

SECTION

2

ENVIRONMENT



STEWARDSHIP AND RESPONSIBILITY

Environment and Climate Change

INTRODUCTION

In previous lessons, you explored the concepts of decent and indecent work, positive work ethics, particularly the value of honesty in the workplace and the impact of human activities on the environment. These activities, whether positive or negative, are influenced by the environment in which we live and work. This section focuses on understanding the environment and its impact on human activities, including the importance of caring for it for current and future generations. It explores the adverse effects of climate change and strategies to mitigate these impacts. The three main religions in Ghana share a common principle of caring for the environment, entrusted to humanity to use responsibly, protect, and conserve for sustainable development. The session also introduces the concept of climate change and its effects on humanity and the environment. By understanding the causes and consequences of climate change, individuals can make informed choices to protect the environment and ensure its sustainability for future generations.

At the end of this section, you will be able to:

- Explain human activities that impact on the environment.

Key Ideas

- Environment encompasses all the living and non-living elements and their influence on human life. The interaction between the living and non-living objects and the products of these interactions constitutes the environment (NaCCA, 2024).
- Human beings live within a thin layer of the planet earth called the biosphere. The sustainability of the planet earth depends on how we interact or use the environment.
- Causes of Climate Change: They are the factors that influence a change in climate conditions.
- Effects of Climate Change: These are the consequences of climate change.
- Greenhouse Gas Emissions: are the release of air or things into the atmosphere to destroy the blanket that protects the Earth from the sun's heat.
- Global Warming: The world becoming very hot due to the damage caused to the blanket the covers the sun's rays.
- Ways of Minimising Negative Impacts of Climate Change: This refers to the plans or activities put in place to reduce the negative effect of climate change on the environment.

THE MEANING, TYPES AND THE IMPORTANCE OF ENVIRONMENT

Meaning of Environment

The term environment originated from the French word “environner” which literally means to surround or encircle. From this root, environment can be defined as any thing that surrounds both living and non-living things. These include air (atmosphere), water (hydrosphere), land/soil (geosphere).

The term environment, also means the surroundings or circumstances in which something lives. The interaction between living and non-living organisms and the products of these interactions constitutes the environment.



Figure. 2.1: The environment

Simply put, the environment is everything that surrounds us and it includes both living and non-living things such as water, soil, air, climate, animals, and plants which adapt themselves to their surroundings (NaCCA, 2024).

Environment is seen as the physical surroundings and physical conditions that affect peoples lives (Schlyffe, 2023). This definition of the environment excludes the spiritual environment which is mostly unseen or not physical.

Other ways of defining environment are:

1. All external forces that, influence and conditions, the life, nature behaviour and the growth, development and maturity of living organisms (Douglass and Holland,)
2. Is everything that affects a living organism(Miller Jnr., 2006).
3. The complex set of physical, geographical, biological, social, cultural and political conditions that surrounded by an individual or organism and that ultimately determines its form and nature of its survival (Mukhopadhyay, 2016)
4. Sum total of all conditions that surrounds man at a given point in space and time (Park, 1980).

5. Anything immediately surrounding an object and exerting a direct influence on it (P. Gisbert, 2020).
6. An external force which influences us (E.J. Ross quoted by Mukhopadhyay, 2016).
7. Anything that is surrounding an object and exerting a direct influence on it (Khyal, 2021).
8. Ones' surroundings which include everything around the organism, abiotic (non living) and biotic (living).

It is a fact that every human being lives within a thin layer of the planet earth. This is called the biosphere. It is made up of air, water and rocks among others (Rutherford, 2019). This fragile nature of the biosphere may sustain or destroy human life on the planet earth depending on human activities towards it. Environment is dynamic and not static because the biotic and abiotic factors are constantly changing. Unfortunately, human activities are polluting the environment. In order to promote the health of the environment, the surroundings which human beings live “environmental activism” or “environmentalism”, a social movement dedicated to protecting the planet earth for humans and other organisms emerged.

Activity 2.1

5th June is celebrated as World Environment Day. As a citizen of Ghana and a member of the global community, write a one-page essay that addresses any environmental challenge in your community to be posted on any social media handle as your contribution to environmentalism.

Types of Environment

Environment is classified on the basis of structure. The commonly agreed types are the physical (abiotic), biological (biotic), social and built environment. Another type of environment that is mostly neglected by scholars is the spiritual environment. Kindly take time to study and appreciate each type of environment in order to understand how they are directly and indirectly connected to one another. (Schyffe, 2023).

The Physical (abiotic) Environment:

This classification is based on the physical characteristics of the environment. This type of environment is made up of water bodies (hydrosphere), rocks and mineral deposits, different landforms (lithosphere), air, the sun (atmosphere) and other nonliving things. This is the solid, liquid and gaseous components of the environment.

- **Lithosphere** is the outer layer of the earth crust. It is made up of different landforms, rocks, metals and minerals.
- **Hydrosphere** is the component of the physical environment that comprises of water bodies like the oceans, ponds, rivers and streams among others. The hydrosphere covers about 70% of the earth's surface area. Oceans make up about 97.5% of the

water bodies (salty water) while fresh water covers only 2.5% of the hydrosphere. 30.8% of fresh water is available to us as ground water while Frozen water (glaciers) is 68.9% while 0.3% of the fresh water is found in lakes, rivers and reservoirs.

- **Atmosphere** is a layer of gases surrounding the planet earth. It is made up 20.95% oxygen, 0.038% of carbon dioxide, 0.93% argon, 78.08% of nitrogen traces of noble gases The atmosphere with oxygen in abundance is unique to Earth and sustains life. It is made up 78.08% nitrogen, 20.95% oxygen, 0.93% argon, 0.038% carbon dioxide and traces of hydrogen, helium, and noble gases and water vapour.

