



The Chartered Environmentalist (CEnv)



Samson Ziyambe

Chartered Environmentalists apply knowledge and understanding of the environment to further the aims of sustainability.

ELWAS AFRICA GROUP

Number 3 Aberdeen
Belgravia
Harare

+263773018622

9/3/2025



Contents

Introduction 1

Municipal Solid Waste Management 3

*Portable Water Treatment and
Management 4*

*Air Pollution Effects to Human Lives
and the Environment 5*

Ecology and Ecosystems 6

Soil and Groundwater Pollution 7

Water Pollution 8

*Effects of Ozone Depletion to humans
and the Environment 9*

*Effects of Global Warming to Humans
and the Environment 10*

*Reducing Human Impacts on Climate
Change 11*

Greener Living 12



Chartered Environmentalists have been working together with Engineers from different disciplines in finding ways to curb climatic crisis. Chartered Environmentalist do not focus on only one specific environmental field but rather all aspects of the environment ranging from **Air Quality Testing, Monitoring and Assessment, Water quality testing and management, Solid Waste Management , Ecology, soil and ground water pollution etc.** They integrate all aspects of the environment into one system because all the living organisms rely on other living/non-living organisms for survival. This simply means that if one environmental aspect is compromised, the entire system will be drastically disturbed. Just imagine a system that has a wetland that purifies waste water, provides food for livestock; livestock is consumed by humans.. Waste water that is heavily contaminated with lead chemicals from vehicles is discharged into this wetland. Wetland cannot purify heavy metals so this water becomes saturated with lead and as a result plants will have a stunted growth syndrome, the water will no longer be safe for human or livestock consumption. Just imagine what will happen to such a system at a smaller scale at a global scale as well. So it is in the interest of the Chartered Environmentalist to ensure that the entire system (earth) is free from any type of pollution (air pollution, water pollution, soil pollution, groundwater pollution, sound and light pollution) for the good of the environment, biotic and abiotic organisms.

For all your Environmental Land Water and Air Solutions



Water Treatment Plant



METHODS OF WASTE DISPOSAL

Training and Consulting Services

- Environmental Impact Assessment (EIA)
- Management Systems Development and Implementation (ISO 14001, 9001 and 18001)
- Air Quality Emissions Testing (e.g. boilers, incinerators, generators, vehicles)
- Resource Efficient & Cleaner Production
- Hazardous Chemicals Management
- Industrial Hygiene (*noise, dust, vibration, light and ventilation*)
- Behavior Based Safety (BBS)
- Ecological Surveys
- GIS Mapping and remote sensing
- SHEQ Audits (*Safety, Health, Environment and Quality*)
- Climate change research
- Monitoring and Evaluation
- Forest Inventory
- Energy Generation and Power Projects
- Solid Waste Engineering
- Water & Wastewater Treatment Plant Design.
- Water Supply Pipeline Designs
- Sewer Pipeline Designs

FOR EFFECTIVE MWS MANAGEMENT AND ENGINEERING CONTACT: ELWAS AFRICA LIMITED

Number 3 Aberdeen
Belgravia, Harare

Also operating in: South Africa, Tanzania, Kenya ,DRC and Zambia

Call: +263 773 018 622

Email: infor@elwas.co.zw , elwaspvlimited@gmail.com OR elwasafrcainsa@gmail.com

Municipal Solid Waste



Municipal Solid Waste Management

Municipal solid waste has become one of the pressing issues in Zimbabwe and other parts of the rest of the world. Residential and CBDS Solid Waste dumping across the country has become a norm and this signifies extremely poor Municipal Solid Waste Management Systems. Waste Management is not only the government's responsibility but a responsibility for every citizen because when the negative impacts hit, there will be no discrimination.

