministries, government institutions, United Nations agencies, local and international non-governmental organizations, civil society, and the private commercial sector. In addition, field specialists were contacted in their duty stations. Through these consultative meetings relevant information on environmental health-related issues was obtained and documented in the assignment report.

Visits were made to relevant locations, such as industrial workshops, sanitary facilities, small-scale factories, slaughterhouses and communal food markets to make first-hand observations of the current situation of environmental and public health. On-site assessments facilitated more detailed investigation. Discussions were held with relevant authorities, directors and managers, local representatives and individuals on progress made, the constraints and challenges faced, and opportunities identified.

Major challenges were encountered in collecting reliable data and in obtaining relevant and up-to-date information for the environmental health assessment. As a result, this assessment may not cover all the components for a comprehensive situation analysis. Its main focus was on key areas of environmental health such as, health, waste, water, food and agriculture, industrial pollution and energy. These key areas will be further discussed in Chapter 2.

The assessment was the first review undertaken of the Somali environmental health situation since 1986. It aimed to document the current situation and practices observed in relation to environmental health and to disseminate the environmental health findings as wide as possible in order to advocate for appropriate response, funding and actions by all stakeholders.

Although this environmental health assessment is based on the findings and recommendations of the zonal assessments undertaken by different health officers (sanitarians) and may not always reflect a complete profile of the zonal situation, it does highlight strong similarities in various key areas of the environmental health situation of the country as a whole.

The assignment report was used to draft the present situation analysis, which will form the basis for the preparation of a Somali environmental health strategy.

2. KEY AREAS OF THE ASSESSMENT

The assessment was articulated around a number of key areas, namely, health, waste, water, food and agriculture, industrial pollution and energy. The present chapter describes in general the situation in the country in respect of, first, land use and general environmental degradation and, second, the ecosystems of the Somali marine environment and the threats confronting them. Following that general account, the chapter describes each of the investigated key areas of the environmental health situation of the country as a whole.

2.1 LAND USE AND ENVIRONMENTAL DEGRADATION: “TRAGEDY OF THE COMMONS”

Somalia’s long-lasting civil strife has contributed to the current worsening of its environmental conditions. The absence of a regulatory and legislative framework and its enforcement and control over access to and use of natural and environmental resources has consequences for the Somali population at large. Shoreline marine species have been affected along the whole length of the coast from Ras Kabon to Zaila. Such activities have been reported in the coastal areas and in the Golis ranges near Berbera, Sheikh and Lughaya in Somaliland. In addition, natural resources and precious minerals, such as diamonds and gold, are being illegally exploited.

The “tragedy of the commons” is the term used to describe the consequences of using the principle of self-interest to govern the exploitation of communally owned resources such as, land, water, sea and air.

Misappropriation of land and land grabbing have become features of the land situation in all zones, where land has become a trading commodity and, in some cases, an instrument for economic gains. One of the main problems associated with aligning economic gains to current environmental and natural resources is the way in which these resources are being utilized and abused. Market-based decisions fail to take into account human and animal needs and the interaction between them, within the available natural and environmental resources, and the way ecosystems function. No land is set aside for national parks, sports and recreation to give urban residents, and especially children, a place to relax, interact and play.

Somalia’s public property and natural resources are grabbed for personal gain without any legal consideration or appropriate compensation. These illegal practices and the overexploitation of land and natural resources, both renewable and non-renewable, will deprive millions of Somalis of the right to own any land.

Deforestation and desertification are rampant in all zones, particularly in the areas between the rivers in the south. This has resulted in the disappearance of natural forests. The lack of grass in grazing areas has led to soil erosion in many parts of the country.

The absence of a strong government in the country has created a free-for-all, where anyone can exploit natural resources for their own personal gain. The widespread lack of awareness and education has led to a situation where the Somali communities are unconcerned about the damage to the environment and loss of ecosystems. Traditional agricultural practices such as slash and burn, the uncontrolled use of pesticides and

fertilizers by farming communities are endangering the natural habitat of wildlife and causing migration and extinction. In addition, there has been no attempt to preserve and manage the natural habitat and native wildlife. Deforestation followed by desertification, erosion and soil salinization are evident everywhere. Such destructive exploitation of ecosystems may lead to irreversible damage and loss to Somalia's environmental and natural resources in the future.

2.2 MARINE ECOSYSTEMS

The ecological status of the Somali marine life and of coastal areas has been significantly affected and it calls for urgent attention and action. The Red Sea and the Gulf of Aden extend over a distance of some 1700 nautical miles and are, on average, between 120 and 150 nautical miles wide.² They form part of one of the world's major shipping routes, carrying a substantial percentage of global seaborne trade. A very large percentage of the world's crude and refined oil cargoes pass through the Red Sea and the Gulf of Aden.

In consequence, the coastal regions suffer significant damage from constant oil spills, which go uncontrolled and unreported. Local people living in coastal cities often report the discovery of oil residues and tar balls on the beaches. Coastal and marine ecosystems support economic activities such as fisheries, which are very vulnerable to oil pollution. Oil-related damage to mangrove, sea grass beds or coral reefs could have a serious and long lasting impact on fish stocks.² In addition, illegal fishing activities take place in many parts of the coastal regions, owing to the absence of a strong government or any other authority that could monitor and protect its territorial waters. Furthermore, local reports indicate that illegal commercial fishing and pollution are contributing to the decline of marine biodiversity in the region, and this is why piracy became an issue in some areas of the Somali coastal regions.

Coral reefs are precious natural treasures and the Somalis themselves are not even aware that they are at great risk of being damaged or illegally exploited. Today, foreign vessels exclusively carry out commercial fishing in Somali territorial waters. Pieces of coral reefs, mangrove and sea grass beds often get caught up in the nets of illegal fishermen, and are thrown away and found on the beaches. Local fishermen have reported that foreign fishermen removed coral reefs off the coast of Lughaya, Somaliland, for relocation to coastal areas of foreign countries. The coastal marine life of Somalia is also subject to threats from overfishing, in particular for lobster. Such illegal actions, together with sea port-generated pollution, are leading to the permanent destruction of coral reefs and marine life. In addition, discarded plastic bottles, bags and other items, whose long-term environmental impacts are being given little attention, pollute coastal areas.

Somali coastal areas have experienced significant and widespread environmental degradation as a result of increasing pressure from human population growth and expansion, and the intensification of land use³. Consequently, large quantities of plastic waste, human sewage and industrial and domestic waste, including fertilizers and pesticides, are being dumped on the beaches or gradually make their way to the sea. The increased stress on the coastal habitats – including coral reefs, mangrove, beaches, estuaries and sea grass beds – is mainly due to the illegal or uncontrolled exploitation

² Information obtained from the website of the Regional Organization for the Conservation of the Environment of Red Sea and Gulf of Aden (PERSGA) – <http://www.persga.org>

³ Country Environmental Profile for Somalia, from 1st March 2006 to 31 August 2006: IUCN Eastern Africa Regional Office, Nairobi, Kenya

of the environmental and natural resources, including sedimentation, dynamiting for fishing, removal of coral reefs for trade, and dredging of harbours. Other damaging human activities include industrial waste, toxic waste, bio hazardous and domestic waste, speedboats, oil spills and oil pollution, and destructive fishing methods such as trawling. These are very prevalent along the Somali coastline.

Details of the key areas of the environmental health situation are set out in the respective sections below. By and large, the problems encountered are common to the country as a whole and may be summarized as follows.

2.3 KEY AREA 1: HEALTH

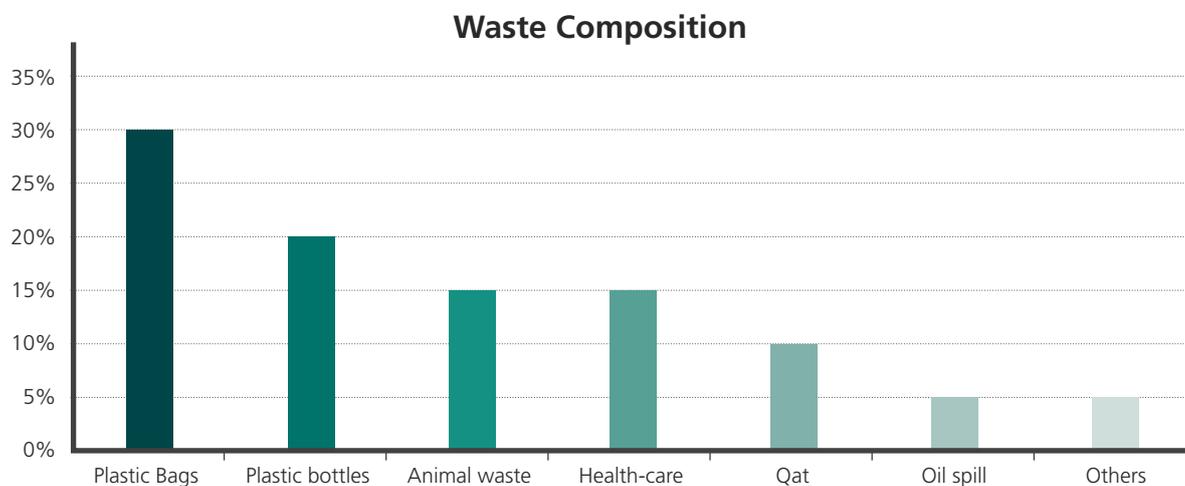
Public health care services in the different zones of the country are managed by the health authorities and are rendered at three tiers: public hospitals, mother and child health (MCH) centres and health posts (HP). Years of war, famine and underinvestment have left the public health sector very weak. The challenges encountered are insufficient number of health facilities, inadequate human and financial resources, limited coordination between line ministries, regional and district authorities, and implementing health partners. There is a thriving but uncontrolled private (commercial) medical sector and many public health facilities are run by local and international NGOs.

The poor status of health is related to various issues such as malnutrition resulting from unavailability of food, high food prices, and bad nutritional practices, inadequate number of healthcare facilities, the prevalence of unhealthy lifestyles, low educational levels and limited access to safe water, poor sanitation and the lack of preventive public health interventions. Outbreaks of seasonal communicable diseases (such as cholera, acute watery and bloody diarrhoea, measles, meningitis, pneumonia, typhoid, etc.) caused by poor sanitation and hygiene practices, contribute to the country's high morbidity and mortality rates, especially among children under five years of age.

At present there is no functioning environmental agency to provide expertise and know-how on risk management and assessment. In addition, there are no environmental health laboratories adequately equipped to carry out sample testing, analysis and response to hazardous substances. Under the previous Government, some public health officers and inspectors were posted at the country's seaports, airports and border-crossing stations for monitoring the importation of food stuff and medicines. But after 1991 the National Food and Drug Regulatory Authorities have no longer been in operation and the affiliated quality control facilities have largely collapsed.

2.4 KEY AREA 2: WASTE

Figure 1: Waste composition



Source: Consultant used various sources to analyse the waste composition in Somalia, 2010 and verified findings with Research, Design and Implementation of Sustainable Technologies for Municipal Solid Waste Management In An East African City: The Case of Hargeisa, Somaliland. Carlo Collivignarelli, Veronica Di Bella, Mentore Vaccari (2009).

All kinds of waste in and around cities are a result of the absence of management and control of waste. While progress has been made based on the “Waste nothing” environmental initiative, the management and control of solid and liquid waste, as in many developing countries, remain a major problem in every town in Somalia.

Empty plastic bags, items of domestic waste and rubbish bags filled with human faeces and food products are hanging in trees or scattered around in empty buildings or are left behind at plots of land. Urine-filled plastic bottles, chemical waste, used engine and motor oil, oil and petrol spills from petrol stations, and abandoned vehicles are signs that hazardous waste is not properly managed. The dumping of detritus from the latest brands of electronics and imported hardware and used computers is also on the rise.

The number of small-scale industries such as soap-producing companies, plants for processing hides and skins, water filtration companies, food processing industry and furniture manufacturers is increasing. These industries contribute to the rise in solid, liquid, and chemical waste to which the general public is exposed on a daily basis through food, water, air, and consumer products.

Hospital waste, like bio hazardous and biological waste, including disposable medical supplies (i.e., used needles, syringes and vials, gloves, surgical dressings and unused expired medicines) are scattered around at hospital premises. Owing to the lack of proper planning or control of bio hazardous waste management, the public is left unprotected from these hazardous and contentious wastes.

Blood, animal body parts and other waste from slaughterhouses are left to rot in riverbeds or dumped in temporary ditches around the cities, where human and animal scavengers scabble side by side. Fumes and dark smoke from open incineration of solid waste hang over cities and villages, and the stench of organic waste is prominent.

There is a need for an efficient and effective waste management strategy for urban settings. The majority of waste is generated particularly in these areas. While there is a general belief of the importance of protecting the environment, there is no consensus on what is meant by the term “environmental responsibility”. The public expects to have access to clean air and water, and safe food, and counts on the local authorities to take appropriate action to manage and control waste.

In general, Somalia does not have effective government institutions in place or an environmental health strategy to deal with waste management and control in a coherent manner. More efforts must be made to develop environmental policies and have a regulatory and legislative framework in place that will ensure effective waste management and control that can safeguard Somali natural and environmental resources, including both terrestrial and aquatic ecosystems. In addition, efforts have to be made to ensure that these ecosystems are managed and developed in a sustainable way so that future generations can benefit from the environmental and natural resources still available today.



● Accumulation of solid waste in Hargeisa, Somaliland

2.5 KEY AREA 3: WATER

Somalia faces water shortages in all the three zones. In addition, water pollution has negatively affected water supplies with the result that people no longer have access to safe drinking water. The demand for water for industrial, agricultural, and human and animal needs is on the rise. Population growth and the high rate of urbanization across the entire country due to migration of destitute people from rural to urban areas, coupled with the severe destruction of the environmental and natural resources through harmful business and pastoral practices, will increase the demand for safe drinking water even more.

The quality of drinking water was investigated in all three zones. Functioning water supply systems are either lacking or totally inadequate. Most Somali people draw water from water catchment areas or wells which are not fit for human consumption. There are several sources of drinking water available to Somali people, which include rainwater (surface water), shallow wells, *berkeds* and groundwater. Only a very small proportion of the Somali population receives piped water, but properly chlorinated water is not available. Furthermore, the standards of sanitation and hygiene of residential areas are low. Only 42% of the population in Somaliland has access to sanitary facilities, such as latrines, and 41% has access to safe water supplies.⁴

Water quality is as important as its quantity for human and animal use, and also for commercial and industrial use throughout the world. Most Somalis are constrained to drink unclean and unchlorinated water from shallow boreholes, surface water, springs, rainwater catchments from *berkeds* (cement catchments) and *ballis* (earth catchments). The increase in urban populations leads inevitably to increased demand for water, further draining of aquifers, and the consumption and pollution of whatever surface water resources are available. Furthermore, the level of sanitation and hygiene standards among the Somali people is inadequate.

As indicated before, the consequences of overgrazing, overpopulation, tree cutting for fuel, drought cycles, and the rise in temperatures due to global warming have led to chronic water shortages throughout Somalia.

Absence of rainfall can persist throughout the country for more than three consecutive years. The loss of arable land, the increase in farming, drought and floods, the low quality and limited availability of clean drinking water, and complex civil or tribal conflicts all contribute to the fragile situation of the environment and the health status of the Somalis.

Few areas, however, have an adequate supply of groundwater and an effective water supply system in place. But concerns exist about the depletion of groundwater as some wells have been drained and others become saline owing to overuse. A key question is raised about how much groundwater is still available, given that groundwater is a critical natural resource. Estimates of the current volume of available groundwater are inaccurate. The amount of groundwater in storage, its quality, and the yield to wells vary greatly from region to region. In addition, groundwater is used where it is found and the effects of localized pumping in a given region are of great concern to some hydrologists.

⁴ UNICEF (2006). Multiple Indicator Cluster Survey 2006



● Solid waste at the beach of Berbera, Somaliland

2.6 KEY AREA 4: FOOD AND AGRICULTURE

The economy of Somalia is largely based on two sectors: livestock and fishing. Livestock herds have been decimated by consecutive seasons of below average rainfall, and in consequence, destitute pastoralists are converging on the main villages in search of assistance. Various regions face food insecurity as a result of recurrent droughts, limited water sources, lack of water infrastructure, and environmental degradation. While droughts have generally been part of the normal cycle of pastoral life in the country, the rapid destruction of the environment caused by overgrazing and charcoal burning has deprived pastoralists of their traditional coping mechanisms. The increase in distances to travel between pasture and water, caused by desertification, means that incidences of drought can trigger humanitarian crises. Pastoralists are unable to travel long distances from water points to good pasture, with the result of massive loss of livestock.