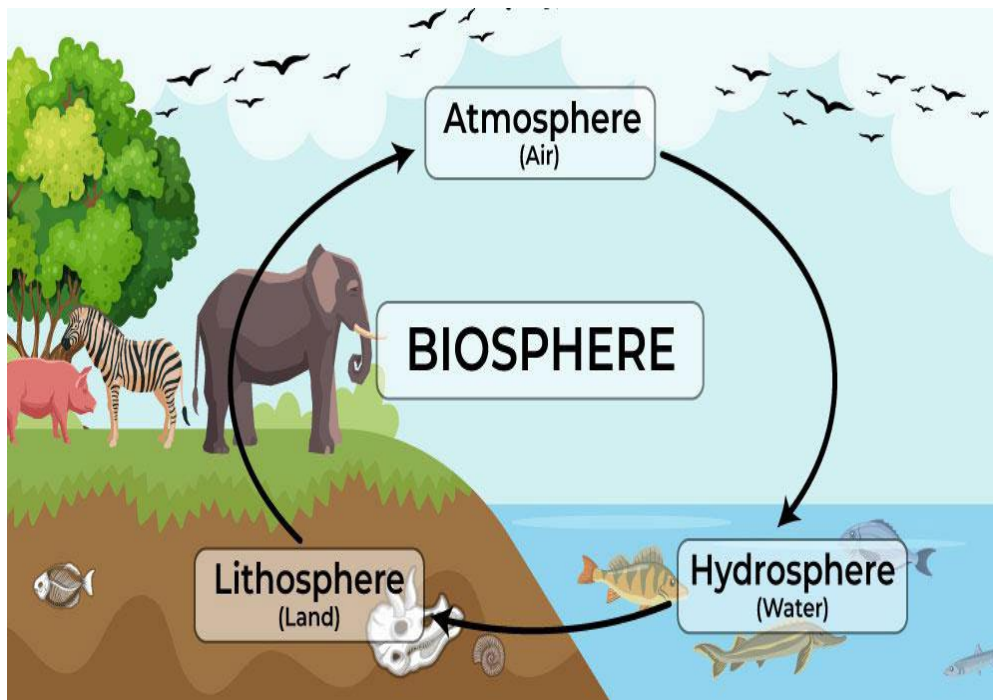


Figure 2.2: The physical (abiotic) Environment

Biological (biotic) Environment:

This type of environment is made up of living things with humankind at its centre. It is subdivided into floral (plants) and fauna (animals) environment. The biotic environment is broken down as producers (plants and algae producing their own food through photosynthesis), consumers (animals and other organisms that feed on plants and other organisms for survival), and decomposers (bacteria, viruses and other microorganisms).

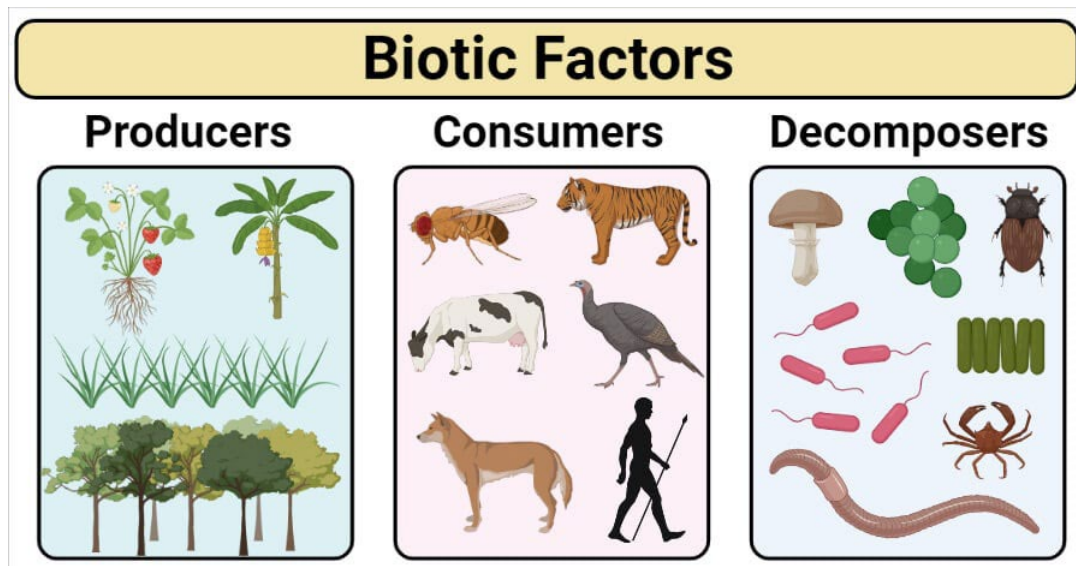


Figure 2.3: Biotic Environment

The biotic environment interacts with the abiotic environment such as air, temperature, light, water soil among others to survive.

Social or Cultural Environment:

This is the complex social or cultural conditions that affect an individual or community (NaCCA, 2024). Thus, external factors such as family, community, social norms, friends, media, education, political affiliations that affects the the thought and behaviour of a person is what defines the social or cultural environment (Hurts et al.,1990). In sum, the social or cultural environment encompasses the interactions, social relationships, and cultural norms among others that influence the behaviour of human beings. It is the type of environment that promotes individual and collective well-being by influencing behaviour, beliefs and societal norms (Tacrendi, 2023).



Figure 2.4: A Social Community

Built Environment:

This is made up of human habitations, workplaces, and areas of recreation, deliberately created or modified by human beings. The basic components are the urban (high rise buildings, roads and transport etc.), rural (less populated areas outside urban centres) and industrial (factories, power plants)



Figure 2.5: Some Built Environments in Ghana

Spiritual Environment:

This is the environment created by practitioners of religion to nurture their faith in their object of worship. This type of environment may be physical (sacred places of worship), a community of religious people and above all the world of the unseen (heaven, hell, the world of the living dead-world of ancestors, and the world of other mystical powers).

Importance of the Environment

The importance of the environment to human survival cannot be underestimated. Trees or forests provide us with food and herbs for medicinal use. The forest is a source of fodder for animals. Trees are the source for fuelwood and charcoal for domestic cooking. Trees are a habitation for animals and birds. <https://www.youtube.com/watch?v=M1obu9wDYhk> Wood from the forest is also used by man in building and construction. Above all, trees absorb carbon dioxide and produce oxygen to support human life.