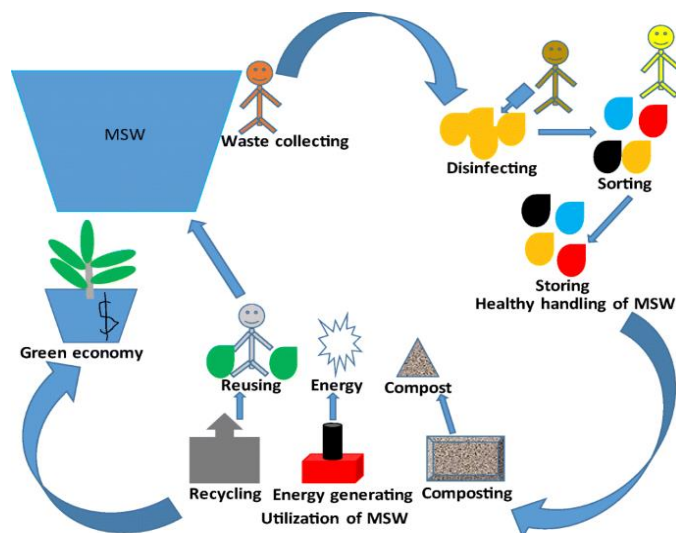
Environmental problems that emanate from Solid Waste mismanagement include plastic soup in the ocean, electronic waste accumulation, toxic waste dump, residential solid waste dumping etc.

Plastic soup

Plastic soups lead to the releasing of plastic chemicals or micro plastics into the water. These chemicals contaminate aquatic organisms some of which are consumed by humans. By ingesting micro plastics, human bodies can come in contact with different toxic substances. Plastics in the water bodies may affect underwater plants, plant disturbance means less oxygen production and concentration in the water and eventually there will be a reduction in fish population which is a reduction in food supply and an aquatic ecosystem disruption.

Residential Waste Dumping

Dumping solid waste in an open area leads to the release of micro plastics into the atmosphere which becomes part of air that humans and animals breathe. Odor/hydrogen sulfide and Greenhouse gases (methane, carbon monoxide) are released into the atmosphere as a result of bio- digestion of bio-degradable waste. Methane causes fire risks which is dangerous to the environment. Methane gas is also a greenhouse gas which stays in the atmosphere for 8years and it is more than 25 times as potent as carbon dioxide at trapping heat in the atmosphere causing an increase in the atmospheric temperatures. Some wastes contain chemicals that leach into the ground therefore contaminating the soil and the groundwater, increasing the cost of groundwater treatment for the developed countries, whereas the developing countries will have no choice but to drink contaminated water.



FOR EFFECTIVE MWS MANAGEMENT AND ENGINEERING CONTACT:
ELWAS AFRICA LIMITED

9-15 Avenue
Avenue, Mabelreign, Harare

Also operating in: South Africa, Tanzania, Kenya and Zambia

Call: +263 773 018 622

Email: infor@elwas.co.zw or elwasptlimited@gmail.com



Blue Drop Management Systems

Portable Water Treatment and Management

For more than a decade, most urban residents have not had access to clean water (blue drop). The situation is even worse in other areas like Chitungwiza where people have not received a single drop of water from their taps for more than 2 years. The residents are relying on borehole or well water which at times depending on the location contains low PH levels, high concentrations of Magnesium or iron levels, turbidity, Bacteria, pathogens, nitrate, calcium etc. It is important that water in certain areas gets tested and treated accordingly before consumption. Natural filtration is not enough in areas where mining of heavy materials is being practiced, areas where septic tanks are installed on top of the slope because the contaminants will be transported during the ground water flow. Contaminated water causes chronic and acute diseases in humans, soap precipitation etc. Other residential areas where there is no solid waste collection, the waste is rather dumped anywhere in the suburbs especially in high density suburbs. Some of this waste might be containing hazardous materials, heavy materials and micro-plastics which will end up infiltrating into the ground during precipitation and as a result, the groundwater will get contaminated. These are the same people who rely on groundwater for their daily activities.

Causes of Blue Drop Scarcity in Big Cities

In cities like Harare, the water supply lines were designed for a population of 300 000 people, but now the city carries more than 2.5 million people and those people need to be accounted for in terms of water supply issues. Infrastructure expansion means more money is needed for pipes, pumps, treatment plants construction, labor and other operational costs such as electricity, chemicals etc. Another factor that has led to water shortage in the cities is the lack of maintenance of the existing water infrastructures by the city councils. Broken pipes lead to large amounts of water losses which is also a loss in water chemicals and all the energy used to treat that water. Drought is another huge factor that is affecting the water quality for treatment. The treatment plants end up treating heavily contaminated water which is very costly because the available dams have not received enough water. Economic decay has largely impacted the blue water industries. If the government does not have enough money for water treatment chemicals, then water cannot be treated and as a result residents are being supplied with raw water from the rivers or directly from the wastewater treatment plants which has only gone under C, N, P removal process and sedimentation.