Cyclical droughts in Somalia have become more frequent. Droughts have caused widespread shortages of water, killing off much of the livestock belonging to the pastoralist communities. General and severe acute malnutrition among children and vulnerable groups is one of the highest in the world and is adversely affecting the health status of the drought stricken population.

The failure to conserve marine resources has had a negative impact on the Somali economy as it relies heavily on the export of fish. Fishing is indeed central to the life of the Somali people and represents the main livelihood of the majority of the urban population. Although the Somali economy has been able to adapt and grow in spite of its failure to conserve its resources, putting more emphasis on fishing should have a positive effect on the local and export markets. The fishing sector provides food and income to over 60% of the country's population. The fish export market provides income opportunities for fishermen and allows them to get better prices for their produce compared to the sale at the local fish market.

Since there is no government oversight, the Somali coastal area, which contains a wealth of varieties of fish and sea creatures, has been pillaged by activities such as overfishing and illegal waste dumping. On occasions, a sheet of brightly coloured substances can be seen on the surface of the water.

Some species of sea creature, such as the hammerhead shark and the "aseba" have disappeared altogether. Others, such as the lobster, turtle and tuna fish (*taraaqad*), are likely to disappear too if conditions do not improve. Nefarious practices such as the killing of sharks for their dorsal fins, which are used as soaps and aphrodisiacs in Asian countries, also serve to deplete the value of the sea's resources. The following practices were noted:

- Uncontrolled overfishing is a kind of theft and gradual destruction of the sea's resources.
- A variety of fish eggs and pregnant lobsters are stolen and transplanted into other sea areas.
- The marine plateau, in which fish breed, grow and hide, is being destroyed.
- During fishing, the small, unwanted fish from the catch get thrown overboard as dead waste.
- Suspected radioactive uranium waste has been spotted along the coast.
- Previously dumped containers with toxic waste were washed ashore by the Somali tsunami.

Because of such practices, an influx of dead, poisoned fish was observed along the shoreline at the beginning of 2007. Later that year there was an outbreak of a new, febrile disease (known locally as *kadudiye* – "shrunken body"), the symptoms of which were joint pain, high fever and vomiting. This disease did not respond to anti-inflammatories, antibiotics or pain relief medication and many people perished. If no action is taken, many other of such incidences will occur.

Where pesticides and their impact on environmental health is concerned, it must be noted that the use of persistent pesticides, including DDT,⁵ in agriculture and for vector control in livestock has become common practice. In the absence of efforts to enact far-sighted environmental policies concentrating on protection and control, the situation in the country could soon become critical, with long-lasting and irreversible adverse consequences on both human and animal health, and the environment.

⁵ WHO Mission report on pesticide incident in Hargeisa, 6-15 October 2003, WHO Regional office for Eastern Mediterranean (internal document)

The situation is further compounded by the problem of desertification, which has led to not only a lack of grazing for livestock, but also to a drastic decline in rainfall, soil erosion and a reduction in local food production.

2.7 KEY AREA 5: INDUSTRIAL POLLUTION

The number of local industries is steadily growing. But they remain unregulated, even though they have the potential to pollute the environment. Such industries include leather-tanning factories, soap producing industries and they operate without any regular inspection or supervision. These factories, whether they produce leather, drinking water, cloths, plastic bags or furniture, do not invest sufficiently in their waste management and control or in safe waste disposal in order to protect the environment and public health. The dumping of heavy metals and its implications of human and animal health and the environment is a particular cause for concern in this sector of the country's economy. Owing to the absence of effective waste management and control systems, the public is exposed to hazardous waste, including volatile organic compounds, some of which are emitted by the ever-growing numbers of small-scale industries, which are subject to no controls.



●
Leather factory
in Da'ar Budhuq,
Somaliland

In addition, marine environmental pollution is a major concern for the country as a whole, given that it has a long coastline, stretching some 3335 km, bordering the Gulf of Aden in the North, the Indian Ocean in the East to South and Kenya in the South. It is the longest coastline in Africa and the richest in biodiversity. The previous Government had ensured that vessels did not dump industrial or other kinds of waste into the sea along the coastal regions of Somalia. The processing infrastructure was destroyed in the civil war and, where private sector plants have been set up to process fish, they do not have satisfactory systems for managing waste: discarded fish are often directly dumped on the beaches.

2.8 KEY AREA 6: ENERGY

The use of charcoal as a source of energy has contributed to the continuing environmental degradation in Somalia. Trees and entire forests are cut continuously either systematically or at random, for burning into charcoal. The local demand for charcoal by households and communities has reached a critical point and needs to be addressed urgently. Charcoal is the most important single fuel for the majority of the households in urban and peri-urban centres and large villages. This energy source is used for cooking, heating, food catering and many other purposes at household and community levels. The production of charcoal is not only meant for local consumption but is also for export to countries in the Gulf region.

Charcoal is exported from Somalia to Arab countries in the region. Although these countries have other sources of energy, their demand for charcoal is mainly for smoking *shiisha*.

In response to the high internal and external demand, trees and forests are cut and these areas become barren, leading to desertification. Little or no interventions are in place to deal with this situation. The impact of charcoal production on natural resources, environment and health is soaring. Somali natural resources have become commodities and are exploited for commercial interests. If no immediate action is taken against the excessive production of charcoal and the aggressive destruction of forests, the environmental degradation may become irreversible.

Deforestation has become visible in almost every populated region where charcoal is used as the main source of energy. A survey undertaken on the use of charcoal was carried out by a local women's non-governmental organization, Nagaad. It revealed that 98% of the housewives used charcoal as their main source of energy. Charcoal was merely used both for cooking and space heating in urban areas, while firewood was more used in rural areas. The findings of the survey showed that only 5% of the households used charcoal-efficient stoves. When properly used, these stoves can conserve as much as 40% more charcoal than traditional stoves.

Shortages in the local charcoal supply have led to price hikes, ranging from five to ten US dollars per bag (private communication, 2010). The increased prices have encouraged further destruction of forests by charcoal dealers. Even poor families who cannot afford the high prices for charcoal have started to collect firewood outside their settlements and towns. Other available alternative energy sources such as electricity, gas or paraffin, are either limited in supply or too costly.

The fumes of extensive domestic charcoal use and commercial charcoal burning affect the health of the Somali people. The presence of environmental pollutants in the air such as mycotoxins, which are associated with chronic and degenerative diseases, cigarette smoking and other tobacco use, highlights the need for modified lifestyles and a more effective enforcement of air pollution control.



● Charcoal bags ready for sale, outside of Hargeisa city, Somaliland

3. SITUATIONAL ANALYSIS OF INDIVIDUAL ZONES

The present chapter sets out the findings of the assessment in the three zones of Somalia – Somaliland, Puntland and Mogadishu, South Central Somalia. The findings are organized into the six key areas – health, waste, water, food and agriculture, industrial pollution and energy. To the extent possible, all these key areas were investigated in each of the three zones. In some cases, coverage of one or another area was impeded by logistical or security constraints in that part of the country.

3.1 SOMALILAND

In the following sections, the findings of the assessment in the six key areas related to Somaliland are set out, followed by conclusions and recommendations specific to Somaliland.

3.1.1. Introduction

The population of Somaliland is estimated at around 3.5 million (government estimates), with an average population growth of 3.5% (WHO/Ministry of Health and Labour, annual report 2006). In all, 55% of the population is either nomadic or semi-nomadic, while the remaining 45% lives in urban centres or villages. The nomadic lifestyle of pastoralist communities poses a major challenge to the creation of accessible health services in rural areas. The average life expectancy for males is 50 years and 55 years for females.⁶ Other challenges are the rapid pace of urbanization and the increase in population growth.

⁶ United Nations Demographic Yearbook 1999

Somaliland is experiencing an increase in the number of internally displaced persons (IDPs). A total of more than 65 000 IDPs were recorded in 2010⁷ and the influx of economic immigrants from neighbouring Ethiopia is a further heavy burden on the environment and public health services.

3.1.2 Key area 1: Health

Health care services in Somaliland

Public health care services are managed by the Ministry of Health and are rendered at three public health tiers: public hospitals, mother and child health (MCH) centres and health posts. There are six regional and five district hospitals, 84 MCHs and 152 health posts in 2010. The Hargeisa Group Hospital plays a major role as a referral hospital, as well as the regional hospitals. There is one malaria reference laboratory, eight tuberculosis centres, and three mental health hospitals. There are eight HIV voluntary counselling and testing (VCT) centres in Somaliland. The Hargeisa Group, Borama, Berbera and Burao hospitals provide services for antiretroviral treatment, care and support to HIV/AIDS patients.

Outbreaks of seasonal communicable diseases (such as cholera and acute watery and bloody diarrhoea), caused by poor sanitation and hygiene practices, contribute to the high morbidity and mortality rates, especially among children under five years of age. The child mortality rate is 145 per 1000 live births, and the maternal mortality rate is 1044 per 100 000 live births,⁸ making the health indicators in Somaliland among the worst in the world.

Environmental health laboratories

At present there are no environmental health laboratories adequately equipped to carry out the sample testing, analysis and response of hazardous substances. The only laboratories available are located within public hospitals but have different equipment in place for use mainly in support of medical diagnoses. The Ministry of Health of Somaliland has accepted the use of Minilabs® to screen medication samples for quality.

While the development and implementation of effective environmental protection programmes are under way, Somaliland still faces big challenges that need to be addressed by government institutions with support of aid agencies. These efforts are not large in scale or based on a comprehensive strategy and implementation plan covering all regions in Somaliland.

Somaliland Consumer Protection Agency

One of the initial initiatives was the establishment of a consumer protection agency in Somaliland. The Somaliland Consumer Protection Agency (SCPA) is an autonomous consumer protection agency established under presidential decree of 31 October 2009. The aim of the agency is to protect the rights of the consumers by ensuring that products consumed and services utilized, meet quality and safety standards. It is the sole agency mandated to handle consumer related matters. SCPA intends to establish a comprehensive and effective consumer protection system based on relevant international standards and specifications for quality control and assurance. It will establish laboratories in all regions. SCPA is in need of financial and technical support from FAO to start its operations.

⁷ UNHCR Fact sheet of 24 September 2010, estimated IDP figures

⁸ UNICEF (2006). Multiple Indicator Cluster Survey 2006

3.1.3 Key area 2: Waste

Solid waste in major urban centres

In Somaliland, the per capita production of domestic waste is relatively small, indicating to some extent its level of development. The main sources of waste in urban areas are households, commercial centres, communal markets, industries, and waste resulting from demolition and construction work. The generation of residential and commercial waste is the largest source of both solid and liquid waste. When poorly managed, however, it becomes an environmental and health hazard. The accumulation of wastes, open dumping, defecating and urinating in open land, in and around human settlements and work areas, is very widespread.

The collection, storage, transport and disposal of solid waste are very limited, owing to an array of factors, including the absence of qualified personnel to implement adequate waste disposal and sanitation procedures, lack of sufficient waste transport, lack of proper dumpsites, the widespread practice of open, unregulated or illegal waste dumping, low level of public education and awareness and the general absence of regulatory and legislative framework and its enforcement.

There are no adequate landfill operations or incineration systems in any urban centre in place.

The authorities and citizens are, however, prepared to shoulder their responsibility to address the problem of waste management and to bring this issue under control. The scaling up of efforts to improve levels of sanitation and hygiene is needed to meet goal 7, target 10, of the Millennium Development Goals concerning a 50% reduction of the proportion of people without sustainable access to safe drinking-water and sanitation by 2015.

• ***Hargeisa city: solid waste***

In the capital city Hargeisa, the per capita production of domestic waste is estimated at 0.45 kg per person per day. With a population of about 700 000, the daily production of domestic waste will be $700\,000 \times 0.45 \text{ kg} = 315 \text{ tons}$.⁹

The amount of domestic waste removed daily from the city is estimated at 38 loads of 6 tons each (i.e., $38 \times 6 = 228 \text{ tons}$). This may indicate that 87 tons are left abandoned in the city every day. Open waste disposal sites and large excavated pits are mainly located in depressions, leading to contamination of surface water and groundwater.

In addition, limited access to latrines and poor levels of hygiene throughout Somaliland contribute to recurrent health problems such as, infectious disease outbreaks (i.e., cholera, diphtheria, hepatitis, typhoid) caused by unmanaged wastes, including hazardous and contentious wastes.

The current dumpsite of the Hargeisa municipality is in a dire state. It is located 15 km north of the city, in low land area, surrounded by farms, grazing land and depressions used for surface water collection. Solid waste is dumped indiscriminately over a vast area, posing threats to the environment, the health of the local people, livestock and vegetation. The dumpsite attracts all kinds of carnivorous birds and wild animals. To improve the efficiency of its mechanized waste collection system, 12 trailers have been ordered.

⁹ WHO (2008). Healthy City Initiative: Hargeisa city health profile survey, 2008

Waste collection in Hargeisa municipality is contracted out to two private companies: DHIS, which covers the northern part of the city and Sabawanaag, which covers the southern part of the city.

DHIS removes 20 loads of solid waste each day to temporary dumpsites where as Sabawanaag removes 18 loads of solid waste per day to temporary dumpsites. Waste is then transported by tipper trucks to two terminal dumpsites located in the north and south of the city. In addition, the two companies have been instructed to buy 10 plots each for the development of temporary waste collection points and dumpsites. In 2010, this has not yet materialized.

The financial sustainability of waste management was an issue of main concern. To reduce waste at source, even with the use of cutting-edge technologies, yields a minimal cost-recovery because of the very low value of salvageable solid waste. The low market value of recycled waste is not favourable either for an initial investment for establishing recycling facilities.

Discarded plastic bags and containers represent the majority of solid waste in Hargeisa. The World Food Programme (WFP) supports the collection of discarded plastic bags through its food-for-work programme but this activity is only on an ad hoc basis.



● A dumpsite just outside the city of Hargeisa, Somaliland

Technical and financial constraints impede the effective removal of waste from Hargeisa. The establishment of a public-private partnership for the effective management and control of solid waste is envisaged as a possible solution.

- **Burao town: solid waste**

The solid waste disposal site of Burao town is located 7 km south of Burao, and is merely a large excavated dumpsite, following semi-controlled tipping procedures. Tipper trucks owned by the Burao municipality bring solid waste directly to the excavated pit and dump it. Site supervisors, who are responsible for ensuring that the trucks dump their loads properly into the pit, guard the site. It was observed that the disposal procedures for solid waste in Burao town were better than those in Hargeisa. No birds or wild animals scavenge at the site. The disposal site poses hardly any public health threat to the residents of Burao or to people living in areas adjacent to it. The waste disposal site of Burao town may easily be transformed into a sanitary landfill after an initial investment for upgrading the site and the provision of adequate mechanical equipment. It can serve as a model to be followed by other municipalities in Somaliland.



● A dumpsite in Burao town, Somaliland

- **Borama town: solid waste**

The dumpsite for the terminal disposal of solid wastes is located some 3–3.5 km north of Borama town where the dry river valley begins. Waste is indiscriminately dumped into this large natural depression and also around the edges. This may pose a threat to water sources, even though the solid waste disposal site is at a considerable distance from Borama town. This site is nearly filled up with waste and a new dumpsite is needed.

The solid waste in town is generally poorly managed. Accumulated heaps of waste can be seen all over town. The municipal authority is committed to improve waste management but lacks funding to set up an adequate waste management and control system. There are insufficient trucks to pick up waste; petrol provided by the local government is only sufficient for three trips to the dumpsite per day; and there are very low incentives (around US\$0.40 a day) for the workers who collect and off-load the waste with their bare hands.



● Collection of waste near a dumping site in Borama town.

• *Erigavo town: solid waste*

The solid waste disposal site of Erigavo town is located at a natural depression and partly protected by a fence. An immediate concern is that the site is nearly full. Accordingly, a new terminal dumpsite is urgently needed. However, Erigavo is one of the cleanest towns in Somaliland. The municipality is committed to keeping the town clean and works closely with the regional sanitation officer.

• *Lasanod town: solid waste*

The dumpsite of Lasanod is situated in open land between two small hills located North east of the town. Lasanod is maybe the worst served town in terms of its solid and liquid waste management. Its municipality does not exercise its function of waste management and control nor organizes clean up campaigns with the participation of the town's residents. Waste collection and disposal was previously carried out by a local non-governmental organization, SAVO, but after the death of its founder in 2005, waste collection and disposal stopped. Signs of poor sanitary conditions of the town are the large swarms of flies seen everywhere.