Figure 2.6: Charcoal Produced from Trees



Figure 2.7: Construction of a Building

Some mineral resources in the environment are sources of energy for human use. Examples are crude oil for petroleum products, coal among others. Others are used in making jewelries

and electronic products. The sun produces light for plants survival. It also generates solar energy for domestic and industrial use. Water resources serve as avenues for transportation and source of fish for human use. Water is used for drinking, washing, cooking, irrigation of plants and extinguishing fires. Water is also a source of hydroelectric energy.

Activity 2.2:

- i. Look for news headlines in the print and electronic media for one week.
- ii. Write down the headlines that are related to the environment. Tabulate your findings into Good News and Bad News.
- iii. Discuss with your colleague or any member of the RMEC team what you think the environmental headlines might be in ten years' time.

RELIGIOUS FOUNDATIONS OF THE ENVIRONMENT

Though the three main religions in Ghana, have differences in their beliefs and practices they all agree on the need to take good care of the environment for our livelihood and for unborn generations. This stems from the fact that the environment is a gift to humankind by the Creator of the Universe and all therein for human beings to use, care, protect and conserve it for sustainable development (development that takes care of the needs of the people today and the generation unborn).

1. African Indigenous Religion's view on the environment:

- a. **The physical environment was created by the Supreme Being** - The practitioners of the African Indigenous Religion have a strong believe that God is the creator of the universe and everything in it. As such, the physical environment, was created by the Supreme Being for a purpose. This belief makes practitioners of the religion to submit to their object of worship.
- b. **The physical environment is the abode of the spiritual entities (e.g. gods, ancestral spirits, and other spirit beings)** - The basic belief of practitioners of AIR is that God is transcendent yet he relates closely to every believer through his intermediaries the gods, ancestral spirits, and other spirit beings. This belief emerged because the practitioners of the religion are convinced that the physical environment is a dwelling place of spirit beings. In other words, there is a certain presence of the gods, or the spirits in certain objects in the physical environment. Note that AIR is not equal to pantheism (a belief that there is a divine presence in every object in nature). The practitioners believe that places like selected mountains, rivers, forests and some special objects among others are considered sacred.

- c. **The ancestors are the custodians of the physical environment while the living (humankind) are stewards** - The physical environment have been entrusted to ancestors as the owners while humankind are the caretakers of the environment. When human activities create imbalance in the environment there is spiritual imbalance leading to curses such as epidemic, drought, famine, death etc.,
- d. **Spirits operate in the human world through sacred animals and plants (totems) and other inanimate objects such as rocks, mountains, water bodies, among others** - One of the main beliefs of the practitioners of AIR is that spiritual forces are deeply involved in human affairs. These unseen forces work through different mediums. The commonest medium of their operations among human beings are highlighted below:
- e. **Totems:** These are plants or animals or special objects that are perceived or believed to have special spiritual qualities or attributes hence are regarded as sacred. Eg. The people of Mirigu- Nabango in the Kasena Nankana West in Upper East Region see monitor lizards as a totem, while the people of Paga in the same district see crocodiles as their totem.



Figure 2.8: A picture of a monitor lizard

Some animals are considered as the abode of human souls while others have spiritual symbolic meaning. For the indigenous African, a good relationship with the natural objects shown below brings peace and harmony in society.

The table below is an illustration of some objects of reverence and their symbolic meaning.

Table 2.1: Objects of reverence and their symbolic meaning

Object of Reverence	Symbolic meaning
Eagle	Strength, vision and courage
Bear	Healing and protection

Wolves	Loyalty, commitment and perseverance
Butterflies	Renewal transformation
Mountains, rocks	Spiritual energies or power
Rivers, streams and lakes	Source of spiritual life or power
Tobacco	Spiritual protection

2. Christians' view on the environment:

- a. **Christians believe that the physical environment (world) was created by the Almighty God (Gen 1:1)** - One of the revealed truths about Christianity is that God is the creator of the universe and everything in it including humankind. The environment is therefore the creative Activity of God. For Christians, the environment created by God was perfect because it was created by a perfect creator.
- b. **God gave humans a special responsibility within creation to cultivate it, guard it and use it wisely** – this is called stewardship (Gen 1:26; 2:15).
- c. **Human beings were at the Centre of God's creation** - As such, He created male and female in his own image and likeness. In fact, human beings came into existence in and through the earth (Berry, 2006). As such, any Activity of humankind that is injurious to the earth and the things in it is an indirect way of injuring human beings.
- d. **For Christians, God the creator expects human beings to be His co-creators** - He therefore tasked human beings to till the land and use what is found in the land wisely. The concept of sustainable development (development that meets the needs of our generation without compromising the needs of generations unborn) has its biblical roots in God's call to humanity to be stewards of the environment.
 - i. Human beings have to work within creation and to look after it (Gen 2:15). Why? The purpose of creating Adam and Eve, the ancestors of the human race was purposeful. The main purpose was that the ancestors of the human race must work for their own livelihood and at the same time conserve and preserve the environment. Since the environment created by God is the source of livelihood of humankind the latter must therefore work within this environment in a way that support their lives and that of others. Human beings must not only be productive in every area of their lives but must take care of the environment. by preserving or conserving it from harm. Maintenance of the environment is a Christian responsibility.
 - ii. All creation, both with and without human beings, depend on God. The harmony in creation reveals God's glory. Creation has a direct link to God because the Christians believe that God is the sustainer of the universe and everything in it. It is for this reason, the universe is seen as a handiwork of God that reveals his greatness. As such, human beings must appreciate nature and their contribution in maintaining the orderliness in nature as this demonstrates the maintenance of one's relationship with his or her creator.
 - iii. Humans have the role of protecting all creation, not abusing or destroying it (Numbers 35:33).