Ways to Maximize Blue drop Management and Treatment.

- Control rural urban migration rate to prevent stress on water resource and infrastructure.
- Expansion of water treatment plants
- Residents to pay due bills and utilities on time to prevent the city councils from running out of finance for treatment chemicals.
- Conserve wetlands, they provide us with free bio water treatment process.
- Construct water harvesting systems for the entire year per city to reduce the water treatment costs.
- Maintain the existing pipelines.



Air Pollution

Air Pollution Effects on Humans and the Environment

Air pollution is a global concern; its impacts affect the entire globe. Most causes of air pollution are anthropogenic and only a few are natural causes such as volcanic eruptions, sand storms, etc. Human causes of air pollution ranges from individual levels to industrial emissions generation. Individuals generate indoor pollutants which include smoking cigarettes, chlorofluorocarbons from refrigerators and aerosol spray cans, paints, insecticides etc. Industrial emissions are generated from oil refineries and these pollutants include SO₂, CO₂, and NO_x. Another source of pollution is from vehicles. They generate large amounts of NO_x and carbon monoxide.

Effects of Air Pollution on the Environment

Methane, CO₂ generated from unmanaged solid waste are greenhouse gases that are responsible for the increase in global temperatures. Global warming leads to natural disasters such as floods, drought, forest fires, ecosystems disruptions and inhabitable conditions for both humans and animals. Chlorofluorocarbons from refrigerators and aerosol spray cans lead to ozone depletion. Their chemical combinations easily react with stratospheric ozone molecules therefore causing a hole in the layer. When the ozone layer is disrupted, earth will receive direct ultraviolet radiation from the sun which has negative effects on the plants and other

biotic organisms. SO₂ and NO_x from the oil refineries and vehicles react with rain water to form acid rain which will contaminate water bodies, alter the soil PH levels and eventually affect the plants' growth.

Effect of Air Pollution on Humans

These pollutants if not monitored or prevented, they will not only affect the environment but also have adverse effects on human health as well. Acute exposures to some of the contaminants in high concentrations may lead to unconsciousness or even sudden death e.g. high concentrations of hydrogen sulfide from untreated biodegradable solid waste. Other pollutants from vehicles (CO, NO_x) cause unconsciousness, sudden death and cardiovascular diseases.

Ways to Prevent air Pollution

Desisting from the activities that are detrimental to the atmosphere and human health is the only way to go ecofriendly.

Ecofriendly Ways

- Use of clean sources of energy
- Manage solid waste to prevent emissions from the biodegradable, hazardous materials, micro-plastics.
- Electrifying vehicles or use public transport to minimize the number of cars in the road per given time.
- Use natural remedies to get rid of bugs than using chemicals.
- Use non-chlorofluorocarbon refrigerators in our homes
- Reducing the pressure on industries by not wasting products.



The figure shows an ecosystem where an ant uses a leaf as a habit. another ant feeds on the same leaf.

Ecology and Ecosystem

Environmentalists study biotic environment, abiotic environment and their interactions. This is referred to as ecology. It is an important field that enables us to maintain balance in nature through knowing the number of producers, consumers and decomposers, identification of keystone species in any given ecosystem. In a disrupted ecosystem, environmental disasters are seen as evidence.

Ecosystem Management is Important For:

- Environmental conservation
- Resource allocation
- Its reduces pollution by treating waste water in wetlands, absorbing carbon dioxide and generating oxygen

- Forests are responsible for cooling down earth.
- Ecosystems provide information about the benefits of the environmental use of earth's resources in ways that make the environmental health for future generation.
- Marine, vegetation and statistical ecology provide us information to understand the world around us.
- Ecosystems management helps improve our environment, protect human health

Ways to Manage Ecosystems

- Reforestation
- Restoration of wetlands
- Wildlife protection
- Reduce extraction of natural resources e.g. mining
- Avoid discharging heavily polluted water into the water bodies



Soil and Groundwater Pollution

Soil and Groundwater Pollution

Although the majority of pollutants have anthropogenic origins, some contaminants can occur naturally in soils and water as components of minerals and can be toxic at high concentrations. The diversity of contaminants is constantly evolving due to agrochemical and industrial developments.