Table 1: Sanitation equipment available in towns of Somaliland

Region	Urban centre	Sanitation equipment	Dumpsite	Sanitation equipment
		Tipper trucks		Bulldozers
Maroodijeex	Hargeisa	12	Hargeisa	2
	Gabiley	1	Gabiley	1
	Togwajaale	1	Togwajaale	1
Awdal	Borama	2	Borama	1
Sahil	Berbera	2	Berbera	1
Togdheer	Burao	4	Burao	1
Sanag	Erigavo	2	Erigavo	1
Sool	Lasanod	–	Lasanod	-
Total		24		8

Non-mechanized equipment such as donkey carts, wheelbarrows, shovels and rakes are also available, but in insufficient quantities.

Liquid waste in major urban centres

The term “liquid waste” is used here to refer to wastewater from domestic sources – namely, households and hotels – including waste from water closets, septic tanks, latrines and flush toilets. From a public health point of view, this wastewater should be considered as sewage that contains pathogens from latrines, septic tanks, baths, showers, wash basins, laundering of clothes, and dish washing and it should be disposed of appropriately.

In Somaliland, wastewater is not treated for sanitary disposal in oxidation ponds. Vacuum tank trucks carrying wastewater from latrines, septic tanks and soak away pits, discharge their contents in open land, or in valleys, shallow wells and water catchment areas protected by dams. The untreated wastewater (leachate) ends up contaminating ground water through subsurface absorption or is washed down by rainstorms.

These liquid waste management practices are common in all urban settings and urgent attention is needed to introduce proper wastewater treatment and recycling systems in Somaliland.

Medical waste, including biological hazards and waste

A particular problem is posed by medical waste, primarily which is generated by Hargeisa General Hospital, which requires special handling and disposal procedures, to prevent adverse consequence on human health. In considering the waste handling and disposal facilities at Hargeisa General Hospital, the sanitary standards at the Hospital were reviewed.

• Hargeisa General Hospital

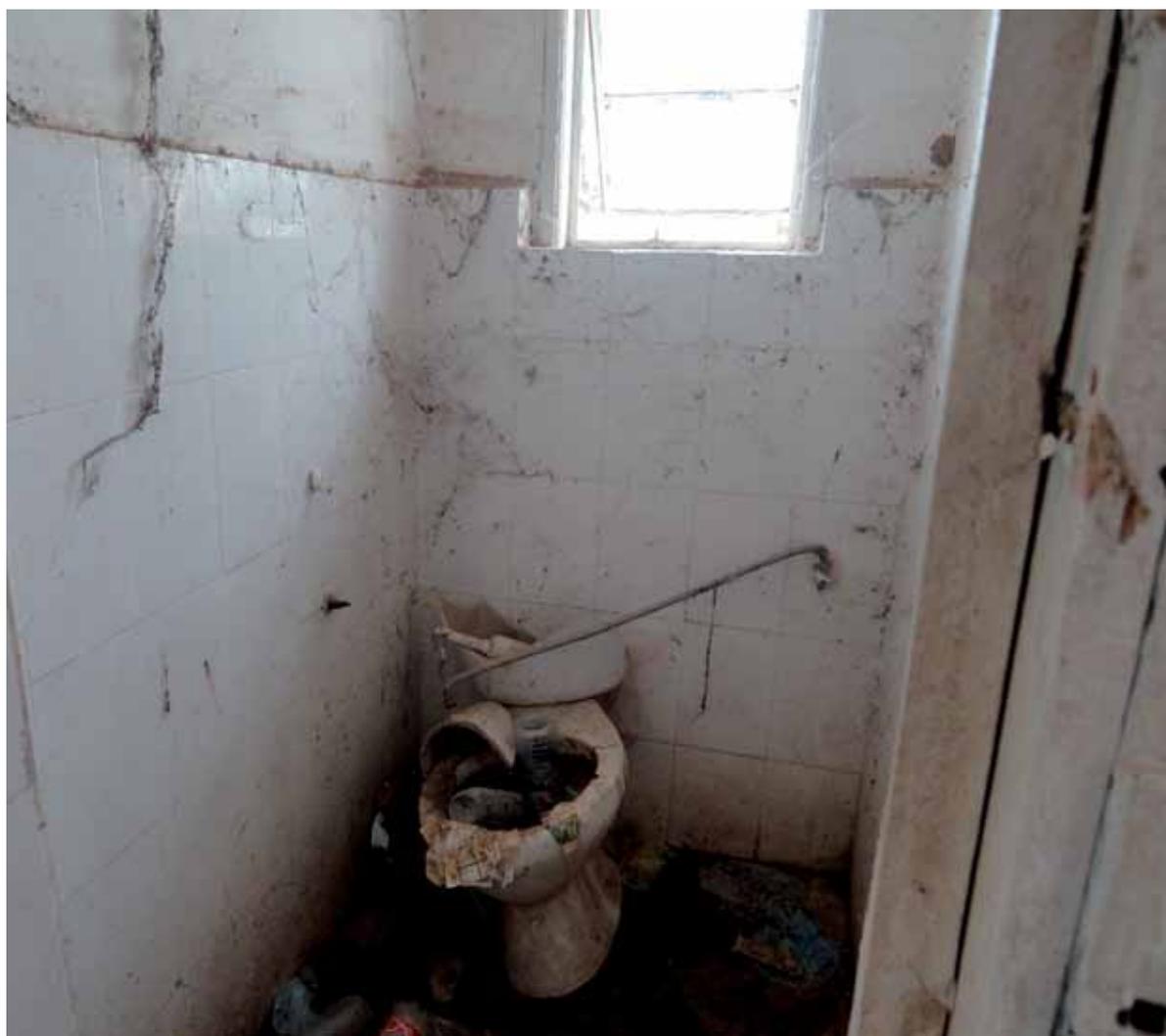
A considerable volume of biological hazards and waste is generated by the hospital services of Hargeisa General Hospital. The collection of various kinds of waste generated by the hospital wards, laboratory and operating theatres, are handled in an acceptable sanitary

manner. When it comes to disposal of the biological hazards and waste, no infection control procedures are in place. Junior hospital staff is instructed to discard biological hazards and waste in the same way as “normal” waste. Biological hazards and waste, including sharps, are dumped in the same place as the hospital’s “normal” waste. All hospital solid waste is collected for disposal at the city’s terminal dumpsite.

The waste is collected daily from the hospital premises by the same trucks that collect the waste from the city. The difference is that the medical staff and hospital administrator check that the truck driver is paid for his services. Thus, the end destruction of the biological hazards and waste was not carried out in an appropriate manner, with the use of an incinerator. The hospital incinerator has been out of order for some time.

• *Sanitary standards at Hargeisa Group Hospital*

The current status of the toilet facilities of Hargeisa Group Hospital is below any hospital and sanitary standards. These facilities are a health hazard by themselves and a threat to patients’ and visitors’ health. Accordingly, the hospital administrator has prepared a proposal for upgrading the water, sanitation and hygiene facilities of the hospital. The cause of the problem, however, is the failure by a public health administration to adhere to and enforce environmental and sanitary standards to protect public health.



● Toilet facilities in Hargeisa General Hospital, Hargeisa, Somaliland

3.1.4 Key area 3: Water

Water supply in Somaliland

For most human and also industrial uses, the quality of water is as important as its quantity. To be suitable for human consumption water must be of an acceptable quality, which should be free of dissolved salts, plant and animal waste and bacterial contamination. In Somaliland, despite advances in drilling, irrigation and purification techniques, the availability of potable water is an environmental and health issue. Major problems encountered include location, quality, quantity, ownership, management and control of potable water.

Other major challenges encountered in establishing sanitation and hygiene services are the failure to collect and analyse information from various sources and use the analyses for decision-making. There is neither a baseline available for showing impact of awareness-raising activities on environmental health, nor impact measured of disease control programmes and their possible connection to improved health status; reasons and causes of high morbidity and mortality rates throughout the country and the possible link to absence of sanitation and hygiene services.

Somaliland Ministry of Water and Mineral Resources

The ultimate goal of the Somaliland Ministry of Water and Mineral Resources is to ensure the provision of safe drinking water. A water quality control laboratory has been established with support from WHO in the form of a donation of analysis equipment. However, the laboratory is unable to function due to the lack of lab reagents. Water quality testing is thus hampered. Financial constraints are faced by the Ministry to procure the necessary reagents for the functioning of the water quality control laboratory. Its annual budget is only US\$130 000, including salaries.

• Hargeisa town water supply

The Hargeisa Water Authority supplies around 9000 cubic metres of water to Hargeisa per day. This means that some 70% of the residents have piped water, with each person receiving 18 litres per day. The remaining 30% of the residents receive water from water tankers, which draw water from shallow wells.

The water supply booster station has two main reservoirs in Biyo-khadar that store pumped water from Geed-deeble. The water is treated with chlorine solution that is administered by homemade feeders from 200 litre plastic barrels. Residual chlorine is monitored at different points in the distribution network in Hargeisa town. The gravity doser donated by WHO is no longer functional and was dismantled.

It was observed that excess and overflow of water and used engine oil are drained together into open land through a soak-away pit, running freely and contaminating the environment and water supplies located even far from the source. Water needs to be disposed separately into a designated pool. A larger ditch is needed for the disposal of engine oil as the current ditch in the compound of the water plant was filled to the rim with used engine oil. The water supply booster station needs upgrading and renovation because its building is cracked and the premises filled with debris. The room for the gravity doser needs renovation too.

Guidelines to ensure continuous water chlorination for the protection of public health are available. It was agreed that the Hargeisa Water Authority would construct drainage pools and lagoons for wastewater, and also ditches for used engine oil in the near future. The Authority will also carry out repairs to the water supply booster station and will install gravity dosers, whereas WHO is requested to provide training of Authority personnel to improve their knowledge and skills in chlorination.



Manual chlorination of water in a water facility, Hargeisa, Somaliland

• *Burao town water supply*

Burao town receives its water supply from two main sources: boreholes and shallow wells. Water from these sources is used for all purposes. Different stakeholders, who are involved in the water supply system, own the boreholes from which the town gets its water. The stakeholders are Burao Water Authority with five borehole wells; the Togdheer regional office of the Ministry of Water and Mineral Resources with four borehole wells; and private owners with 22 borehole wells. In all, 30 shallow wells owned by individuals provide water supply to communities residing along Togdheer dry river and to some extent also to business units located near the shallow wells.

Approximately 20% of the residents of Burao town use the water supply from these shallow wells throughout the year. During the cholera outbreak of 2007, the water from the shallow wells was highly contaminated to the extent that the concentration of coli forms reached a level of 1000 coli forms per 1 ml of water¹⁰ because owners refused to have their wells chlorinated.

¹⁰ Ministry of Health and Oxfam GB, 2007

Borehole wells owned by government institutions such as the Water Authority and the Ministry of Water and Mineral Resources provide water to the public through a direct connection from the borehole wells to houses, business units and kiosks installed at strategic points and locations convenient for public use. Water from privately owned borehole wells is transported by tank trucks to town and distributed to the public.

It was observed that the Burao town water supply lacks a streamlined management approach in the production and distribution of water. There is no central facility to store the water supply pumped from the borehole wells owned by different stakeholders. As a result, it is impossible to chlorinate water and maintain an acceptable water quality to prevent outbreaks of water-borne diseases, and sustain sufficient quantities of water when one of the borehole wells falls dry.

- *Borama water supply*

The Borama water supply may be the best in Somaliland. Sheba Water Company is a public-private partnership with various stakeholders. The public-private partnership is an effort to bring safe drinking water to the residents of Borama town and to enhance their health and welfare. Safe drinking water is provided to 90% of Borama town residents as water is chlorinated and of high quality. In April 2002, a study was carried out by the international consulting company, Hydroconseil, on the commercialization of urban water distribution and collection and disposal of solid and liquid waste in Somalia and Somaliland. The European Union and UNICEF funded the study. A lease contract was developed between Borama municipality, the Ministry of Water and Mineral Resources, and the Borama Utility Corporation, to set up a private company, called Shaba Water Company, to operate and manage the water supply of Borama town.

Figure 2: Growth indicator for the Shaba Water Company (Borama)

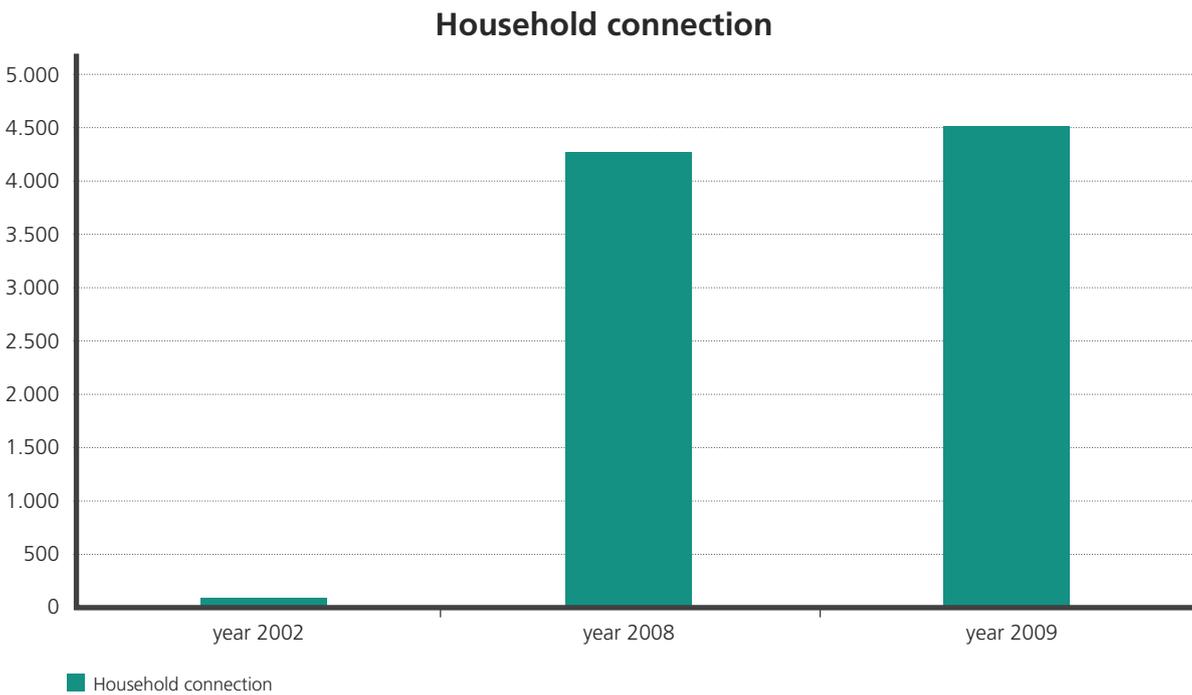


Figure 3: Household connections per 1000 inhabitants (Borama)

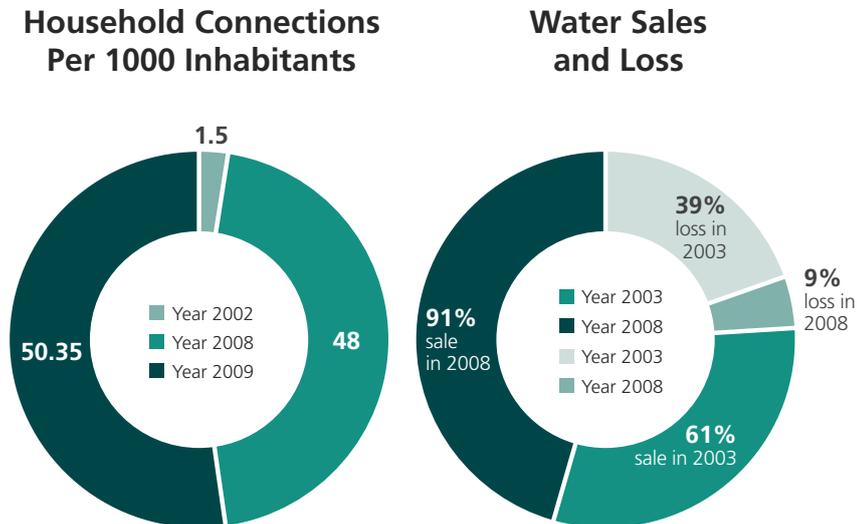
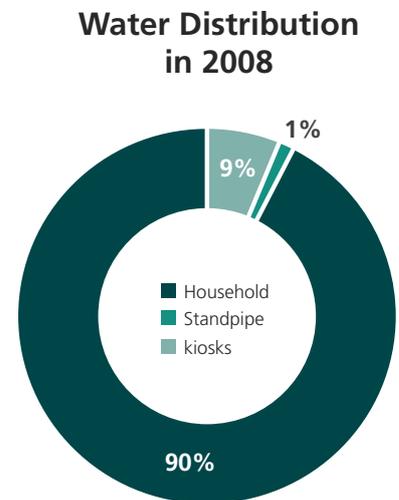


Figure 4: Water distribution in 2008 (Borama)



• **Water supply in Erigavo, Berbera, Lasanod and Gabiley**

The water supply systems of Erigavo and Berbera need to be expanded and renovated as they produce insufficient quantities and poor quality water to meet public demand. The water supply in Gabiley is very limited. The borehole wells in Gabiley yield very little water and it has a high chlorine concentration that may be harmful to health. The high chlorine concentration gives the water a bitter taste. The water supply in Lasanod comes from shallow wells and water is heavily polluted and bitter in taste. An alternative water

supply is therefore rainwater harvesting. In Sanag and Sool there is hard water that comes from shallow wells and cannot be used for drinking purposes. The salt concentration is as high as 9000 mg per litre in some places.