- iv. The Christian faith enjoins all believers to avoid land, air and water pollution. Destruction of human life becomes a serious offence.
- v. All types of exploitation of the world and its resources and all creatures are rejected. Humans should not do anything that risks or damages the world (cf. Numbers 35:33; John 6:12). Christians must use natural resources judiciously. They must apply sound environmental methods in exploiting natural resources such as trees, minerals, animals among others from the land. Activities that pollute the land must not be tolerated.
- vi. Christians must avoid wasting resources endowed to them by nature. Jesus instructed his followers to gather left over crumbs of bread after they had eaten to their fill. This is a lesson that followers of Jesus and by extension everybody are called to be environmental stewards by not littering the environment.

3. Islam's view on the environment:

The following quotes from Islamic teachings support the position that the environment is sacred, and therefore should be treated with utmost care:

- a. **Muslims believe that the universe was created by Allah, and it belongs to Him (Qur'an 2:29; 2:117; 3:190; 45:11-12)** - One of the basic beliefs in Islam is that Allah is the creator of humankind. He is the source and origin of the heavens, the seas and everything on earth. Thus, Muslims acknowledge God as the creator of humankind and everything that surrounds him or her.
- b. **All creation is like a family of Allah; and He loves the most those who are beneficent to His family** - The main lesson of this Islamic teaching is that every Muslim must treat creation with kindness. Thus, the environment ought to be treated with care because it belongs to Allah. Anyone who takes good care of the environment becomes a member of Allah's family for creation itself may be seen as an extension of Allah's family. Allah places a human being as an authority on earth to care for the environment. As such, He even admonishes angels to prostrate before humans because his breath is in him (Qur'an 15: 29ff). The special place of man on earth makes Muslims see human beings as real stewards of the environment.
- c. **In Islam, khalifah is a steward** - Islam teaches that humans have been made the Khalifa (trustees or stewards) of the environment (Qur'an 6: 65). In environmental care, a Khalifa is a person Allah has appointed to manage environmental resources. Every steward of the environment in Islam must take the teachings below seriously in environmental management.
- d. **Islam prohibits the excessive consumption of resources the earth provides to humanity (Qur'an 7:3; 6:141; 30:30)** - In Islam man and nature are directly bonded together. The Qur'an sees wasteful consumption (Israf) of environmental resources as a sin. "Devote thyself single-mindedly to the Faith, and thus follow the nature designed by Allah, the nature according to which He has fashioned mankind. There is no altering the creation of Allah" (Qur'an 30:30). "Do not strut arrogantly on the earth. You will never split the earth apart nor will you ever rival the mountains' stature" (Qur'an 17: 37). Allah loves human beings and gave them environmental resources to use for their survival. That notwithstanding, the Quran is very clear on how human beings should exploit natural sources. "It is Allah who made for you the earth a place of settlement and the sky a ceiling and formed you and perfected your forms and provided you with

good things. That is Allah, your Lord; then blessed is Allah , Lord of the worlds.” (Qur’an, 40:64)

- e. **Islam believes that the whole world is a mosque (Hadith 1057:4)** - The prophet Muhamad (PBUH), indicated to his followers that the whole world is a place of prayer except graveyards and wash rooms (Sunan al-Tirmidhī 317). The implication for Islamic life is that the entire world is a sacred place. If it is a sacred place, then it must be treated with absolute reverence. Pollution in all its forms must be avoided to make every place on earth fit for prayer.
- f. **Allah loves and cares for all creatures so cruelty to animals is forbidden** - This is attested by the statement “ There is no creature on the earth or bird that flies with its wings but that they are communities like you (Quran 6:38). “Islam upholds the rights of animals to kind treatment and justice the same as it does for human being. Animals should not be abused or taken for granted. Allah has informed us that the animals are communities like human beings and have similar rights” (Elias, 2016).
- g. **Doing good to a beast is as good as doing good to a human being** - Islam is a religion that shows compassion to animals. Below are some teachings in the Hadiths about care for animals.
 - i. “There is a reward (ajr) for helping any living creature.” (Hadith: Bukhari and Muslim)
 - ii. “It is a great sin for man to imprison those animals which are in his power.” (Hadith: Muslim)
 - iii. “The worst of shepherds is the ungentle, who causes the beasts to crush or bruise one another.” (Hadith: Muslim)
 - iv. “You will not have secure faith until you love one another and have mercy on those who live upon the earth.” (Hadiths: Bukhari, Muslim, and Abu Dawud)
 - v. “Fear God in these mute animals and ride them when they are fit to be ridden and let them go free when ... they (need to) rest.” (Hadith: Abu Dawud)
 - vi. “The grievous things are shirk (polytheism); disobedience to parents; the killing of breathing beings ...” (Hadiths: Bukhari and Muslim)
 - vii. “May God curse anyone who maims animals.” (Hadith: Bukhari)
 - viii. “Whoever is kind to the creatures of God is kind to himself.” (Hadith: Bukhari)

Activity 2.3

Your teacher may split you into groups of three to research information on one of the dominant religion’s views of the environment. You may search the library or internet for further information. In your groups, prepare PowerPoint slides to teach your other colleagues about the specific religion that you have been allocated. The teacher may regroup you into new groups of three with one each from group that has focused on a particular religion. In the new groups, you will take turns to share what you have learnt in the previous group.

The video below is an example of the indigenous Ghanaian understanding of the environment. Analyse the content of the video and relate it to how it helps you to appreciate the indigenous Ghanaian understanding of the environment and how you will apply that in preserving and conserving the environment.

Click the link below and watch the video carefully. <https://www.youtube.com/watch?v=gxhLD4DaZd4>

HUMAN ACTIVITIES THAT IMPACT ON THE ENVIRONMENT

You have learnt that environmental resources were created by God for human livelihood. Human activities may sustain or destroy the environment. The focus of this lesson is to help you appreciate the impact human activities have on the environment and ways by which humans can sustain the environment. It is hoped that by the end of this lesson, you will examine your own actions and inaction as a steward of the school, home and community environment and become a better environmental steward whose words and actions will encourage better environmental health.

1. Human activities that can impact the environment negatively:

With a colleague discuss human activities that impact negatively on the environment. How many activities did you identify? Were you able to carry out the exercise with ease?

The following are some of the human activities that impact negatively on our environment.