Main Pollutants, Sources and Their Effects

There are six main groundwater and soil pollution. Heavy metals are regarded as main pollutants. They are the most persistent and complex kind of pollutants to remediate in nature. They do not only degrade the quality of the atmosphere, water bodies, soil, food crops, but also threaten the health and wellbeing of animals and humans. Metals accumulate in the tissues of living organisms, unlike most organic compounds; they are not subject to metabolic breakdown.

Nitrogen and phosphorus become pollutants when they are applied in excess to agricultural soils in the form of fertilizers or in areas of intensive livestock production. Pesticides are also another type of main pollutants. Pesticides' persistence behavior and mobility are also extremely varied. They leach into the soil and

contaminate groundwater, they are up-taken by plants and volatilize into the atmosphere.

Polycyclic Aromatic Hydrocarbons (PAHs) from incomplete combustion of fossil fuel, waste incineration, long term waste water irrigation that enter soil may be degraded by a number of volatilization or photo-oxidation to the atmosphere, irreversible sorption to soil organic matter, leaching to groundwater, abiotic loss, uptake by plants or microbial degradation.

Persistent Organic Pollutants (POPs) include chlorinated and brominated chemicals such as polychlorinated biphenyls, which have been useful in a variety of industrial applications have a high mobility, they can easily penetrate water in its gaseous phase during warm weathers and volatilize from the soils into the atmosphere, they can also leach into the ground water. Human low levels exposure of POPs can lead to many health effects including increased cancer risks, reproductive disorders, alteration of immune system, neurobehavioral impairment, endocrine disruption and increased birth defects.

Radionuclides are present in the environment both as a naturally occurring substance and as one of the anthropogenic origin. The most common natural and anthropogenic radionuclides found in soils are ^{40}K , ^{238}U , ^{232}Th , ^{90}Sr and ^{137}Cs . Anthropogenic sources of nuclear pollution include the global fallout from atmospheric nuclear weapons testing, operations of nuclear facilities, nuclear waste handling and disposal, mining of radioactive ores, mineral fertilizers and nuclear accidents. Radionuclides in the soil are up-taken by plants, thereby becoming available for further redistribution within the food chain. For that reason after a major radioactive accident, agricultural areas are often abandoned for many years. Inhalation exposure to radionuclides in humans has been linked to chronic lung disease, leukopenia, anemia, cancer etc.



Effects of long term water pollution

Water Pollution

The sources of water pollution are classified into two types namely point source pollution and non-point source pollution. Point source pollution is discharged into the environment through sewer pipes or ditches from specific sites such as factories or sewage treatment plants. Non-point source pollution is caused by land pollutants that enter precipitation moves over and through the soil, picking up and carrying away pollutants. This includes agricultural runoff, mining wastes such as acid mine drainage, soil erosion from fields, logging operations, eroding stream banks and construction sites is a major cause of non-point source pollution. Three major sources of human-induced water pollution in greater detail are agriculture, municipalities and industries.

Pollutants Types and Their Effects

The release of sewage into water bodies poses a threat to public health because sewage water carries disease causing agents. Sewage water also generates two serious environmental problems in water namely Oxygen demand and eutrophication. Micro-organisms that decompose sewage require oxygen for respiration, fish and other organisms in water also use oxygen. Since only limited amounts of oxygen can dissolve inter, an aquatic ecosystem containing high levels of sewage or other organic material, the decomposing micro-

organisms use up most of the dissolves oxygen. At extremely low oxygen levels, fish and other animals will die. Also when dissolved oxygen levels are low, anaerobic microorganisms take over producing compounds with unpleasant odors, further deteriorating water quality. Eutrophication is excessive supply of nutrients (N, P) which cause a dense growth of plant life. An enriched body of water results in an increased photosynthetic productivity which leads to poor light penetration, low dissolved oxygen, shallow waters from accumulation of dead plants.