Lessons learnt from public-private partnerships in water supply

The establishment of public-private partnerships for water supply and management may be a sustainable way to reduce the longer term reliance on foreign support. While less than 70% of the residents of Hargeisa town has piped water, over 90% of Borama's residents have piped water at their homes, businesses and work places.

To initiate a successful public-private partnership, it is essential to improve the water supply infrastructure already in place. In addition, a strong commitment is needed on the part of local and zonal authorities, including firm leadership. It is crucial to follow transparent procedures in the set up of the company and in dealing with company shareholders. Because Shaba adhered to all these criteria, it continues to be a sustainable, strong and profit-making company, which provides reliable services and good quality water to the residents of Borama town.

The water supply in Gabiley is troublesome and a public-private partnership may improve the system and its management. The feasibility of a public-private partnership in the Berbera water supply is under investigation.

Rainwater harvesting

Rainwater harvesting is common and stored in dams, berkeds. There is, however, a lack of coordination between the relevant ministries.

Boreholes

Redevelopment plans are implemented to improve access to safe water and increase responsible water consumption. Steps must be taken to change the current practice of allowing the same vacuum tank trucks to carry sewage on one trip and drinking water on another.

Tog-wajale

Berkeds or cement catchments are the same method of water catching for public use. They are often green in colour due to biological growth.

Non-governmental organizations involved in rural water supply and sanitation

The Somali Red Crescent Society (SRCS) is engaged in implementing rural sanitation and water projects supported by the German Red Cross. The aim of these projects are to improve the standard of water, sanitation and hygiene (WASH) facilities and practices within the rural population through the provision of basic physical and social amenities, to build their capacity for action and ensure the sustainability of projects with community involvement. The projects support the construction of household latrines and promote their proper use, the construction or rehabilitation of water facilities, and the training in the use of WASH infrastructure.

Over the period 2005–2009 the following water and sanitation facilities have been established:

Table 2: Water and sanitation facilities established by SRCS (Borama) (2005 - 2009)

Rainwater harvesting	
Berkeds	268 (new or rehabilitated)
Shallow wells	101
Sand dams	15
Borehole wells	
School water tanks	24
Human excreta disposal	
Model latrines for demonstration	20
Family latrines	3235
School latrines	55

Support is also provided by the Swiss organization, Caritas, in such areas as hygiene education and community mobilization, designed to promote the involvement of communities in such health and environment-related undertakings as the digging of pit latrines and the construction of related infrastructure.

Table 3: Community latrines established by Caritas (2007 – 2009)

Year	Region	Number of (dry pit) latrines
2007	Maroodijeex	60
	Togdheer	186
2008	Maroodijeex	137
	Togdheer	215
2009	Maroodijeex	280
	Togdheer	365
Total		1223

Caritas is involved in rural sanitation projects in Maroodijeex and Togdheer. The areas of intervention are in the field of establishing WASH infrastructure: development of human excreta disposal systems by using conservancy methods promoted in rural villages and schools; distribution of sanitary hand tools for non-mechanized clean-up of solid waste and hygiene campaigns; and rainwater harvesting.

Rural Somaliland communities are supported by improving their water supply, sanitation and hygiene, with the aim of improving their livelihoods and the development of the community. WASH infrastructure in Maroodijeex and Togdheer regions is established by constructing shallow wells, surface dams, berkeds and waste disposal pits.

Table 4: Hand tools and other utilities distributed for health-related purposes in Maroodijeex and Togdheer regions in 2007

Wheel-barrows	154
Shovels	313
Rakes	130
Pick axes	61
Buckets	466
Plastic sheets	158
Donkey carts	22

3.1.5 Key area 4: Food and agriculture

In Somaliland the knowledge and awareness of food safety, environmental health, sanitation and hygiene standards and practices are very limited. In the following sections, the situation in the regional slaughterhouses and communal food markets were reviewed, as well as the use of pesticides and its implications for public health.

Hargeisa town slaughterhouse

Hargeisa slaughterhouse is located on the eastern edge of the city. The Hargeisa municipality owns the premises of the slaughterhouse, whereas a private company, called Mandeeg, manages the slaughterhouse operations. The company has recently invested in the expansion of the slaughterhouse. About 96 workers are employed at the slaughterhouse. Butchers are assigned quotas for the slaughter of animals in the slaughterhouse and these are strictly observed. Hargeisa municipality ensures and oversees the enforcement of regulations on the use of the slaughterhouse by the public for slaughtering animals. Slaughtering animals outside the slaughterhouse is illegal and carries an appropriate penalty.

• Health of livestock brought for slaughtering

Meat supplied to the market must be certified disease-free at ante-mortem veterinary inspections and quality assured with veterinary post-mortem permits.

• Slaughterhouse water, sanitation and hygiene practices

No zoning restrictions are in place. Therefore, other buildings, including dwellings, are less than 100 metres from the site. A fence protects the slaughterhouse premises. The buildings, work blocks and cemented concrete platforms for slaughtering animals are all in good condition, smooth and clean. The facilities are well lit and equipped with proper ventilation and adequate drainage for the disposal of sewage and liquid waste.

In the animal slaughtering areas, a high level of cleanliness was maintained and the personnel complied with good sanitary and hygiene operating procedures and standards. Adequate amounts of water, cleaning agents and chemicals were used. Effluent biological waste and sewage was drained into watertight septic tanks. There was no overflow from the septic tanks into the dry riverbed. Waste from septic tanks and refuse, offal manure, non-edible parts and condemned meats are all disposed of separately. The entire premises were found to be free of insects and rodents.

At the time of the visit, the borehole well was under repair and maintenance. The slaughterhouse's water supply was assured by water tank trucks, which brought water to the facility at a cost of US\$250 per day. With each truck delivering 50 barrels per day, and each barrel containing 200 litres, this meant a delivery rate of 50 000 litres per day. Transportation of edible meat was organized by six transport vehicles, some equipped with cooling systems. All trucks were found clean and hygienic, and the meat was properly wrapped and protected.

• *Disposal of solid biological waste*

Animal parts of slaughtered animals, offal manure and other solid waste are removed by trucks and disposed in open dumpsites, shown in the picture below. Offensive odours were evident at the site. These high levels of environmental pollution attract scavenging birds and animals. There is no recycling system in place.

Two vacuum tank trucks remove sewage from the septic tanks and together with the solid biological waste this is poured into open cesspools and ditches from and overflow of liquid waste drains into lowlands, gullies and rivers. These practices lead to the contamination of extensive areas. The sewage disposal ditches are located near the Nasahablood hills. The lagoons are poorly designed and unprotected. Liquid waste is allowed to drain into the entire basin of watershed areas lying below the disposal ditches, and this basin in turn feeds into the lagoons. Wildlife species – birds and animals – swim in the cesspools and feed on the refuse of biological wastes that are indiscriminately dumped near the cesspools. As a result, there is a threat of outbreaks of epizootic diseases, affecting the populations living downstream, either in adjacent areas or further afield. Therefore, there is an urgent need to construct proper oxidation ponds, which should be well managed and protected.



● Disposal of biological waste in a slaughterhouse near Nasa Hablood dumpsite, Hargeisa, Somaliland

• *Disposal of liquid biological waste*

Blood as biological waste is collected in the septic tanks of the slaughterhouse and emptied into open cesspools up to the level of overflow, at which point the liquid biological waste spills into downstream watercourses or open land. It is common practice to design slaughterhouses in such a manner that liquid biological wastes are disposed into downstream valleys and open fields. A similar method is followed in the slaughterhouses of Burao, Borama and Berbera.

The picture below demonstrate the scale of negligence, the extensive damage caused to the environment and the high risk posed to public health.

These open landfills used for dumping both solid and liquid wastes, including human and animal waste, have a significant impact on the environment and the ecological systems surrounding big towns and cities across the country. Even though the country is not heavily industrialized, there is uncontrolled dumping of municipal, agricultural, biological and industrial wastes in every space available. Often these wastes flow directly into the rivers or are washed down into them by floodwaters. From there they penetrate deep into local water sources. Most people and their livestock drink from shallow, hand-dug wells or directly from rivers, berkedes and other water catchment areas, especially during the rainy season.

Number of animals slaughtered daily (Hargeisa)

- ▶ **Sheep and goats:** 1000 head
- ▶ **Cattle:** 60 head
- ▶ **Camels:** 30 head



● Disposal of animal liquid parts in a slaughterhouse near Nasa Hablood dumpsite, Hargeisa, Somaliland

Burao town slaughterhouse

The slaughterhouse in Burao town is constructed as an open-sky design, with no roofing or enclosed rooms. The slaughterhouse is owned and managed by the Burao municipality.

The slaughtering plots for sheep, goats, camels and cattle are fitted with concrete floors, and kept drained and clean. At the time of the visit the slaughterhouse was in progress of being cleaned. The slaughterhouse inside was relatively clean. But the sanitary arrangements at the slaughterhouse for the disposal of liquid biological waste, however, posed a real threat to the surrounding environment and to the entire area of the dry river basin, including its downstream reaches. Septic tanks constructed years ago for the collection and decomposition of liquid biological waste are not anymore in use as soak away pits. As a result, the liquid waste from the slaughterhouse is drained directly into the Togdheer riverbed and soaks far downstream. This is a public health hazard for the residents of Burao town and the communities living in areas along the banks of the river. Many of them draw water from shallow wells located along the riverbanks or on the riverbed.

Accordingly, the slaughterhouse in Burao town should be relocated immediately and replaced by a modern slaughterhouse, properly designed and constructed.

Number of animals slaughtered daily (Burao)

- ▶ Sheep and goats: 750 head
- ▶ Camels: 25 head

Borama town old slaughterhouse

Borama old slaughterhouse is also built in the traditional open-sky design. It is located to the south-east of the town, near the valley of the dry Qorgab river, where a large number of shallow wells are available to provide water for a large proportion of the town's residents, but also for rural and pastoralist communities. The Borama slaughterhouse resembles those of Berbera and Burao in terms of its sanitation and hygiene standards and daily slaughtering capacity.

Sanitation and hygiene standards are difficult to maintain, because of the lack of an appropriate water supply, and the hard-baked earth on which the slaughterhouse is constructed. This makes it difficult to dig septic tanks for liquid biological waste. As a result, liquid biological waste flows into open land and drains into the Qorgab valley and riverbed, where it contaminates the water of the shallow wells. A new slaughterhouse was recently constructed.

Number of animals slaughtered daily (Borama)

- ▶ Sheep and goats: 130 head
- ▶ Cattle: 20 head
- ▶ Camels: 5 head

New slaughterhouse in Borama town

The biological waste from the new slaughterhouse is separated at different stages. Solid biological waste is collected at the first collection point and is then transported to an open earth catchment where it is treated with bacteria to break down the waste. The waste will be eventually used as fertilizer. Any remaining fatty material is removed in a second chamber before reaching the septic tank and this is added to the solid biological waste. The liquid biological waste passes through the septic tank and is then released into an open field where it is absorbed into the soil. The question remains, however, whether this liquid is sufficiently safe to be released into the soil. Necessary measures are needed to ensure strict environmental safety and protection of the communities residing around the vicinity of the new slaughterhouse after it becomes fully operational.



● Construction of a new slaughterhouse, Borama, Somaliland

Erigavo and Lasanod slaughterhouses

Neither Erigavo nor Lasanod, capital towns of Sanag and Sool regions respectively, have slaughterhouses or designated infrastructure for slaughtering animals. As a result, animals are slaughtered in the open. Blood is drained into the soil and the remnants and unwanted body parts of slaughtered livestock are simply discarded at the place of slaughter in the open. These sites with the remnants, blood and other biological wastes attract scavenging birds, wild animals, and rodents. In the rainy season, these biological wastes are washed down into streams and contaminate shallow wells and surface water reservoirs used by urban, rural and nomadic communities. These practices may cause outbreaks of infectious diseases, including epizootic diseases, and contribute to the already poor sanitation and unhygienic living conditions of these towns, which needs to be urgently addressed.

Number of animals slaughtered daily (Hargeisa)

Erigavo (Sanag)

▶ Sheep and goats:	160 head (average)
▶ Camels:	18 head
▶ Cattle:	12 head

Lasanod (Sool)

▶ Sheep and goats:	175 head
▶ Camels:	20 head
▶ Cattle:	8 head

Communal food markets

In Somaliland, main towns and also peri-urban centres have at least one communal food market with an infrastructure designed for food sales, especially meat, groceries (fruit and vegetables), and dairy. The main meat bazaar for the urban and peri-urban centres is usually part of this communal food market. The average standards of sanitation and hygiene in these communal food markets range from poor to relatively satisfactory. In some meat market areas, the tables of the meat vendors are usually made of cement stands while others use wooden or metal tables to display their meat. In most cases, cleaning practices are sub-standard as the water supply for cleaning the premises before and after use are either inadequate or even non-existent. Meat is displayed in open air, and therefore at risk of contamination from dust, flies and rodents.

Meat market areas are generally safer than open-air meat places. If adequate water supply is made available and cement floors are regularly maintained and kept free of cracks, the sanitary and hygiene standards of meat markets would be substantially improved.

Grocery and dairy market areas are located either within the main communal food market or on the outskirts of the building at a distance from the meat market area, or located in a building adjacent to it. The grocery and dairy market areas are generally cleaner than the meat market areas and could be categorized as moderately hygienic. Groceries are perishable food items, and large quantities of vegetables and fruit rot and add to the quantities of waste as there is no cooling and conservation system installed in food market areas in Somaliland. The grocery and dairy market areas generate substantial amounts of waste in the form of spoiled fruit and vegetables that are then discarded in the streets.

It is common to find food vendors selling their products under unhygienic conditions in open and busy areas. The municipal authorities demolish from time to time food markets in slum areas.

Plastic containers used in the transport and distribution of vegetables and dairy products are made of hazardous materials that are detrimental to health and the environment and should not be used for the storage of edible items. The containers cannot easily be cleaned and therefore, attract flies that pose a constant threat to public health. The use of biodegradable containers and bags should be introduced.

Food catering and processing facilities

Food catering facilities include hotels, restaurants, teashops, snack bars and soft drinks kiosks, should adhere to acceptable levels of sanitation and hygiene standards. Food catering facilities housed in small decrepit buildings can be seen in slum areas, but are also common in urban settings. These facilities adhere to very low standards of sanitation and hygiene.

At regular intervals, local government sanitation and hygiene inspectors carry out inspections of food catering facilities. They recommend remedial measures to improve their sanitation and hygiene standards. Minimum standards of sanitation and hygiene are generally maintained.

The food processing facilities include bakeries, soft drink bottling companies, manufacturers of powdered soft drinks and processing and packaging factories. Although not officially certified by a competent food quality control laboratory, these food processing, bottling and packaging factories meet the sterility standards set for the commercial sale of food items. Their manufacturing processes are consistent with good sanitation and hygiene practices. However, quality assurance certification by a competent food quality control laboratory should be introduced.

Pesticides

• Ministry of Agriculture of Somaliland

The Plant Entomology Department of the Ministry of Agriculture is involved in pesticide control. Discussions were held on the importation, registration, use and disposal of pesticides, and the concerns linked to the potential effect of pesticides and hazardous chemicals on human health and public safety.

Spraying operations are carried out by trained personnel from the Ministry of Agriculture or by farmers under their supervision. When emptied, the pesticide containers are crushed. Burnt or buried pesticides are toxic substances and cause problems for the soil. Their odour is noxious and when people are exposed to them they can fall ill, mainly with skin and respiratory diseases. Excessive exposure to pesticides can also cause mental disorders. The importation of pesticides is not licensed and there is no data available on the types and quantities of pesticides stock-piled in Somaliland.