- a. **Indiscriminate lumbering** (e.g. Timber, charcoal, firewood, building) Irresponsible felling of trees for domestic and industrial uses may affect the environment in the following ways:
 - i. Deforestation and destruction of plants and animals habitat.
 - ii. Loss of different species of plants and animal (biodiversity).
 - iii. Soil erosion.
 - iv. Increases emission of greenhouse gases because the trees that should act as a carbon sink have been destroyed.
 - v. It reduces rainfall pattern because the water cycle is disrupted.
 - vi. Contributes to climate change.



Figure 2.9: Photo of lumbering

- b. **Bad farming practices** (eg. slash and burn methods, excessive use of chemicals like inorganic fertilizer and weedicide/pesticide)



Figure 2.10: Photo of slash and burn method of farming

- c. **Deforestation and habitat destruction**

The effects of these are:

- Soil degradation and erosion
- Increased greenhouse gas emissions
- Water pollution and decreased water quality

Excessive use of chemicals:

- Soil and water pollution
- Harm to beneficial organisms and ecosystems
- Contribution to climate change

- Negative impact on human health



Figure 2.11: Forests are cut down for agricultural purposes



Figure 2.12: Deforestation and habitat destruction.

- d. **Illegal mining activities** (eg. “Gather them and sell”–“Galamsey”).
Kindly click the link below and watch a video on the devastating effect of illegal mining on the Ghanaian environment <https://www.youtube.com/watch?v=XDURzqdsyZQ>
Non-regulated mining activities have serious negative impacts on the environment.
- Destruction of biological diversity: Miners clear the vegetation to have easy access to mineral deposits. This leads to loss of biological diversity.
 - Water Pollution: Chemicals used by miners pollute surface and underground water thereby posing health risk to living organisms.
 - Air Pollution: Mining operations release dust and particles into the air making it unsafe for respiration.

- iv. **Soil Erosion and Landslides:** Mining activities destroy the soil cover making it very easy for erosion and landslides to take place.
 - v. **Health risks to miners and neighbouring communities:** The unregulated use of toxic substances such as mercury and cyanide by galamsey operators exposes the miners and the neighbouring communities to health problems such as respiratory and heart conditions as well as deformities of children at birth.
 - vi. **Destruction of Agricultural Land:** Mining activities destroy farmlands. The consequence of this destruction is food insecurity that affects livelihoods.
 - vii. **Increased Greenhouse Gas Emissions:** Destruction of forests by illegal mining activities creates a major carbon sink which contributes to climate change.
 - viii. **Loss of Cultural Heritage Sites:** Historical or cultural sites may be destroyed by illegal miners whose sole aim is to exploit mineral resources from the earth.
- e. **Illegal fishing activities** (e.g. use of unapproved fishing net, pair trolling, use of chemicals such as DDT for fishing, light fishing). The use of unapproved fishing nets, pair trolling (a practice which two fishing lines or lures are towed simultaneously, one behind the other, to increase the chances of catching fish), use of chemicals in fishing, light fishing, also known as “light attraction” or “luminescent fishing,” is a fishing technique that uses artificial light sources to attract fish). The damage these unfriendly activities pose to the environment are:
- i. **Overfishing:** Depletion of fish populations in the case of the use of unapproved fishing nets, pair trolling and light fishing.
 - ii. **Damage to Marine Habitats:** The use of chemicals in fishing destroys, coral reefs, seagrass beds among others.
 - iii. **Pollution:** Illegal fishing vessels dump oil, fuel, and other pollutants into the ocean thereby destroying aquatic and marine lives.
 - iv. **Climate Change:** Illegal fishing contributes to climate change through fuel consumption, habitat destruction, and displacement of carbon-storing marine ecosystems.
 - v. **Loss of Biodiversity:** Illegal fishing threatens the survival of many marine species, destroys marine/aquatic ecology thereby eliminating endangered fishes in our water bodies.etc.
 - vi. The direct consequences of all the unfriendly fishing activities are unsustainable fisheries management that leads to food insecurity.
 - vii. **Damage to Coastal Ecosystems:** Illegal fishing can lead to coastal erosion, sedimentation, and decreased water quality.
 - viii. **Economic Impacts:** Illegal fishing undermines sustainable fisheries management, depriving communities of livelihoods and revenue.
- f. **Indiscriminate hunting for game** (eg. the use of chemicals for hunting, burning of bushes for hunting, hunting on unapproved seasons). Humankind has depended and will continue to depend on resources in nature for survival. Hunting is one of the ways human beings depend on nature in order to survive. Unfortunately, the use of chemicals for hunting, burning bushes to kill game and hunting during the period animals in the bush are pregnant or are nursing their young ones, make our dependence

on environmental resources unsustainable. The direct impact of these activities on the environment are:

- i. The reduction in population of hunted species or animals in danger of extinction.
 - ii. Loss of genetic diversity: Over-hunting can result in the loss of genetic diversity, making species more vulnerable to disease and environmental changes.
 - iii. Ecosystem imbalance: Over-hunting can lead to an overpopulation of some species, causing imbalance in ecosystems.
 - iv. Climate change: Over-hunting can contribute to climate change because burning the bush, digging holes and sometimes felling down trees in order to hunt for animal species may lead to destruction of plant species, major absorbers of carbon thereby leading to climate change.
 - v. Economic impacts: Over hunting can have economic impacts on communities that depend on wildlife for income and resources.
 - vi. Ecosystem services: Over hunting can impact ecosystem services like pollination, pest control, and nutrient cycling.
- g. **Construction menace** (e.g. Building on waterways and wetlands, depleting of forest cover for construction). Construction of buildings, roads, houses among others are meant to make life comfortable for human beings. When human beings build on waterways and wetlands that prevent flooding or destroy forest cover for construction purposes without replacing them, the environment becomes unhealthy for human comfort. Construction projects can sometimes be a source of frustration for nearby residents, businesses, or commuters, due to factors like noise pollution, traffic disruption, or aesthetic changes to a neighborhood. Some of these negative impacts on the environment are:
- i. Air pollution: because the construction activities produce dust and noise that pollute the environment.
 - ii. Water pollution: waterways created during construction works contaminate nearby water sources.
 - iii. Waste generation: Construction activities produce large amounts of waste materials.
 - iv. Climate change: Construction contributes to greenhouse gas emissions because of the use of fossil fuels and particulate matter as well as destroying trees that absorb carbons.
- h. **Indiscriminate sand winning and quarrying**
- i. Habitat destruction: Removal of vegetation and topsoil leads to loss of biodiversity and ecosystem disruption.
 - ii. Soil erosion: Exposure of soil to erosion, landslides, and sedimentation in waterways.
 - iii. Water pollution: Increased turbidity, sedimentation, and chemical contamination in nearby water sources.