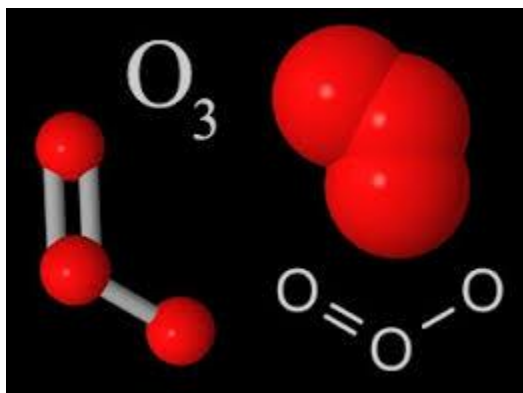
Typhoid, cholera, bacteria dysentery, polio and infectious hepatitis are some of the more common bacterial or viral diseases transmitted through contaminated food and water. The contamination could be coming from human wastes such as from septic systems that are not operating effectively or from animal feedlots.

Sediment pollution that comes from erosion of agricultural lands, forest soils exposed by logging, overgrazed lands, mines and construction areas leads to reduction in light penetration, the covering of aquatic organisms, shallow waterways and brings insoluble toxic pollutants into the water.

Inorganic plant and algal nutrients are chemicals such as nitrogen and phosphorus that stimulates the growth of plants. They are essential for the normal functional of healthy ecosystems but are harmful in larger concentrations. High BOD occurs when the excessive numbers of algae die and are decomposed by bacteria.

Ways to Prevent Water Pollution

- Controlling erosion by planting vegetation
- Appropriate use of fertilizers.
- Proper treatment of municipal waste water and industrial wastewater before discharging into the water bodies.



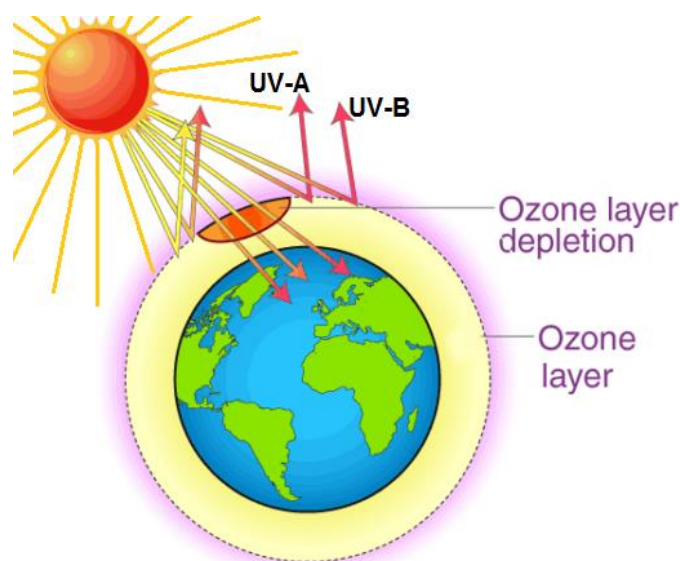
Ozone layer

Effects of Ozone Depletion to Humans and the Environment

There are two types of ozone (O_3), Ozone in the troposphere is considered a pollutant and the ozone in the stratosphere is considered as good ozone, it protects humans and other living organisms from direct ultraviolet radiation by filtering most of the sun's UV radiation. This means that when this good ozone layer is compromised, earth will receive direct ultraviolet radiation from the sun, therefore posing threat to human health. It is well known that high levels of UV radiation leads to diseases such as skin cancer, eye cataracts and immune system disruption. So for people who spend most of their time in the sun or field, their health is endangered because they are prone to the negative effects of the radiation. Skin cancer occurs when a person is continually exposed to the unfiltered UV from the sun. The skin will lose its elasticity and skin aging changes including wrinkles will start to appear. And increased absorption of UV radiation triggers the thickening of the skin to protect the skin from future sunburns. This protective mechanism makes the skin more vulnerable to skin cancers. Eye cataracts formation occurs when the eyes are exposed to direct UV radiation, the eye lens will start thickening as a protective mechanism of an eye to prevent the sunlight from passing through it. This thickening is what is referred to as the cataract.

Ways to Prevent Ozone depletion.