The Food and Agriculture Organization of the United Nations (FAO) is working with the Ministry of Agriculture to assist in the importation of treated vegetable and cereal seedlings. Pesticides cause germination problems when they enter the soil. Farmers use pesticides for spraying crops, without understanding the health hazards caused by the improper use of pesticides. They should wear protective clothing when handling pesticides. The Ministry of Agriculture plans to launch a media campaign in 2010 to raise awareness on pesticide risks for the general public.

In 1988 at the location of the Desert Locust Control Programme, pesticides were spilled into the Hargeisa dry river. This has been the worst incident of toxic substance exposure in Somaliland. In the past water samples from shallow wells as far away as Hallo village

have been collected and tested by both FAO and WHO for pesticide concentration levels in the environment. The Ministry of Health, working together with the Ministry of Agriculture, need to take blood samples from people using this water and measure levels of pesticide concentration again. Support from WHO and FAO is needed for this exercise.

- ***Ministry of Livestock of Somaliland***

The Animal Health and Husbandry Department of the Ministry of Livestock confirmed that the use of chemicals in tick control and in controlling other livestock ectoparasites has been stopped completely and thus no longer poses a threat to public health and safety. However, chemicals used in the dyeing and staining of animal skins are also used as medicines in animal health and husbandry in the control of ticks and ectoparasites. Animals treated with chemical substances as medicines pose a threat to human health.

Uncontrolled use of chemicals (pesticides) in growing vegetables, fruits and crops is a concern. The pesticide residue in treated food items and khat could pose a health threat requiring control at national level. If animal products or farm produce are consumed before the chemicals have been shed or excreted within the recommended time frames it should be treated as a public health and safety issue. Accordingly, more collaboration is needed between line ministries on treating zoonotic diseases in a responsible way. Another important issue is food safety, which is a priority to be properly addressed by line ministries in the context of public health and safety.

No food quality control and assurance system is in place and therefore the issue of food quality is not yet properly addressed, owing to the absence of a regulatory and institutional framework for the line ministries involved in ensuring public health and safety. The establishment of a food quality control and assurance committee is needed as a first step. It is the right of all citizens to be protected from the negative effects of the use of chemicals on human health. WHO support is needed.

3.1.6 Key area 5: Industrial pollution

The number of local industries is steadily growing. But they remain unregulated, even though they have the potential to pollute the environment. Such industries include leather tanning factories and soap producing industries and they operate without any regular inspection or supervision. These factories, whether they produce leather, drinking water, cloths, plastic bags or furniture, do not invest sufficiently in their waste management and control or in safe waste disposal in order to protect the environment and public health.

There are environmental and health problems arising from the operations of leather tanning factories in Da'ar-budhuq, whose compound had once been home to a geological camp owned by the Ministry of Water and Natural Resources.

A baseline study of water supplies in Da'ar-budhuq needs to be carried out to establish the contamination levels of the groundwater from the outset. It is necessary to adopt a holistic approach to environmental quality monitoring, involving experts and environmentalists from WHO, the Ministry of Health and the Ministry of Water and Natural Resources.

The emergence of light industries operating with new and expanding technological advances in production and manufacturing generate industrial wastes and using plastic products for storage and transportation. Owing to resource limitations, the disposal of industrial hazardous wastes, including infectious, chemical and toxic wastes, is not separated from that of other types of waste. In addition, no institutional, regulatory and legislative framework or enforcement arrangements are in place.

In addition, there are verbal statements and reporting of extensive illegal export of hazardous toxic wastes, including radioactive waste, from industrial countries to the territorial waters of Somalia (personal communication, 2010).

Da'ar-budhuq leather tanning factories

There are two leather-tanning factories in the town of Da'ar-budhuq, between Hargeisa and Berbera. One is a Chinese-owned company and the other is Somali-owned. The factories are situated on the eastern and western banks of Da'ar-budhuq river valley, which has a perennial stream and a large number of shallow wells, from which the local people draw their drinking water. It is well known that leather tanning factories make extensive use of chromium, an inorganic and toxic chemical. Neither factory has any measures in place to prevent liquid waste from its operations contaminating the water in the shallow wells. Untreated factory wastewater (leachate) gets into these wells through direct liquid waste spills or subsurface absorption. In addition, wastewater ponds are located outside the Chinese factory, which are contaminating the water drawn from the river wells for drinking purposes.

In 2009, liquid waste water from the Chinese factory was discharged directly into the river while the Somali-owned factory had wastewater pools with no concrete or cement floors. Sooner or later health problems will emerge among the communities living along the entire length of the river radius as far as the sea. There is a need, accordingly, to conduct a baseline survey on the safety and concentration levels of chromium in the drinking water supply and a study of the current health status of people living around the factories.



● Leather factory in Da'ar Budhuq, Somaliland ●



Water bottling in Somaliland

• *Safi Water Bottling Factory*

At the time of the visit the Safi Water Bottling Factory was not functioning, but a visit was allowed.

The water source of the factory is drawn from the borehole well from the Hargeisa water supply and transported by water tank trucks and poured into an underground water reservoir. The water is then pumped to elevated water tanks from which the force of gravity takes it through a series of water filters for purification.

The most essential equipment for water quality testing has been installed to test the pH of the water, total dissolved solids and conductivity. The filtered water is then bottled in plastic bottles, as far as possible under hermetically sealed conditions. The labels on the bottles specify the trace element concentration levels but this should be questioned and verified by a competent public health laboratory.

• *Togdheer Mineral Water (Maaxda) Bottling Factory*

At the time of the visit the Maaxda Water Factory was not operational as that day was the scheduled day for cleaning activities. On the other six days of the week the factory produces water at the rate of 2000 cartons per day.

The factory has its own borehole well for water supply. Water is pumped from the deep borehole well to elevated water tanks. The water then passes through a series of filter machines equipped with water quality control and assurance devices. The water is disinfected with chlorine, but also with ozone and ultraviolet light treatment before bottling.

The factory management gave first priority to water quality standards in the manufacturing of bottled drinking water for human consumption and the next goal is to meet the quantity demand of consumers.

The staff of the factory is trained in international standards of hygiene in the processing of food and food-related products for human consumption. Processing and manufacturing are carried out under hermetically sealed off conditions and meet the required level of commercial sterility for canned, bottled and packaged food items, including drinking water.

A small quality control facility has been established to monitor the water quality. The quality control staff consists of a national and an expatriate laboratory officer who conduct basic tests for the control of pH, total dissolved solids, conductivity etc.

The labels on the bottles indicate the concentration levels of trace elements. A laboratory in India has certified these at intervals in line with the guidelines on "certified industry inspection". However, the specifications indicated on the labels of the mineral water bottles should be re-examined and verified by a competent public health laboratory.

• *Plastic bottle recycling*

The factory management indicated that there was no point in recycling empty plastic water bottles as the costs of investment in recycling far outweighed the salvageable market value of the recycled bottles. It is more cost-effective to import new plastic water bottles.

3.1.7 Key area 6: Energy

Logistical constraints precluded the gathering of any information on energy-related matters, including the trade in and use of charcoal, in Somaliland. However, the issues raised in section 2.8 may apply to Somaliland as well.

3.1.8. Somaliland: findings and recommendations

Findings

The assessment brought to light the effort invested in environmental health activities and the challenges arising throughout Somaliland with regard to public health and safety, arising from inadequate water supply management and poor sanitation, and unhygienic living conditions. It was clear that the serious problems posed by solid and liquid wastes, and inadequate water supply management and control in every major urban centre across Somaliland and the associated environmental impacts need to be further systematically investigated and documented.

In particular, solid and liquid waste management and control, food safety and control, water safety and control, energy (charcoal use), residential and institutional environmental sanitation and control remain at a very rudimentary level. Unacceptable practices such as, the accumulation of wastes, open dumping, defecating in open land in and around places of human settlement and work areas are very widespread, owing to technical, economic, social and legal enforcement constraints.

The exposure-mitigation and response strategies need to cover public health but also public education and awareness about risk assessment and management, monitoring and evaluation, and law enforcement to protect the public from the adverse health effects of contaminants in food, water and air.

The following specific findings relating to Somaliland were identified. The order in which they are presented does not reflect any priority.

- ▶ There is a general lack of investment in the installation and maintenance of health and sanitation infrastructure, at both public and private levels;
- ▶ There is an evident lack of efficient measures, sufficient funds, or even commitment and an effective strategy to deal with municipal, industrial and bio hazardous and biological waste;
- ▶ There is virtually no effort at any level to reduce waste at source, nor is there any sorting or recycling system in place;
- ▶ Arrangements for the sorting and separate disposal of various categories of liquid and solid wastes are not in place everywhere that needs them, including hospitals and industrial sites, and no attempt is made to sort hazardous waste of any type, including industrial, bio hazardous and biological waste, and to dispose of it separately;
- ▶ The absence of adequate bio hazardous and biological waste management procedures in health institutions in both public and private sectors leads to uncontrolled outbreaks of infectious diseases, including diarrhoeal diseases, and poses a threat to public health;

- ▶ Some hospitals and medical facilities in Borama town were seen to be clean and more effectively managed, ensuring protection of both the environment and the patients;
- ▶ There is no burning or recycling of waste at dumpsites, nor is there any adequate incineration system in place at premises of health facilities;
- ▶ Waste handling practices (collection, storage, transportation and disposal) are highly rudimentary and there is no dumpsite equipped to handle biohazard and biological waste;
- ▶ There is an urgent need for the creation of a zonal environmental agency to provide expertise and know-how on risk management and assessment. Such an agency should develop exposure-assessment and response strategies, including environmental sample testing, analysis and response, and the development of guidelines and protocols for these exposure assessments. Quality assurance and control is a critical element in exposure investigation and must be part of the strategy;
- ▶ There is no zonal public health laboratory in place to investigate adverse health effects of contaminants in food, water and air and to perform quality control testing of food stuff, water and air samples;
- ▶ Water shortage crises are common in Somaliland with cyclic droughts regularly experienced every two to three years;
- ▶ There is no sanitary disposal system for solid and liquid wastes in place either in the public sector, or municipality, slaughterhouses, food catering and processing facilities, and communal markets or in the private sector which meets the minimum sanitary and hygiene standards or complies with the public health and safety regulations on the design, construction and operations of these entities;
- ▶ None of the slaughterhouses and communal markets have piped water from the water mains; water is delivered to the slaughterhouses and communal markets by water tank trucks;
- ▶ The operating practices followed at the Hargeisa slaughterhouse in the slaughtering of livestock, hygienic handling of the meat and its delivery to the market were reasonably compliant with applicable sanitary standards whereas these procedures were not available at communal markets;
- ▶ Manual cleaning and disinfection procedures to improve and maintain slaughterhouse sanitation and hygienic standards, with the use of brushes, chlorine and detergents, were also found to be reasonably effective at Hargeisa slaughterhouse;
- ▶ All concrete and cement surfaces and floors of Hargeisa and Burao slaughterhouse, and, to some extent, that of Borama slaughterhouse were all smooth, without cracks and sloped to ensure the draining of wastewater and repair and maintenance facilities were all in place. The cement floor of Berbera slaughterhouse, however, was found to be cracked and unrepaired and the sanitary conditions in both Erigavo and Lasanod are no less than alarming, as they currently have no designated slaughterhouse facilities.

Recommendations

GENERAL

- ▶ In the light of the deficiencies identified and, in some cases, acceptable practices observed, a number of interventions are recommended that would address the improvement of the public health and safety issues in Somaliland to be undertaken by government institutions, private sector and individuals supported by a regulatory framework and law enforcement measures.

HEALTH

- ▶ An environmental health working group should be set up with clear terms of reference under the auspices of the Ministry of Health of Somaliland together with other relevant line ministries for coordination and/or development of an environmental health policy, supported by relevant laws and regulations, guidelines and adherence to international standards, where applicable and possible. Then a 5-year master plan should be developed for the implementation of the environmental health policy.
- ▶ Adequate investment should be made in public and environmental sanitation and high priority should be given to the establishment of environmental health, sanitation and hygiene infrastructure and the introduction and strengthening of public health, sanitation and environmental inspection services in urban, rural and remote areas.
- ▶ Capacity-building and training should be arranged for public health and environmental inspectors, and sanitation officers, not exceeding 15 persons at the outset.

WASTE

- ▶ Proper arrangements must be made for the management and control of biohazard and biological waste from all health facilities, laboratories, and pharmacies in both public and private sectors in order to protect public health. The installation and use of incinerators are vital;
- ▶ Systems should be put in place for efficient disposal of human excreta by using conservation methods;
- ▶ Urgent efforts should be made to tackle the present volumes of biohazard and biological wastes, both solid and liquid, which pose immediate and negative consequences to public and environmental health.

WATER

- ▶ Rainwater harvesting is of the first importance in increasing the water supply: accordingly, efforts should be made to set in place rainwater harvesting systems, including water redevelopment plans for boreholes and shallow wells for rainwater harvesting.

- ▶ The treatment of surface and groundwater should be actively encouraged as a means of protecting public health. Various treatment methods should be investigated to support community acceptability.

FOOD AND AGRICULTURE

- ▶ An effective environmental surveillance and response system should be put in place to reduce any further degradation of both terrestrial and aquatic ecological systems that are now under great stress or threat.
- ▶ The use of pesticides as a form of medicine for the treatment of cattle should be further investigated.

INDUSTRIAL POLLUTION

- ▶ The industrial pollution generated by the small-scale industries and the public health consequences thereof should be mapped and appropriately addressed.

ENERGY

- ▶ New cooking fuel and solar methods should be introduced with community involvement to reduce the use of charcoal.

3.2 PUNTLAND

In the following sections, the findings of the assessment in the six key areas – namely: health, waste, water, food and agriculture, industrial pollution and energy – as they relate to the area of Puntland are set out, followed by conclusions and recommendations specific to Puntland.

In some cases, coverage of one or another topic was impeded by logistical or security constraints faced in Puntland.

3.2.1 Introduction

The administrative system of the state of Puntland is divided into central, regional and local authorities, which govern districts in the rural areas and municipalities in the urban centres. The administrative system is the governance framework and clarifies the separation of powers and responsibilities between the executive, the judiciary and Parliament.

The population of Puntland is estimated at 2.4 million. As the humanitarian crisis in Somalia persists, 42% of the country's population – or some 3.2 million people – remain in need of emergency humanitarian assistance and livelihood support. Puntland hosts the largest number of IDPs from conflict-affected regions of Somalia, particularly from South-Central Somalia.

Bosasso and Galkayo are estimated to contain the largest numbers of IDPs, who face a myriad of challenges such as acute shortages of water and food, malnutrition in children under five years of age, poor levels of hygiene and sanitation and a lack of permanent shelter.

3.2.2 Key area 1: Health

Ministry of Health of Puntland

The overall aim of the public and environmental health sectors of Puntland is to attain the highest possible standard of health and social wellbeing for the individual, the family, the community and society at large. The goal of the Ministry of Health is to improve the health of the population of Puntland by ensuring increased access to quality health services for meeting their needs.

The Ministry of Health seeks to provide equitable, affordable and sustainable quality health services with the objective of reducing morbidity and mortality, improving life expectancy and fostering comprehensive socio-economic development strategies including pro-poor and poverty reduction policies in order to address the social determinants of health.

One of the roles of the Health Authorities is to coordinate the activities of the UN agencies and the international and local non-governmental organizations that provide support to the health sector.

The challenges encountered are insufficient number of health facilities, inadequate human and financial resources, limited coordination between line ministries, regional and district authorities, and implementing health partners.

The Ministry of Health has drafted a public and environmental health policy that will guide the process of health sector reform, planning and management, and quality health service delivery. The main issues to be addressed are:

- a) Restructuring the central health authorities in line with the decentralized planning and management of health care services, including resource mobilization and service delivery, to the regions and districts. The core functions of the health authorities are policy formulation, strategic planning of infrastructure, human and financial resources for service delivery and health financing, resource mobilization, donor coordination, monitoring and evaluation of the performance of the health sector, and collaboration with other line ministries;
- b) Transforming the current donor-driven healthcare system into a self-sustaining, community-based, co-financed and co-managed healthcare delivery system;
- c) Strengthening the environmental health services, and developing supportive legislation and regulatory framework.

The current public and environmental health policy is a working document and will be periodically updated to accommodate the dynamics of the public and environmental health sectors.

Health standards

The quality of the health services currently offered by public health facilities in Puntland is poor, and their rate of utilization is low, only 21% of the population uses public health facilities. The rate is even lower among the nomads (8%) and in urban centres the utilization rate is less than 50%.¹¹

The health status in Puntland can be categorized as poor. The health statistics currently available, although limited, indicate that upper respiratory tract infections and diarrhoea are the two main causes of ill health and death among the children in Puntland.