- iv. **Groundwater depletion:** Over-extraction of groundwater for quarrying and sand washing, leading to reduced water tables and aquifer depletion.
- v. **Noise and air pollution:** Generation of dust, noise, and vibrations from blasting and extraction activities.
- vi. **Landscape degradation:** Alteration of natural landscape, loss of aesthetic value, and reduction of eco-tourism potential.
- vii. **Increased risk of natural disasters:** Deforestation and soil removal can increase the risk of landslides, floods, and droughts.
- viii. **Community displacement:** Indiscriminate quarrying and sand winning can lead to displacement of local communities and loss of livelihoods.
- ix. **Decreased agricultural productivity:** Soil degradation and water pollution can reduce agricultural yields and affect food security.
- x. **Negative economic impacts:** Unsustainable extraction can lead to reduced economic benefits and decreased property values in the long term.

i. Improper waste disposal

Solid waste, liquid waste, biomedical waste (eg. dumping of refuse on water bodies/ways, dumping of refuse in unapproved places). Improper waste disposal can have serious negative effects on the environment, human health, and the economy. It can lead to:

- i. **Pollution:** Toxins from solid and liquid waste will cause air pollution, water and soil contamination.
- ii. **Climate Change:** Methane emissions from landfills contribute to global warming.
- iii. **Water Pollution:** Waste can enter waterways, harming aquatic life and human health.
- iv. **Soil Pollution:** Toxic waste can alter soil chemistry, affecting plant growth and ecosystems.
- v. **Loss of Biodiversity:** Habitat destruction and pollution can lead to extinction.
- vi. **Health Risks:** Exposure to waste-related pollution can cause cancer, birth defects, and other health issues.
- vii. **Fire Hazards:** Improperly disposed waste can ignite, causing fires and air pollution.
- viii. **Waste of Resources:** Valuable materials are lost when waste is not recycled or properly managed. In other words, waste as a resource is underrated.
- ix. **Economic Impacts:** Environmental damage and health costs can burden local economies.



Figure 2.13: Open burning to reduce volume of Biomedical solid waste at a landfill site, Gbahili, Tamale



Figure 2.14: A substandard offsite storage facility within Tamale Teaching Hospital showing easy access to vectors, rain and unauthorised persons

j. Burning of fossil fuel by industrial machines and transportation vehicles.

Manufacturing of goods and industries produce emissions. Most often, they produce energy through the burning of fossil fuels to make things such as; electronics, plastics, steel, iron, cement, clothes, etc. The burning of fossil fuels by industrial machines and transportation vehicles negatively affect the environment in the following ways:

- i. **Air pollution:** Releases harmful gases like carbon monoxide, nitrogen oxides, and particulate matter, contributing to respiratory problems and poor air quality.
- ii. **Climate change:** Carbon dioxide and other greenhouse gases emitted by vehicles and industries which use fossil fuel cause climate change.
- iii. **Water pollution:** Extracting, processing, and transporting fossil fuels can spill on water sources harming the health of aquatic as well as human life.
- iv. **Noise pollution:** Noise from heavy industries and vehicles that run on fossil fuel may lead to miscarriages and other health conditions in mammals.

- v. Land degradation: Extraction of fossil and transportation of fossil fuels can lead to the destruction of habitat of plants and animal species.
- vi. Ocean acidification: burning of fossil fuels increases CO₂ levels in the atmosphere. This is absorbed by oceans. This turns the ocean water into acid that can harm aquatic or marine life.
- vii. Hazard on Human health: Exposure to air pollution from fossil fuels increases the risk of heart, lung diseases and other health issues.



Figure 2.15: An Industrial Site Producing Steel

Activity 2.4

- i. Take a walk round your school or your neighbourhood and shoot a video or take pictures of environmental problems in your school or neighbourhood.
- ii. Watch the video or look at each picture carefully and identify the environmental issues depicted and the potential solutions and actions you will take to address these environmental issues. Share your findings with a colleague or a member of the RMEC team.

Activity 2.5

Click the link below and watch a video on environmental problems. Once you have viewed the video, write a report describing ways that you could solve at least one identifiable environmental problem in the video?

https://www.youtube.com/watch?v=aTrWtFR_FrQ

2. Ways by which humans can sustain the environment:

- a. **Afforestation:** This is the act of planting trees in order to create forest, or to prevent soil erosion and deforestation and the loss of biological diversity. Planting trees by the roadside (avenue trees) for beautification purposes and wind breaks in the houses are forms of afforestation.
- b. **Improved farming practices:** Farmers should adopt environmental friendly agricultural practices like crop rotation, organic farming, and agroforestry (cultivating crops and trees together) to reduce soil degradation and pollution.
- c. **Proper mining practices:** state of the art mining practices and environmentally friendly methods of extracting mineral resources should be encouraged to minimise the harm mining activities cause to the environment. Mined sites should be reclaimed (leveled and trees planted) as a way of reducing the impact on the environment.
- d. **Approved fishing methods:** Catch-and-release (Catching fish for recreational or scientific purposes and releasing them back into the water immediately, with minimal harm or injury) and selective fishing (targeting specific fish species, sizes, or ages) methods of fishing should be adopted in order to conserve fish populations.
- e. **Construction of irrigation projects:** Building efficient irrigation systems to conserve water, reduce evaporation, and support sustainable agriculture is one of the ways of improving food security and at the same time managing the environment from over exploitation.
- f. **The use of clean energy:** We should use renewable energy sources like biogas, LPG, solar, and wind power among others in order to reduce our over dependency on fossil fuel, fuelwood etc. As a way of minimising greenhouse gas emissions, the major cause of climate change.
- g. **Proper use of space in urban centres:** Adopting space-efficient urban planning strategies, like building high-rise structures will minimise land use and preserve natural habitats of plants and animals.
- h. **Enforcement of environmental laws:** Strengthening regulations, conducting regular monitoring, and imposing penalties for non-compliance to protect the environment.
- i. **Protection of underground and surface water bodies:** Conserving water sources through measures like watershed management, pollution control, and efficient use to ensure sustainable supply.
- j. **Proper waste management practices:** Implementing effective waste collection, segregation, recycling, and disposal methods to reduce waste generation. Reduce waste generation. Reuse waste generated. Recycle waste generated into something valuable for human use. Thus, waste should be used as resource (Atigah, 2015).