To prevent and to stop ozone layer depletion, humans should live sustainably by putting an end to the use of chlorofluorocarbon products found in refrigerators and in aerosol spray cans. CFCs cause chemical reactions that break down ozone molecules at a faster rate thereby creating a hole in the ozone layer. Eco-friendly refrigerators such as hydrocarbons can be used instead. Natural remedies can be used to replace aerosol spray cans such as insecticides to get rid of nuisance insects such as flies, cockroaches, ants etc. Luckily mother nature has plenty of remedies to prevent insect invasion. Herbs and flowers such as bay leaves, catnip, cucumbers, garlic, mint, rosemary, have their natural scent that keeps cockroaches away.



Ozone Layer Depletion



1effects of Global Warming on the Environment

Effects of Global Warming to humans and on The Environment

Air pollutants such as carbon dioxide, methane, nitrogen oxides and water vapor are called greenhouse gases which are responsible for trapping the heat and solar radiation from the earth's surface, therefore causing an increase in the atmospheric temperature which we call global warming. These gases emanate mostly from vehicles, industrial emissions and burning of fuel for energy. In countries where public transport is not properly function, nitrogen oxides generation rate is higher especially during the morning and evening (peak hour) when everyone is travelling to and from work.

Effects of Global Warming on the Environment

When temperatures are too high, glaciers and icepacks are prone to melting causing the sea levels to rise. Thermal pollution also occurs in water bodies, the higher the temperature, the lower the oxygen concentration. If oxygen concentrations in the waters are, fish and other aquatic organisms will die. As global temperatures increase, the evaporation and evapotranspiration rates will be high as well. This means that more water vapor will condense in the upper atmosphere to form clouds followed by heavy precipitation. Heavy rains leads to floods, infrastructure destruction, washing away of topsoil if the land is not

covered, plant damage and eventually drought will hit. When the topsoil is washed away, it is carried into the water bodies causing shallow waterways. The washing away of top soil causes cracks formation on the ground.



The figure shows people cooling off their bodies in the river on a hot day

Effects of Global warming on Human Health

Extreme heat may lead to sever health issues in humans such as heart attacks, strokes, hyperthermia and Malaria. Heat naturally moves from warm areas to cooler areas. So as long as the air around you is cooler than your body, you radiate heat into the air. But this transfer stops when the air temperature approaches your body temperature. Now hot weather means that your body has to work harder to keep its core temperature to normal levels, and this puts extra strain on your heart, lungs and kidneys.

Hyperthermia is a condition that causes body temperature to rise above 40°C. It happens when human body takes in more heat than it releases. This can lead to heat cramps or muscle twitching and heat stroke. In regions that receive rainfall during summer seasons, people living there are prone to Malaria infections because mosquitos usually breed in hot and humid places.



The figure above shows food being thrown into the bin (food wastes has 10% effect on greenhouse gases emissions)

Reducing Human Impacts on Climate Change

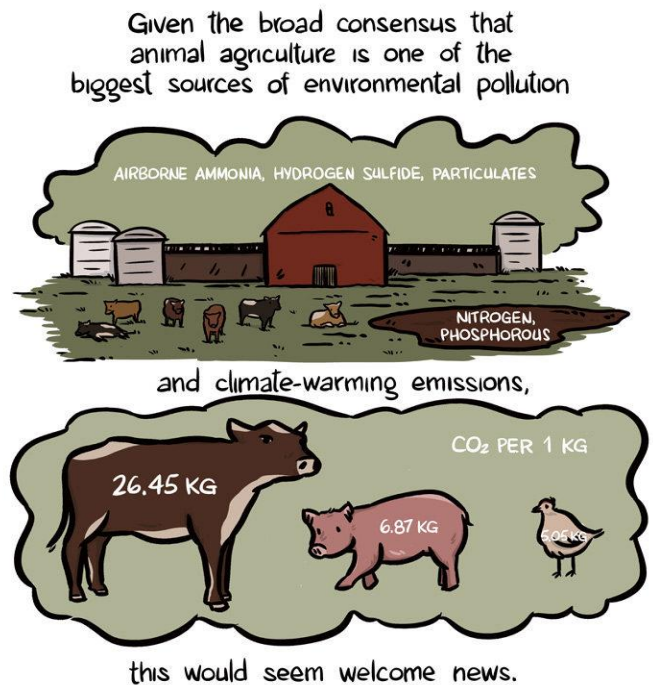
Global climate change has already had observable effects on the environment. Loss of sea ice, accelerated sea level rise, more intense heat etc. There are a few ways to reduce human impacts on climate change. Knowing your carbon footprint can help you pinpoint areas where you can make easy small changes. Carbon footprint is the total amount of greenhouse gas emissions that come from the production, use of and end of life of a product or service. This includes carbon dioxide, methane and fluorinated gases.