The poor status of health is related to various issues such as malnutrition resulting from unavailability of food, high food prices, and bad nutritional practices, inadequate number of healthcare facilities, the prevalence of unhealthy lifestyles, and the lack of preventive public health interventions.

The mortality rate in Puntland remains high – at 16 per 100 000. The infant mortality rate is 128 per 1000 live births, and the child mortality rate is 205 per 1000 live births. Maternal mortality rate is estimated at 1550 per 100 000 live births.¹²

Acute infectious diseases are the most common causes of ill health and death. Outbreaks of measles, cholera, dysentery and meningitis pose a major threat to public health in terms of both morbidity and mortality. Malaria is a seasonal disease with a high mortality rate. It can account for as much as 20% of childhood mortality. It is estimated that malaria continues to account for 10% of all hospital admissions in the main hospitals in Puntland.

¹¹ UNICEF (2006). Multiple Indicator Cluster Survey 2006

¹² UNICEF (2006). Multiple Indicator Cluster Survey 2006

Determinants of health

The major determinants of health in Puntland are low educational levels and limited access to safe water, poor sanitation and nutrition status. These areas show low levels of development. Malnutrition may not be as prominent as in South-Central Somalia, acute wasting and malnutrition occur from time to time due to droughts.

Only 24% of the population have access to safe water. Among the nomadic community, only 2% obtain water from protected sources.¹³ In urban centres, the majority of residents uses pit latrines. Shallow wells are the main sources of water. In urban areas, some of these wells are dug close to pit latrines and septic tanks; hence there is a high likelihood of cross-contamination.

Basic education is an important determinant of health. It is estimated that only 27.7% of children aged from 9 to 14 years is currently attending school and this percentage varies from 34% in urban areas to 13.3% in rural areas and 1.3% in nomadic communities.¹⁴ Low levels of education severely limit the capacity of people to recognize and avoid a kind of behaviour associated with health risks. The lack of public health education and awareness programmes, the prevalence of certain cultural beliefs, and the availability of alternative services (traditional and religious healers) are also determinants of health.

Health facilities in Puntland

Public health care services are managed by the Ministry of Health and are rendered at three public health tiers: public hospitals, mother and child health (MCH) centres and health posts. In 2010, there were three regional and four district hospitals, 51 MCH centres and 119 health posts. The Garowe and Galkayo Hospitals are referral hospitals, as well as the regional hospitals. The resources currently available to the Ministry of Health are limited.

To improve health services in urban centres, international and local non-governmental organizations managed MCH centres and health posts. Of the total of 51 MCH centres, 34 are managed by non-governmental organizations. They also provide training of community health workers and traditional birth attendants in basic health services. There are seven TB clinics, one malaria reference laboratory, five HIV VCT centres, three ART centres and three mental health facilities in Puntland in 2010.

3.2.3 Key area 2: Waste

Solid waste in major regions

- ***Nugal region***

Before 2007, the local authorities were responsible for waste management and control. This did not work well, owing to the inadequate disposal facilities managed by the local authorities and the lack of equipment and trained human resources. Since 2007, a local non-governmental organization, Nabad Relief and Development, supported by the local government and authorities, took on the responsibility for waste management, committing itself to managing solid waste disposal in the city of Garowe and other

¹³ UNICEF (2006). Multiple Indicator Cluster Survey 2006

¹⁴ UNICEF (2006). Multiple Indicator Cluster Survey 2006

areas in the Nugal region for a period of six years. Nabad has set up a new solid waste collection system in Garowe, using three waste collection points and processing waste from an additional five collection points.

Nabad has two vehicles for transporting solid waste to the final disposal pit, located some eight kilometres from the city. They have a third vehicle for transporting liquid waste. There is no separate waste collection system to differentiate between commercially generated solid waste and that generated by homes, hospitals, clinics and pharmacies. The waste collection workers are not supplied with adequate equipment. Other districts within the Nugal region, such as Dangorayo, Burtule and Eyl, have no functioning waste disposal management system in place.

• *Mudug region*

Since the collapse of the central Government of Somalia in 1991, there has not been a functional solid waste management and control system in place in the Mudug region. After 2007, local authorities have tried to manage solid waste disposal, but hardly any progress has been made due to lack of sufficient funding.

The Mudug local authorities have only one vehicle for transporting solid waste in the city of Galkayo, which has a population of over 300 000.

The city of Galkayo manages different kinds of solid waste. Waste that is generated by commercial enterprises, food markets, households, abandoned vehicles and metal scraps, hospitals, health clinics and pharmacies. Galkayo has neither separate solid waste collection systems, nor designated waste collection points for each of these types of waste.

There is one terminal waste disposal pit, which is situated some seven kilometres from the city. The majority of the city's waste is not properly disposed of, however, as residents dump their waste at random in streets and open plots of land, owing to lack of public awareness of the health-related risks and lack of commitment on the part of the local authorities to assert their responsibilities. However, the risk is even greater for the waste collection workers as they do not have adequate equipment or protective clothing. In other districts of the Mudug Region, such as Galdogob and Jariban, communities themselves make efforts to manage their own waste and disposal.

• *Sool region*

There is no solid waste management and control in the entire Sool region. The communities in the region made many attempts to set up their waste management and control systems, but did not receive any appropriate support from the local government.

Liquid waste in major regions

There are no liquid waste systems of any kind in place in the regions and major cities of Puntland. Rainwater and other liquid wastes are not properly managed or controlled and therefore freely disposed in streets and open land between villages. This very poor level of sanitation and hygiene creates breeding places for mosquitoes.

Despite the enormous increase in the number of public latrines and laundries in urban areas over the last 10 years, there are no governmental guidelines and regulations on their use, and no activities are being implemented to maintain a minimum standard of sanitation and hygiene for the public. Liquid biological wastes run freely in the streets, creating a very poor level of sanitation and hygiene.

In the town of Garowe, in the Nugal region, Nabad has one vehicle for transporting liquid waste produced by local restaurants to waste disposal pits.

3.2.4 Key area 3: Water

Water supply in Puntland

In Puntland, people and livestock depend on their water supply from traditional shallow wells dug by hand, springs, rainwater catchment areas such as berkeds (cement catchments) and ballis (earth catchments), and boreholes. The majority of the population draws water from unprotected water catchments or shallow wells; therefore, the quality of water for human consumption is poor.

External support in Puntland

UNICEF has a programme that aims to enhance the capacity of institutions and communities to manage WASH systems effectively and efficiently in emergency situations. It also sustains existing WASH services and expands services to those who have not yet been reached, referred to as “unserved population”. Further, it sustains and expands hygiene education to communities through schools and MCH centres. The 2010 targets are:

- ▶ To provide 310 000 unserved people with increased access to safe water and improved hygiene and sanitation services;
- ▶ To enhance the infrastructural and institutional capacity of the Ministry of Public Works and Transport and the Puntland State Agency for Water, Energy and Natural Resources, the WASH authorities, in two regional offices and promote water policy in 10 locations within two regions and five districts;
- ▶ To rehabilitate the water infrastructure (water yards, shallow wells, berkeds) to service 310 000 people within 12 districts, drawing on the participation of the communities and the private sector;
- ▶ To provide 40 schools and 10 MCH centres with functional sanitation facilities in 18 districts, including access to continuous education on good hygiene and involvement in environmental sanitation activities;
- ▶ To provide water infrastructure with sufficient supplies and enhance the technical capacity of personnel of the local WASH authorities in the regions of Puntland in order to respond effectively to emergencies.

Water situation in the various regions

• *Mudug region*

There are several sources of water in the Mudug region, such as groundwater, rainwater, shallow wells and berkeds. The main source of drinking water in this region, however, remain groundwater.

The Galkayo Water Company, Galwa, is the main water supply facility in the Mudug region, which provides water to the city of Galkayo. Since 2003, the company has provided piped water to 6497 households in Galkayo. The private sector together with the Government of Puntland has set up a public-private partnership that is supported by UNICEF. The company has three borehole wells and one tank truck, which is not sufficient to manage the water supply. The water is not treated with any chemicals, so the taste is salty due to high concentration of minerals.

Galdogob, Bursalax and Ba'adweyn districts in the Mudug region have to a certain extent piped water. Only 1549 households have piped water in Galdogob town, while 291 households in Ba'adweyn town have piped water, and 251 households in Bursalax town. It is estimated that 8388 families in the Mudug region have access to piped water.

Agencies involved in the public and environmental health sector and providing external support in the Mudug region include UN agencies such as UNICEF, UNFPA, UNHCR and WHO, and international non-governmental organizations, such as Merlin, Somali Red Crescent Society (SRCS), Save the Children, Danish Refugee Council (DRC), Care International, Norwegian Refugee Council (NRC), Islamic Relief and Relief International.

• *Nugal region*

There are several sources of water in the Nugal region such as, groundwater, rainwater, shallow wells, berkeds and ballis. The main sources of drinking water in this region, however, are berkeds and ballis. The main water supply company is the Nugal Water Company, a public-private partnership, which supplies water to the city of Garowe. Since 2006, the company has provided piped water to 2493 households in Garowe. This public-private partnership involves the participation of the private sector and the Government of Puntland, and is supported by UNICEF. The company has only one borehole well and one tank truck, which is not sufficient to meet the water supply needs. The company does not treat the water, and consequently there is a high concentration of minerals in the water.

The Dawad and Adra water companies provide the water supply in the Eyl district, but only 83 households have piped water. The majority of households do not have piped water.

The remaining districts of the Nugal region are dependent on berkeds and ballis for their water supply.

Agencies involved in the public and environmental health sectors and providing external support in the Nugal region include UN agencies such as UNICEF, UNFPA, UNHCR and WHO, and international non-governmental organizations, such as Merlin, SRCS, Save the Children and Action Africa Help.

• *Sool region*

There are several sources of water in the Sool region: rainwater, shallow wells, berkeds and ballis. None of these sources provide safe drinking water.

3.2.5 Key area 4: Food and agriculture

Slaughterhouses

For various logistical reasons, no information specific to slaughterhouses was gathered for Puntland. The findings identified and recommendations formulated for the other zones and for the country as a whole may well apply to Puntland as well. However, some observations were integrated in the following subsection.

Communal food markets and catering facilities in Puntland

The level of hygiene in food markets is very poor. Since the collapse of the central Government of Somalia in 1991, there has been no control of sanitation and hygiene standards in communal food markets for selling fish, meat and dairy products, nor in cafeterias and restaurants in Puntland. In addition, there are neither regulations in place to control the transport and storage of food, nor ones to deal with incidences of spoiled food or food poisoning.

The absence of food safety and hygiene standards is the underlying cause of many food-borne diseases, which are prevalent among the population of Puntland. A number of recent disease outbreaks were transmitted through food and the presence of live animals in the communal food markets. These disease outbreaks underline the importance of addressing food safety and occupational health issues by improving conditions in food markets. The prevention and control of food-borne diseases and zoonoses in communal food markets need appropriate action.

In the Mudug region, a new slaughterhouse and a meat and dairy market are under construction in Galkayo city under the auspices of Vétérinaires Sans Frontières and Tierärzte ohne Grenzen, Switzerland. A fish market is under construction and supported by Care International.

The Nugal region has very low standards of sanitation and hygiene in place in communal food markets. There are no guidelines or regulations to manage and control food markets and food catering facilities such as restaurants, cafeterias, and food delivery and storage systems. There is one slaughterhouse in Garowe but it is no longer in use.

The level of hygiene in communal food markets in the Sool region is very poor. There has been no sanitation and hygiene management and control of communal food markets selling fish, meat and dairy products and of food catering facilities such as, restaurants and cafeterias in the Sool region since the collapse of the central Government of Somalia in 1991. There are neither regulations in place to control the transportation and storage of food.

Pesticides

For various logistical reasons, no information specific to pesticides was gathered for Puntland. The findings identified and recommendations formulated for the other zones and for the country as a whole may well apply to Puntland as well.

3.2.6 Key area 5: Industrial pollution

The Ministry of Fisheries and the private sector are both involved in the fishing industry in Puntland.

A fish processing facility, which was built by the Soviet Union in the 1970s, is now defunct as it was partially destroyed by heavy shelling during the civil war in 1995.

In 2000, the private sector opened fish processing and canning facilities in two districts, Lasqoray and Habbo, of the Sanag Region. These medium-size factories are the first business facilities that have been set up in Somalia since the civil war. The factories process and can the locally caught tuna and sardines. They provide an alternative livelihood for the local communities, in particular, for destitute herders. These factories currently produce 800 tons of canned fish for the domestic market as well as for the export market to Kenya and United Arab Emirates per year. Waste of the factories is not well managed. Discarded fish and bones are directly dumped on the beaches.



Fisher boat along the shores of Bosasso, Puntland

3.2.7 Key area 6: Energy

Charcoal

The main source of household energy is charcoal. Charcoal production, however, is estimated to be one of the most harmful business practices in terms of the effect on the environment. Some of the detrimental effects of charcoal production are environmental degradation, soil erosion and the destruction of pastureland. The consumption rate of solid fuel in households is 99.4%. Recent scientific studies on charcoal show that its rate of consumption has doubled over the last seven years, and support the negative effect on the environment. There have been some private sector initiatives to develop an alternative solution to the use of the charcoal. Somgas, for example, is a private company that has introduced natural gas as a substitute for charcoal. Only a limited number of urban households have switched over to the use of natural gas. The two main reasons for the slow uptake are that gas is more expensive than charcoal and the public perception about the additional safety measures needed to be in place (e.g. fire extinguishers) when using gas in the household.

3.2.8 Puntland: Findings and recommendations

Findings

The assessment led to the formulation of the following essential findings on the situation obtaining in Puntland in respect of public health and safety, inadequate sanitation and unhygienic living conditions, poor water supply management and control, and the state of the environment. In addition, the gaps and shortcomings were identified on which the recommendations in response were based. Serious problems came to light in every major urban centre across Puntland and the associated environmental impacts need to be further systematically investigated and documented. The order in which the findings and recommendations are presented is not intended to reflect any priority.

In particular, solid and liquid waste management and control, food safety and control, water safety and control, energy (charcoal use), residential and institutional environmental sanitation and control remain at a very rudimentary level. Unacceptable practices such as, the accumulation of wastes, open dumping, defecating in open land in and around places of human settlement and work areas are very widespread, owing to technical, economic, social and legal-enforcement constraints.

The exposure-mitigation and response strategies need to cover public health but also public education and awareness about risk assessment and management, monitoring and evaluation, and law enforcement to protect the public from the adverse health effects of contaminants in food, water and air.

The following specific findings relating to Puntland were identified. The order in which they are presented does not reflect any priority.

- ▶ While the Ministry of Health has plans to improve the standards of health and sanitation throughout the whole of Puntland, there are many gaps to be addressed with regard to public and environmental health. These gaps include: the lack of laws and regulations on environmental health and sanitation, such as food safety and quality assurance and control, water management and quality control, systems to manage and control of solid and liquid waste and the surveillance and response to biohazard and biological wastes;
- ▶ There is a general lack of investment in the installation and maintenance of health and sanitation infrastructure, at both public and private levels;
- ▶ There are no studies undertaken and findings available and there is no provision of public information and education in the field of public and environmental health;
- ▶ The proportion of the population in Puntland with access to piped water is very small, so the majority of the population in Puntland is constrained to use unsafe water from shallow wells, berkedes and ballis;
- ▶ There is no sustainable waste management and control system in place for the adequate disposal, recycling or conservation of solid and of liquid waste. Most districts in Puntland use open land to discard their solid and liquid waste uncontrolled.

Recommendations

HEALTH

- ▶ The Ministry of Health should develop a comprehensive environmental health policy based on identified priorities and proposed approaches.
- ▶ Adequate investment should be made in public and environmental sanitation and high priority should be given to the establishment of environmental health, sanitation and hygiene infrastructure and the introduction and strengthening of public health, sanitation and environmental inspection services in urban, rural and remote areas.
- ▶ Capacity-building and training should be arranged for public health and environmental inspectors, and sanitation officers, not exceeding 20 persons at the outset;
- ▶ The health care delivery system in all the regions of Puntland should be improved and strengthened.
- ▶ The current legal framework should be reviewed by taking into consideration relevant laws and regulations in support of enforcement to protect the public from the adverse effects of contaminants in food, water and air.
- ▶ Coordination and cooperation should be established between relevant government bodies involved in public and environmental health: the ministries of health, education, veterinary services, agriculture, minerals, water, planning, internal affairs and labour; local authorities; and with the private sector, UN agencies, and international and local non-governmental organizations in order to establish partnerships for sustainable development in environmental health.
- ▶ A zonal environmental agency should be established to provide expertise and know-how on risk management and assessment. Such an agency should develop exposure-assessment and response strategies, including environmental sample testing, analysis and response, and the development of guidelines and protocols for these exposure assessments. Quality assurance and control is a critical element in exposure investigation and must be part of the strategy.
- ▶ A zonal public health laboratory should be established to investigate adverse health effects of contaminants in food, water and air and to perform quality control testing of food stuff, water and air samples.