- k. **Wildlife conservation:** Endangered or species of animals near extinction should be kept in protected areas like zoos. Areas earmarked as wildlife conservation sites should jealously be protected from hunters, miners, loggers of timber, uncontrolled bush burning among others in order to conserve wildlife. The giraffe (*Giraffa camelopardalis*), an African even-toed ungulate mammal, the tallest of all extant land-living animal species, and the largest ruminant is hardly found in wildlife conservation sites today.

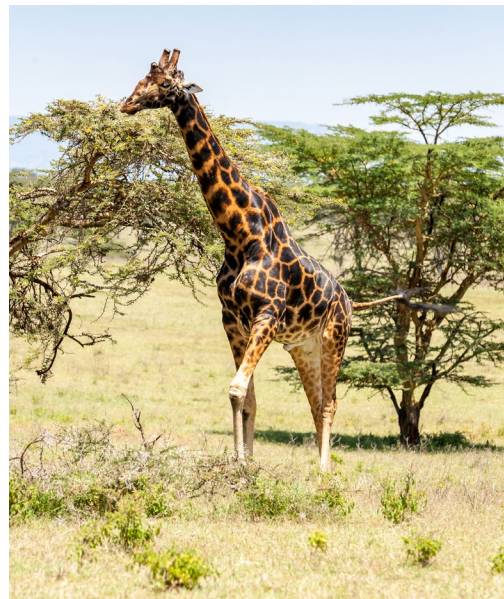


Photo of a giraffe, an endangered species

Activity 2.6

Work with a colleague(s) who is different from you in terms of gender, religion and ability in learning and form a group. List ten practical steps you could undertake to help save the world for future generations.

<https://www.youtube.com/watch?v=FMJhKQjO5uk>

Activity 2.7

Click the YouTube video link below and watch the video.

<https://www.youtube.com/watch?v=jAa58N4Jlos>

Reflect on the following statement

“If we don’t protect nature, we can’t protect ourselves”.

Use Microsoft Word or PowerPoint and type your reflections/thoughts on the statement to deliver a five minutes presentation in class.

The following tips on reflective writing may be helpful to you.

- a. Identify the experience: Choose a specific experience or event you want to reflect on.
- b. Describe the experience: Write a brief description of what happened.
- c. Analyse your thoughts and feelings: Explore your thoughts, feelings, and reactions during and after the experience.
- d. Identify what you learned: Reflect on what you learned from the experience, including skills, knowledge, or personal growth.

- e. Evaluate the experience: Consider what went well and what didn't, and what you would do differently next time.
- f. Make connections: Connect the experience to your broader life, goals, or previous experiences.
- g. Use reflective language: Use words and phrases like "I realised," "I learned," "I felt," and "I would do differently next time."
- h. Be honest and authentic: Write honestly and authentically, without sugarcoating or pretending.
- i. Edit and refine: Review and edit your writing to ensure clarity, coherence, and depth.

Remember, reflective writing is a personal and individual process. Be patient, and don't be afraid to explore your thoughts and feelings.

HUMAN ACTIVITIES THAT IMPACT THE ENVIRONMENT

Highly Valued Learner, in your previous lesson, you were exposed to some human activities that influence the environment and some appropriate solutions. Indeed, the environment is suffering from the hands of humans. This session reflects specifically on human activities that affect the school campus and practical ways to address them. This session is meant to help you inculcate sound environmental practices in your immediate neighbourhood and beyond.

Some of the Noticeable Environmental Problems in Schools or the Community.

You are aware that God created the environment for man to sustain it. Even though humankind's responsibility is to protect the environment created by God, we sometimes do a lot of harm to it. A number of visible environmental problems that are found in the school or the community because of human activities are:

1. **Choked drains:** This is also known as blocked drains. Drains are choked by rubbish and other materials. Similarly sewage systems in your school or community are sometimes blocked by papers, plastics, rubbish, stones amongst other things. Sewage blockage can cause air pollution. The overflow of the sewage may lead to underground water pollution. The untreated sewage may spill into waterways thereby contaminating water bodies such as rivers, lakes, dams, streams or lagoons. Choked drains can also attract insects that disturb local animals in the community and flooding that result in the destruction of people's properties. Overflowing gutters can also carry toxins into water bodies to endanger the fish in them.
2. **Indiscriminate dumping:** This refers to the careless way in which people throw away waste. In the school environment, indiscriminate dumping of waste may result in health risks.

3. **Poor shade/vegetation cover on campus:** Some schools may focus on putting up more buildings and infrastructure rather than parks and vegetation. This generates higher temperatures which can lead to increased energy use, sicknesses related to heat and also causes discomfort for students and staff.
4. **Erosion and leaching:** Erosion and leaching are connected environmental problems that have effect on man and the environment. Erosion is the wearing away of the soil, rock, or land surfaces by natural forces such as water, wind or ice. In our school or community, erosion can take place in our playgrounds, gardens and parks. For example, loss of fertile topsoil is caused by erosion. Leaching is the movement of nutrients or other substances through soil or rock layers which reaches water bodies. Leaching can happen in the school or community gardens, farms and nearby water bodies. For instance, leaching results in soil degradation.
5. **Open defecation:** Lack of sufficient toilet facilities in schools and communities can result in open defecation. This contaminates the water bodies, pollutes the soil and causes spread of diseases like cholera.
6. **Unhygienic washrooms, kitchens, drains and dormitories:** The unhygienic conditions of kitchens, drains and dormitories in our various homes, communities and schools are notable environmental and health challenges. It causes soil contamination, air pollution and contamination of water sources which lead to skin infections and diseases.