Cutting down on meat, in particular red meat is better for the environment. Factory farming contributes greatly to climate change by increasing greenhouse gas emissions, increasing toxins to the environment and harming land nutrients. Swapping out a few meat-heavy meals for vegan recipes to help significantly reduce your environmental impact along with paying attention to where your meat is coming from. Try to purchase locally sourced, 100% lifetime grass-fed beef when possible.

Creating less waste also reduces environmental impacts. It is wiser to create a grocery list beforehand and stick to it while shopping to prevent overbuying or purchasing things that are not needed. Reusing leftovers instead of throwing away, freezing food if it is not being consumed soon to prevent it from going bad also helps in creating less waste.

Making small changes can make a big difference. Small changes such as turning off the lights and appliances when they are not in use or unplugging can reduce even more energy. Use laptops instead of desktops because desktops use a lot more energy and use a constant source of electricity. Replace lights with LED lights since they use up to 85% less energy and last up to 25% longer. Pay attention to your fridge temperatures, replace old fridges if possible and seal homes well and insulate it to keep the temperatures stable. All these small changes have a huge impact.

Recycling more and creating less waste reduces the volume of waste production. Dressing sustainably by looking for fair-trade, shopping vintage, considering low environmental impact fabrics and donating old clothes is another way or creating less waste. Doing one or two things from the above list can create major changes in one's environmental impact and lower their effect on climate change.



Animal waste generates large amounts of CO₂ and methane gas



Greener Living

Renewable heating and cooling is the generation of energy from renewable technologies and resources to serve end-use applications such as heating water, space heating, space cooling and process heat. Renewable energies offer safe, clean, efficient and cost effective benefits. It is the best option to reduce emissions and air pollutants as it utilizes sustainable renewable resources rather than finite fossil fuels.

Hydropower Plants

Hydropower is a renewable energy that generates power by using a dam or diversion structure to alter the natural flow of a river or other body of water. It is fueled by water, making it a clean source of energy. Other advantages of hydropower plants includes recreation opportunities such as fishing, swimming, boat cruising, providing flood control, irrigation support, clean drinking water and low cost electricity and durability over time compared to other sources of energy.

Solar Power

Solar power is the conversion of renewable energy from sunlight into electricity by using photovoltaic or concentrated solar power. It has the least negative impact on the environment compared to other energy sources such as nuclear power plants. Solar power plants do not produce greenhouse gases, pollute the water or create noise. Creating your own electricity also

means that you will be using less from the utility supplier therefore reducing your energy bill.



Solar Powered House

Biofuel

Biofuel is an alternative fuel to petrol and diesel produced from renewable sources such as new and used vegetable oils and animal fats. Biofuels help reduce the carbon footprint of transportation and other industries by recycling planet's carbon. Another advantage of biofuel is that they are cost effective and they reduce the dependence on fossil fuels. It has been scientifically proven that biofuels reduce greenhouse gases up to 65%. The greenhouses gases trap solar radiation and cause the planet to warm.



Biofuel

Editorial team

Editor-in-Chief

Sziyambe

Design and layout

S. Ziyambe

Contributors

S.Ziyambe

S.Ziyambe

S.Ziyambe

Technical Advisor

S.Ziyambe

Photography

S.Ziyambe

Disclaimer

The Chartered Environmentalists Magazine is an independent magazine with background information about the Kyoto mechanisms, emissions trading and other climate policy and sustainability issues.

Chartered Environmentalist Contact Information:



Number 3 Aberdeen
, Belgravia, Harare

Also operating in: South Africa, Tanzania, Kenya and Zambia

Call: +263 773 018 622

Email: infor@elwas.co.zw , elwaspvlimited@gmail.com OR elwasafricainsa@gmail.com