WASTE

- ▶ Systems should be put in place for the management and control of biohazard and biological waste from all health facilities, laboratories, and pharmacies in both public and private sectors in order to protect public health. The installation and use of incinerators are vital.

- ▶ Sanitary disposal system for solid and liquid wastes should be put in place either in the public, or municipal, slaughterhouses or in the private sector which meets the minimum sanitary and hygiene standards or complies with the public health and safety regulations on the design, construction and operation of slaughtering houses.
- ▶ Systems should be put in place for efficient disposal of human excreta by using conservation methods.

WATER

- ▶ Access to safe drinking water should be prioritized for the community of Puntland. Public-private partnerships should be considered for sustainable environmental health development.
- ▶ Aid programmes should provide sufficient drinking water and adequate sanitation facilities for IDPs should be strengthened; WASH services for the benefit of IDPs and other affected sections of the population should be rehabilitated and protected.

FOOD AND AGRICULTURE

- ▶ An effective environmental surveillance and response system should be put in place to reduce any further degradation of both terrestrial and aquatic ecological systems that are now under great stress or threat.
- ▶ The use of pesticides as a form of medicine for the treatment of cattle should be further investigated.
- ▶ Vector control programmes should be strengthened to reduce the mosquito population in every region of Puntland.

INDUSTRIAL POLLUTION

- ▶ The industrial pollution generated by the small-scale industries and the public health consequences thereof should be mapped and appropriately addressed

ENERGY

- ▶ New cooking fuel and solar methods should be introduced with community involvement to reduce the use of charcoal.

3.3 MOGADISHU, SOUTH-CENTRAL SOMALIA

3.3.1 Introduction

In the following sections, the findings of the assessment in the six key areas – namely: health, waste, water, food and agriculture, industrial pollution and energy – as they relate to the area of Mogadishu and South-Central Somalia are set out, followed by conclusions and recommendations specific to Mogadishu and South-Central Somalia.

3.3.2 Key area 1: Health

Years of war, famine and underinvestment have left the health sector very weak. The Ministry of Health is unable to provide and guarantee adequate quality healthcare services for the population at large.

Ministry of Health

Public health care services are managed by the Ministry of Health and are rendered at three public health tiers: public hospitals, mother and child health (MCH) centres and health posts. In 2010, there were 24 regional and 12 district hospitals, 145 MCH centres and 325 health posts. To improve health services in urban centres, international and local non-governmental organizations managed MCH centres and health posts. There are 41 TB clinics, one malaria reference laboratory, nine HIV VCT centres, three ART centres and three mental health facilities in South Central Somalia.

Food and medicines control systems

Under the previous central Government there was a public health laboratory for the quality control of food and medicines. The quality of food was analysed to ascertain its fitness for human consumption and its nutritional value, and medicines were tested on quality and their validity. There was also a public health office within the Mogadishu local government that was in charge of sanitation and hygiene related issues especially food catering facilities such as, hotels, restaurants, cafeterias, and kiosks. It also covered facilities such as, shops, pharmacies, barbershops, stores and markets. The office managed also liquid waste and disposal. Public health inspectors from the Ministry of Health were assigned to the public health office to take responsibility for control and supervision of these facilities.

Seaports

In the seaports, public health offices were in place. Public health officers and inspectors were responsible for the enforcement of international health regulations. Areas of responsibility included monitoring of imported food and medicines, deratization exemption certificate for ships, and monitoring of international health vaccine books etc.

Airports and borders

Public health officers and inspectors were also posted at airports and cross border points to enforce international health regulations, and to monitor international health vaccine books, persons with diseases as stipulated under the International Health Regulations who need to be quarantined, and the importation of food and medicines. Expired food stuff, beverages and medicines that entered the country were declared unfit for human consumption were disposed and burnt at appropriate dumpsites by public health inspectors in accordance with the public health laws of the country. Since 1991, the food and medicines control systems have no longer been in operation.

3.3.3 Key area 2: Waste

Solid waste

Under the previous central Government, there was a municipal department that managed and controlled solid waste and temporary and terminal disposal areas, known as karan tips. There were waste disposal bins in public areas and bulk containers in temporary disposal areas, and vehicles and tractors for waste collection and disposal. Before 1991, public health officers from the Ministry of Health and WHO were involved in waste management and disposal systems.

Since 1991, there are no properly functioning household waste collection and disposal systems in place. Residents have to take care of their own domestic waste, which they collect and burn or bury in dug holes near their homes or simply dump in open areas, transforming them into massive rubbish heaps. Local and international non-governmental organizations, together with the Somali women's development organizations like IIDA and SAACID, helped to dispose of these massive heaps by shifting them to dumpsites outside the town.

External support

During September 2007 and February 2008, SAACID and DRC were involved in waste collection and disposal. Road sweepers were involved to collect voluntarily waste in the 16 districts of Mogadishu (Banadir region) and received US\$60 per month as an incentive. The 16 vehicles available collected waste and disposed of it at the rate of six loads per day. Nearly 500 metric tons of waste were removed from town to be disposed of at the terminal dumpsites.

During April 2008 and March 2009, IIDA was assisted by WFP in the conduct of a food-for-work project in support of waste collection and disposal in Mogadishu. The project employed 7100 workers in the 16 districts of Mogadishu and used six vehicles for transporting waste to the disposal areas. Each vehicle carried four loads per day. The workers were paid in food on a monthly basis. There were three disposal sites – Kaysaney, Halane and an area near the police school.

Public health officers from the Somali Public Health Professional Association (SOPHPA) collaborated closely with IIDA and supervised the waste collection and disposal project. The project succeeded in reducing the numbers of garbage heaps in town and provided families with food support. The project was not continued and therefore waste collection and disposal activities were stopped.

3.3.4 Key area 3: Water

Water supply

Under the previous central Government, only one source of water was available and managed by the Mogadishu Water Supply Agency. In the past, a gas chlorination process chlorinated water. No outbreaks of acute watery diarrhoea and cholera were recorded. With the collapse of the central Government in 1991, the Mogadishu Water Supply Agency ceased functioning.

After 1991, the city of Mogadishu and its outskirts, including the surrounding IDP camps, received water supply from privately owned borehole wells in the community. These borehole wells were not chlorinated and consequently there were regular outbreaks of water-borne diseases, such as acute watery diarrhoea and cholera. Cholera treatment centres (CTCs) were put in place by United Nations agencies, working together with local and international non-governmental organizations.

Since 2008, SOPHPA, with the support of UNICEF, started to chlorinate borehole wells used for water supply in Mogadishu. This made a great health impact on the community, as the annual outbreaks of acute watery diarrhoea and cholera decreased. SOPHPA is in charge of a project to chlorinate 217 main borehole wells in Mogadishu and the surrounding IDP camps and settlements and 58 water points (kiosks) in the Afgoye corridor.



● IDPs searching for water in Mogadishu, Somalia

3.3.5 Key area 4: Food and agriculture

Slaughterhouses

There are a number of slaughterhouses in the city of Mogadishu. Before 1991, two slaughterhouses were functioning, one near the marina and the other near Mogadishu's main jail. The old slaughterhouse located in Karan district needs to be renovated and upgraded.

There are two privately owned slaughterhouses, one of which is still under construction. The other – operated by the company Somali Fresh Meat (Sofmeat) – is functional. It has sections where veterinary health officers can check the health status of the live animals and where public health inspectors can examine the meat for human consumption. It has also sections where the animals are slaughtered, and where the meat is kept in optimum storage conditions. There is running water for cleaning purposes. There are dustbins for the refuse and waste. Personnel are required to carry health certification cards which indicate their health status in order to prevent the spread of communicable diseases. First-aid kits are available.

There are five other sites used by communities for animal slaughtering. The standards of sanitation and hygiene at these five sites are very low. Slaughtering is carried out in the open. The waste and bones are left behind at the place where the animals were slaughtered, posing a public health hazard. In addition, the stench caused at these five sites is repugnant to the surrounding communities. The sites are in Waberi district, near the former military airport known as the "Afasione", in Gubta district, behind the tobacco factory, and in Dharkenkly, Karan and Halane districts.

Food catering facilities

Since the collapse of the central Government in 1991, food-catering facilities have no longer been monitored. A few traders have made efforts to maintain good standards of hygiene and sanitation in their facilities, but most of them sell food from unsuitable sites, such as open areas on the side of the road where food can easily be contaminated by dust and flies. There are no sanitation and hygiene guidelines in place for food markets and catering facilities.

Communal markets

There are no appropriate places for vending vegetables and fish and no proper storage in place to keep vegetables and fish under optimal conditions. The buildings are in poor condition; the floors are not smooth and clean and walls are not painted. There are no doors in place to keep out scavenging animals. Food handlers do not carry health certification cards. No running water is available for cleaning purposes and there is no functional drainage system. There is no management and control system in place for solid and liquid waste disposal. Sanitation and hygiene standards are not enforced. There are no first-aid kits available.

Butchers, who abandoned former meat markets, sell meat in the open on the roadside or at vegetable communal markets. They use cracked wooden tables for handling and selling meat that cannot be cleaned well. Dust, rodents and flies can easily contaminate the meat.

Pharmacies

There are no longer any qualified pharmacists selling medicines and medical supplies. Pharmacies do not have proper storage systems, including cold storage, in place. Medicines may be exposed to direct sunlight and heat, which causes chemical reactions and changes to their composition. There is no quality control and assurance system in place and expired medicines circulate in the local market and are sold without penalties.

3.3.6 Key area 5: Industrial pollution

Under the previous central Government, strict controls over waste disposal were exercised, so that local communities could not dump their domestic and other waste into the sea but used specified disposal sites. Before 1991, there were functioning drainage systems in place such as the one in Hamar Weyne.

Since the collapse of the central Government in 1991, however, there has been no system in place for controlling the coastline of Somalia, so foreign vessels can freely dump chemical waste on to the Somali seashore. For instance, in 2000, incidents were recorded in Eil-dher town in the Galgadud Region, and also in Adale town in the Middle Shabelle region, where the water on the seashore took on a blue-black colour and an unprecedentedly oily texture. In addition, a large number of sealed, unidentifiable containers were seen floating on the surface of the water. Local people, driven by curiosity about the content of these containers, tried to open them and were killed in the process.

The same type of containers appeared on the seashores of Kismayo, Barawe, Marka and Mogadishu in 2005. Residents of Mogadishu dumped the contents from these containers onto the seashore. With the growth of piracy off the Somali coast, however, the dumping of chemical waste from ships reduced considerably.

3.3.7 Key area 6: Energy

For various logistical reasons, no specific information was collected on energy-related matters in Mogadishu and South-Central Somalia, although the findings identified and recommendations formulated in respect of energy for the other zones and for the country as a whole may well apply to Mogadishu and South-Central Somalia as well.

3.3.8 Mogadishu, South-Central Somalia: Findings and recommendations

Findings

The assessment led to the formulation of the following essential findings on the situation obtaining in Mogadishu and South-Central Somalia in respect of public health and safety, inadequate sanitation and unhygienic living conditions, poor water supply management and control, and the state of the environment. In addition, the gaps and shortcomings were identified on which the recommendations in response were based. Serious problems came to light in Mogadishu and the associated environmental impacts need to be further systematically investigated and documented.

In particular, solid and liquid waste management and control, food safety and control, water safety and control, energy (charcoal use), residential and institutional environmental sanitation and control remain at a very rudimentary level. Unacceptable practices such as, the accumulation of wastes, open dumping, defecating in open land in and around places of human settlement and work areas are very widespread, owing to technical, economic, social and legal enforcement constraints.

The exposure-mitigation and response strategies need to cover public health but also public education and awareness about risk assessment and management, monitoring and evaluation, and law enforcement to protect the public from the adverse health effects of contaminants in food, water and air.

The following specific findings relating to South-Central Somalia and Mogadishu were identified. The order in which they are presented does not reflect any priority.

- ▶ With the collapse of the central Government, there is very little regulation and control of health and environment-related practices either by businesses or members of the general public;
- ▶ The public health system is in a state of utmost dereliction;
- ▶ Domestic and industrial refuse collection and disposal systems are virtually non-existent;
- ▶ There is no sanitary disposal system for solid and liquid wastes in place either in the public sector or municipality, slaughterhouses, food catering and processing facilities, and communal markets or in the private sector which meets the minimum sanitary and hygiene standards or complies with the public health and safety regulations on the design, construction and operations of these entities.

Recommendations

When the situation allows the following recommendations should be executed:

HEALTH

- ▶ The Ministry of Health should develop a comprehensive environmental health policy based on identified priorities and proposed approaches.
- ▶ The current legal framework should be reviewed by taking into consideration relevant laws and regulations in support of enforcement to protect the public from the adverse effects of contaminants in food, water and air.
- ▶ The health care delivery system in all the regions of South Central Somalia should be improved and strengthened.
- ▶ Coordination and cooperation should be established between relevant government bodies involved in public and environmental health: the ministries of health, education, veterinary services, agriculture, minerals, water, planning, internal affairs and labour; local authorities; and with the private sector, UN agencies, and international and local non-governmental organizations in order to establish partnerships for sustainable development in environmental health.
- ▶ Adequate investment should be made in public and environmental sanitation and high priority should be given to the establishment of environmental health, sanitation and hygiene infrastructure and the introduction and strengthening of public health, sanitation and environmental inspection services in urban, rural and remote areas.
- ▶ An environmental health agency should be established to provide expertise and know-how on risk management and assessment. Such an agency should develop exposure-assessment and response strategies, including environmental sample testing, analysis and response, and the development of guidelines and protocols for these exposure assessments. Quality assurance is a critical element in exposure investigation and must be part of the strategy.
- ▶ A zonal public health laboratory should be established to investigate adverse health effects of contaminants in food, water and air and to perform quality control testing of food stuff, water and air samples.
- ▶ Capacity-building and training should be arranged for Ministry of Health public health and environmental inspectors, and sanitation officers. Retraining should be provided for public health and environmental inspectors working at municipality level and dealing with public premises, industries, borders, coastal areas and airports.

WASTE

- ▶ Sanitary disposal system for solid and liquid wastes should be put in place either in the public or municipality, slaughterhouses, food catering and processing facilities, and communal markets or in the private sector which meets the minimum sanitary and hygiene standards or complies with the public health and safety regulations on the design, construction and operation of these entities.

- ▶ Systems should be put in place for the management and control of biohazard and biological waste from all health facilities, laboratories, and pharmacies in both public and private sectors in order to protect public health. The installation and use of incinerators are vital.
- ▶ Municipal departments should receive support to enable them to run effective refuse collection and disposal operations. National and international agencies should be encouraged to support sustainable programmes for refuse collection; Public-private partnerships should be considered for sustainable waste management and control.

WATER

- ▶ Aid programmes should provide sufficient drinking water and adequate sanitation facilities for IDPs should be strengthened. WASH services for the benefit of IDPs and other affected sections of the population should be rehabilitated and protected.
- ▶ Steps must be taken to ensure the sustainability of the chlorination system, in particular in Mogadishu and its outskirts, and the IDP settlements, in order to prevent outbreaks of water-borne diseases such as acute watery diarrhoea, cholera and others.
- ▶ Access to safe drinking water should be prioritized for the 16 districts in Mogadishu. Public-private partnerships should be considered for sustainable water supply management and control.

FOOD AND AGRICULTURE

- ▶ Slaughterhouses and fish, meat and vegetable communal markets no longer in use should be rehabilitated, as soon as law and order is restored.
- ▶ Vector control programmes should be strengthened to reduce the mosquito population in every region of South Central Somalia.
- ▶ An effective environmental surveillance and response system should be put in place to reduce any further degradation of both terrestrial and aquatic ecological systems that are now under great stress or threat.

INDUSTRIAL POLLUTION

- ▶ The industrial pollution generated by the small-scale industries and the public health consequences thereof should be mapped and appropriately addressed.

ENERGY

- ▶ New cooking fuel and solar methods should be introduced with community involvement to reduce the use of charcoal.

4. CONCLUSIONS AND RECOMMENDATIONS FOR THE COUNTRY AS A WHOLE

4.1 CONCLUSIONS FOR THE COUNTRY AS A WHOLE

This environmental health situation analysis has revealed the reality on the ground regarding the environmental and public health situation in the three zones of Somalia: Somaliland, Puntland and South-Central Somalia. This situation analysis is a first attempt to assess the Somali environmental health situation after the last joint assessment of 1986. It does not claim to be complete or comprehensive but it documented the various key areas which should be further addressed in a Somali environmental health strategy applicable to the three zones.

For various reasons in relation to the political situation of the country, no up-to-date or specific data could be collected from local government institutions due to lack of systematic reporting; hence visual images were collected to complement the situation analysis. The issues raised and their associated environmental impacts on terrestrial and aquatic ecological systems need to be further systematically investigated and documented. Given the general state of the country where governance is either in total collapse (South-Central Somalia) or the funds and the technical staff to improve the dire situation are lacking (Somaliland and Puntland), there would be grounds to assume that the public health system in the country is weak. However, some clean hospitals and medical facilities were found as well as slaughterhouses compliant to minimum sanitation and hygiene standards and effectively managed, ensuring protection of both of the people and the environment.

The situation analysis brought to light the current efforts invested in environmental health activities by various stakeholders in both public and private sectors, and the local communities. Public-private partnership initiatives in water or waste management demonstrated a way of collaboration with potential outcomes in support of sustainable development.

Although shortage of funds was indicated, there was a general lack of any effective strategy and commitment on the part of the local governments to enforce the regulations or to conduct any sort of analysis of how well their related measures were working. This failure is attributable to a general lack of environmental policies or of any effective vision on how to control waste while following well defined regulations to deal with the problem. There is a critical need for all three zones to initiate the development of environmental health strategies, to establish infrastructure and government institutions for necessary exposure-mitigation and response strategies in order to safeguard the environment and to improve the level of people's health.

The alarming situation in Somalia calls for urgent and effective regulatory measures that can address the issues of both environmental health and public health. Environmental laws and regulations are becoming necessary to manage the sustainable use of natural resources and to safeguard the environment. Regulatory strategies should be designed to reduce the amount of waste and promote its reuse or recycling, which is a prevention-oriented environmental policy. The arsenal, in general terms, of regulatory and managerial instruments and tools available for addressing environmental health is large. It includes

guidance on establishing regulatory framework and adherence to international standards and control mechanisms, many of which are backed by penalties for non-compliance. It also includes analytical and participatory measures intended to help policy decision makers and local communities to better plan and manage their living standards and conditions in urban and rural settlements.

Although some environmental policies are preventive, most have focused on cleaning up messes after the fact – applying what environmentalists call “end of pipe” solutions. Every local and international non-governmental organization that was interviewed made similar comments on the issue of waste.

There is a multitude of international and local non-governmental organizations that, while providing a certain amount of support and guidance to local environmental and public health projects, they have not made sustainable environmental health impact due to lack of long-term commitment from authorities and local communities. Coordination and cooperation should be established between relevant government bodies involved in public and environmental health: the ministries of health, education, veterinary services, agriculture, minerals, water, planning, internal affairs and labour; local authorities; and with the private sector, UN agencies, and international and local non-governmental organizations in order to establish partnerships for sustainable development in environmental health.

The challenges observed with regard to public and environmental health, arising from inadequate water supply and waste management, poor sanitation, and unhygienic living conditions appear to be applicable across the three zones and for the country as a whole. In particular, solid and liquid waste management and control, food safety and control, water safety and control, energy (charcoal use), residential and institutional environmental sanitation and control remain at a very rudimentary level in the three zones.

The unacceptable practices leading to deforestation and desertification need to be further studied and appropriate solutions to be put in place with community participation and acceptance to re-establish and manage replanting projects.

There was general consensus that the local governments in the different zones were not measuring up to their responsibilities. Instead, they tended to look for other scapegoats and to try and shift the blame. There is a manifest lack of efficient measures, sufficient funds, or even commitment and an effective strategy to deal with the problem of both municipal, biohazard and biological, and industrial waste.

Many of their environmental health goals have not been met nor, in many cases, have they been approached with sustainable strategies. The sheer volume of abandoned and overflowing waste in all the zones and the perceived potential threat to human health is testimony to their failed strategies which, while elegant in theory, were not designed to address the environmental health issues in the country in a sustainable and lasting way.

Given that public health problems in the three zones are mainly infectious diseases due to insufficient disease management and control, poor sanitation and lack of hygienic living conditions, there is an urgent need for immediate and effective interventions to scale up, contain and control some of the health problems and to introduce new initiatives, policies and guidance for better water supply and waste management and control systems in urban and rural areas. A holistic approach should be adopted to bring about effective coordination of WASH activities to reduce the impact of water-borne diseases.

Waste disposal system for solid and liquid wastes should be put in place either in the public or municipality, slaughterhouses, food catering and processing facilities, and communal markets or in the private sector which meets the minimum sanitary and hygiene standards or complies with the public health and safety regulations on the design, construction and operation of these entities. Unacceptable practices such as, the accumulation of wastes, open dumping, defecating in open land in and around places of human settlement and work areas are very widespread and need to be urgently addressed.

The absence of adequate biohazard and biological waste management procedures in health institutions in both public and private sectors allows for uncontrolled outbreaks of contagious diseases and is a threat to public health. In particular, there is no adequate incineration system in place in any of the health facilities and the construction of modern landfills and incinerators poses an enormous task for the local authorities and the non-governmental organizations operating in these regions.

Rainwater harvesting is of the first importance in increasing the water supply: accordingly, efforts should be made to set in place rainwater harvesting systems, including water redevelopment plans for boreholes and shallow wells for rainwater harvesting.

Somali people have a desire to change for the better, provided the necessary know-how and expertise are shared with local communities in order to initiate necessary behaviour and structural changes. It is the general consensus among members of the public and local governments that concerted efforts and collaborative actions should be initiated to ensure that the cities, towns and rural settlements and their environment are clean, safe, pollution-free, and visually attractive.

4.2 RECOMMENDATIONS FOR THE COUNTRY AS A WHOLE

In the light of the general conclusions, the following recommendations have been formulated in an endeavour to respond to the gaps, shortcomings and other deficiencies identified. For ease of reference, the recommendations are divided into the categories of health; waste; water; food and agriculture; industrial pollution; and energy and appear to be applicable for the country as a whole. Inevitably, there is some overlap between the various categories and many of the recommendations may repeat those applicable to specific zones and set out in the respective sections below.

As with all the lists of recommendations put forward in the present report, the order of the listing is purely thematic in nature and not intended to reflect any priority.

Key area 1: Health

- ▶ Zonal authorities and local governments should be encouraged to formulate and implement effective public and environmental health policies to address the issue of the management and control of waste, water, and air. Quality assurance and control is a critical element in exposure investigation and should be part of the strategy.
- ▶ A comprehensive legal framework should be developed by taking into consideration relevant laws and regulations in support of enforcement to protect the public from the adverse effects of contaminants in food, water and air.
- ▶ Occupational health and safety programmes should be set in operation with taking the necessary steps to enforce occupational health and safety programmes within the work place.

- ▶ Zonal environmental agencies and regional environmental health units should be established to provide expertise and know-how on risk management and assessment. Such an agency should develop exposure-assessment and response strategies, including environmental sample testing, analysis and response, and the development of guidelines and protocols for these exposure assessments. Necessary support should be provided to their functioning.
- ▶ Adequate investment should be made in public and environmental sanitation and high priority should be given to the establishment of environmental health, sanitation and hygiene infrastructure and the introduction and strengthening of public health, sanitation and environmental inspection services in urban, rural and remote areas.
- ▶ Zonal public health laboratories should be established to investigate adverse health effects of contaminants in food, water and air and to perform quality control testing of food stuff, water and air samples. The laboratories should be properly equipped, maintained and run by skilled laboratory staff and scientists to develop epidemiological studies on public and environmental health. Operational research and analytical studies should be facilitated and carried out.
- ▶ As one of the policy objectives, ISO standard 14001 of the International Organization should be achieved by setting up environmental management systems that include improving environmental performance, complying with regulations, preventing pollution, auditing performance and disclosing information to the general public.
- ▶ Sampling and testing methods should be performed in line with existing guidelines and standard operating procedures. Separation techniques involve chromatography processes such as liquid chromatography, gas chromatography, mass spectrometry, atomic absorption, ion chromatography, and thin-layer chromatography. Detection methods involve devices such as flame-ionization detectors, photo-ionization detectors, selective ionization detectors, and thermal conduction devices.
- ▶ Capacity-building and training should be arranged for public health and environmental inspectors, and sanitation officers and supervisors. Retraining should be provided for public health and environmental inspectors working at municipality level and dealing with public premises, industries, borders, coastal areas and airports.
- ▶ Appropriate public health inspection services and the necessary regulatory framework and law enforcement measures must be set in place and strengthened; Public health inspection services should be set in place and maintained and a regulatory framework established for law enforcement measures. Public health officials should be invited to take on a more forceful participatory role in assessing the health risks of proposed development projects. Performance-based monitoring and supervision systems should be developed.
- ▶ Coordination and cooperation should be established between relevant government bodies involved in public and environmental health: the ministries of health, education, veterinary services, agriculture, minerals, water, planning, internal affairs and labour; local authorities; and with the private sector, UN agencies, and international and local non-governmental organizations in order to establish public-private partnerships for sustainable development in environmental health. Zonal cooperation should be established and maintained and efforts made to encourage the regions to join efforts, share knowledge and work together for a better environment.

Key area 2: Waste

- ▶ A comprehensive waste management strategy should be developed, supported by a regulatory and legislative framework and its enforcement at zonal, regional and district levels.
- ▶ A public health laboratory for integrated quality control must be set in place and appropriate low-cost sanitation technology options introduced into the integrated management and control of solid and liquid wastes.
- ▶ Municipal departments should receive support to enable them to run effective refuse collection and disposal operations. National and international agencies should be encouraged to support sustainable programmes for refuse collection.
- ▶ Adequate and structured solid and liquid waste management systems conforming to the latest management standards should be established.
- ▶ Solid waste transfer stations should be set up in cities, supported by sufficient quantities of heavy machinery and the employment of waste-removal crews and cleaners. Personnel should be recruited and trained for the collection, loading and dumping of waste. The necessary heavy machinery, such as garbage collection vehicles, bulldozers, graders, compactors and vacuum tankers, should be provided.
- ▶ Public-private partnerships should be considered for sustainable waste management and control as well as for funding of market development to promote waste recycling and sanitation and hygiene services, including solid and liquid waste management.
- ▶ Land use plans should be developed for the disposal of solid waste at dumpsites and for the disposal of liquid waste in constructed ponds for liquid waste processing.
- ▶ Urgent steps should be taken to deal with the problem of solid waste by designing more effective landfills and incinerators and better waste management systems.
- ▶ The sort of safeguards that are needed include building modern landfills, one in every region, where the waste could be properly managed, and the issuance of directives, requiring manufacturers, restaurants and other businesses, under the leadership of local governments or independent agencies, to set in place the necessary infrastructure to collect their waste.
- ▶ Where necessary, facilities responsible for generating wastes and other environmentally hazardous facilities, such as dumpsites, should be relocated to reduce the negative impact on the population.
- ▶ It is vital that when waste is discharged, systems should be in place for the initial screening of solid waste, biological effluent, for the treatment of sludge (composting) and for the testing and recycling of solid and liquid waste. Arrangements should be made for the structured and efficient disposal of human excreta, using conservation methods.
- ▶ Systems should be put in place for the management and control of biohazard and biological waste from all health facilities, laboratories, and pharmacies in both public and private sectors in order to protect public health.

- ▶ Urgent efforts should be made to tackle the present volume of biohazardous waste, both solid and liquid, which poses immediate and negative consequences to public and environmental health, in order to avoid further exposure.
- ▶ The final destruction of infectious and biohazardous waste should be managed in a safe and appropriate manner, in particular through the installation and use of a large incinerator.
- ▶ Proper arrangements should be made for the management and control of biological waste from all health facilities and laboratories and pharmacies, in both public and private sectors, in order to protect public health.
- ▶ An endeavour should be made to bring sanitation and hygiene up to the highest standards possible with the use of the country's own human and financial resources.

Key area 3: Water

- ▶ A proper water management strategy should be developed based on research findings and options for desalination to be explored. Access to safe drinking water should be prioritized.
- ▶ Public-private partnerships should be considered for sustainable water supply management and control.
- ▶ A water quality control unit as part of a zonal public health laboratory should be established in each zone, as a matter of priority, to train personnel in the fields of health, water and sanitation and there should be an overall strategy for the control of water-borne diseases.
- ▶ The treatment of surface and groundwater should be actively encouraged as a means of protecting public health. Various treatment methods should be investigated to support community acceptability as transporting unchlorinated water in tanker trucks from dams and shallow wells contributes to the repeated outbreaks of disease among consumers.
- ▶ Steps should be taken to ensure the sustainability of the chlorination system in all parts of the country, in order to prevent outbreaks of water-borne diseases such as acute watery diarrhoea, cholera and others.
- ▶ Rainwater harvesting systems and water redevelopment plans, including boreholes and shallow wells for rainwater harvesting, should be widely deployed.
- ▶ Aid programmes should support the provision of sufficient drinking water and adequate sanitation facilities for IDPs. WASH services for the benefit of IDPs and other affected target groups of the population should be rehabilitated and protected.

Key area 4: Food and agriculture

- ▶ The necessary legal and policy framework should be set in place for the conservation of habitats and biodiversity, both in terrestrial and aquatic ecosystems.

- ▶ An effective environmental surveillance and response system should be put in place to reduce any further degradation of both terrestrial and aquatic ecological systems that are currently under great stress or threat. Preventive and proactive measures should be taken to avert the ongoing environmental damage to coastal and marine ecosystems in Somalia.
- ▶ Efforts should be mounted to reduce deforestation, environmental degradation and mosquito population by strengthening vector control programmes and to improve and sustain environmental health.
- ▶ Sufficient resources should be allocated for the protection of all ecological systems that would guarantee the protection of biodiversity.
- ▶ Capacity-building efforts should be stepped up at all levels and training initiated at local and regional levels in the conservation of habitats and biodiversity.
- ▶ The use of pesticides as a form of medicine for the treatment of cattle should be further investigated.

Key area 5: Industrial pollution

- ▶ The industrial pollution generated by the small-scale industries and the public health consequences thereof should be mapped and appropriately addressed.

Key area 6: Energy

- ▶ The necessary environmental protection measures should be set in place and the development of alternative fuel generation and use options explored.
- ▶ New cooking fuel and solar methods should be introduced with community involvement to reduce the use of charcoal and domestic air pollution which may lead to reduced chronic lung diseases.

4.3 WAY FORWARD

- ▶ Additional operational research should be undertaken to further investigate issues raised in this document.
- ▶ A comprehensive environmental health strategy should be developed with involvement of main stakeholders.
- ▶ A multisectoral approach should be adopted to address issues of water and waste management and control in order to reduce health-related events and incidences. FAO, UNEP, UNHABITAT, UNICEF and WHO should closely collaborate together and support a multisectoral approach for addressing issues raised in this document.
- ▶ The international community and donors should provide adequate investment and technical assistance for addressing the critical environmental issues mentioned in this document.

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Somalia's long-lasting civil strife, unrest and lack of a functioning government for the last 20 years have all contributed to the current worsening of the environmental conditions and the implications for public health. The absence of proper governance and a regulatory and legislative framework and its enforcement and control over access to and use of natural and environmental resources has consequences for the Somali population at large. Concerns expressed by the Government and health authorities about the implications of environmental neglect and degradation on public health have led to an environmental health assessment in the three zones of Somalia initiated by the World Health Organization. This assessment took place in 2010.

The assessment is a first review of the Somali environmental health situation since 1986 and it documented the current situation and practices observed in order to advocate and better address the environmental and public health findings. The assessment was used to draft the environmental health situation analysis in Somalia.

Chapter 1 sets out the methodology used for the assessment included a three-day training workshop in which the assessment tool and guidance on information and data collection, and analysis were discussed. The zonal situation assessments included site visits to relevant locations, such as industrial workshops, sanitary facilities, small-scale factories, slaughterhouses and communal food markets to make first-hand observations of the current situation of environmental and public health. Consultations were held with various stakeholders involved in environmental health areas in the country.

Chapter 2 provides the findings of a desk review that was conducted to extrapolate relevant information from published documents on main areas of health, waste, water, food and agriculture, industrial pollution and energy over the last five years in relation to the findings of the assessment. Chapter 3 describes the zonal assessments, followed by zonal specific findings and recommendations. The conclusions and recommendations for the country as a whole are provided in Chapter 4.

The environmental health situation analysis will form the basis for the development of a Somali environmental health strategy.