Figure 2.16: Soil erosion

Solutions to the environmental problems that can be identified in the school, or the community:

- a. **De-silting of choked drains:** Drains and gutters must be cleaned regularly to prevent flooding that draws mosquitoes and initiates unpleasant odour. De-silted drains allow for proper flow of water which goes a long way to protect the environment.
- b. **Clearing and proper disposal of waste:** When people properly dispose of waste, it actually creates a clean and healthy environment that can be termed as a disease free

environment. Refuse can be sorted for recycling, or for artistic purposes. For instance, used polythene bags can be used to create bags. There is the need to educate people in the community about environmental responsibility that keeps the environment safe for future generations.

- c. **Planting and caring for trees, grasses on the school playing field, and ornamental plants:** This practice can really solve environmental problems in the school and community. Trees and plants take in carbon dioxide and give out oxygen which enhances the quality of air and lessens pollution. Planting of trees and grasses also prevents soil erosion as the roots keep the soil firm.
- d. **Provide erosion breaks:** Erosion breaks such as sandbags, pegs, growing of cover plants or grass, etc. soak up floodwater and rainfall, and this act decreases debris flow and soil erosion. Cover plants or grass decreases the pressure on surface water during and after rainfall hence lessens soil erosion, and over flooding.



Figure 2.17: Planting of trees

Activity 2.8

Tour your school environment either as an individual or with some of your colleagues to observe, identify and list environmental problems on your campus.

You should produce a plan or solution to one identified environmental problem on your school campus.

Steps:

- a. Search the internet to draw a plan or a solution to one of the challenges you identified in your school or community. You can also seek the opinions of your colleagues at school or people from your locality about the issue.
- b. Provide a step-by-step guide to solving the challenge.
Produce a write-up and post it on your school's website page or social media platform.

Note: Present the write-up to any member of the RMEC for his or her endorsement. Below is a guide to assist in preparing for your write-up or project.

Table 2.2: Project Write-up Guide

Identify the Problem	What challenges is my school facing when it comes to its environment?
Set a Goal	How can I help?
Analyse the Cause	How did the problem start?
Think about the Solution	How will I address the problem?
Evaluate the solution options	What do I need to help me solve this problem?
Develop Responsibilities	Who could assist me execute my plan and what jobs will they do?
Develop Timelines	When can I make this possible?

Activity 2.9

From your service learning, produce skits to educate others about the need to take good care of the environment.

Or

Creative Work

Compose a short poem, song/rap to campaign for the protection of the environment.

Note: The Digital Literacy Project and the Creative Work may be shared on school platforms or school gatherings with a prior approval of the RMEC.

THE CONCEPT OF CLIMATE CHANGE.

Dear Learner, in the previous sessions you will have realised that human activities may impact positively or negatively on the environment. The focus of this lesson is to introduce you to the concept of climate change and its effects on the human race and the environment as a whole. It will undoubtedly help you to appreciate the need to observe the changing pattern of weather conditions over the years and plan your activities to correspond with the changes. This is known as climate adaptation. You would also be encouraged to undertake activities that will minimise climate change and its teething problems. This is called climate change mitigation.

Meaning of Climate and Climate Change

1. Climate:

- i. Climate is the average weather conditions for a particular location over a long period of time, ranging from months to thousands or millions of years. (World Meteorological Organisation, 2024).
- ii. Climate also refers to the average course or condition of the weather at a place usually over a period of years as exhibited by temperature, wind velocity, and precipitation (Merriam-Webster). The long-term atmospheric conditions in a specific region (climate), may include, temperature, humidity, wind, atmospheric pressure, solar radiation among others. Climate unlike weather is broader, regional, and long-term average weather conditions.
- iii. Weather refers to the temporary and local conditions of the atmosphere at a specific time and place, including: Temperature, humidity, Cloudiness, precipitation, wind, atmospheric pressure, air quality among others. It refers to local conditions on the scale of minutes, hours, days, months to years. Examples of Weather Patterns occurs when the weather remains the same for days or weeks at a time. They include; hot and dry weather and cold weather. When the weather patterns remain or go on for too long, they can result to emergencies such as flooding, heat waves and storms.

2. Climate Change:

- i. Climate change refers to changes in climatic elements such as temperature, rainfall, wind and other elements varying over decades or more. Climate change is simply, the long-term shifts in the average conditions of the Earth's climate system, including temperature, rainfall, wind among others. The effects of climate change are far-reaching and interconnected, making it a pressing global issue requiring immediate attention and collective action.
- ii. It is a long-term significant variation in climatic conditions of the earth. Thus, Climate change is any change in climate variability either natural or as a result of human activities. It is a prolonged and substantial change in the Earth's climate system, persisting over several decades or even centuries.
- iii. Climate change is a change of climate which is attributed directly or indirectly to human activities that alters the composition of the global atmosphere and which is in addition to natural climate variability (fluctuations that occur naturally over time). observed over comparable time period. (UN 1992).

The rising levels of greenhouse gases, such as carbon dioxide and methane, in the atmosphere trap heat from the sun, leading to:

- Rising temperatures which make summers hotter and winters milder.
- Extreme weather conditions leading to more frequent and severe heatwaves, droughts, and heavy rainfall.
- Melting ice (Glaciers and polar ice caps melting), causing sea levels to rise.
- Impacts on nature affect ecosystems, leading to changes in plant and animal habitats, and extinction.



Figure 2.18: Melting ice

Activity 2.10

Go to YouTube and watch the video on the explanation of climate change and carry out the following activities. <https://www.youtube.com/watch?v=ljFXBPoWsO0>

- a. In your own understanding, how would you describe the concept of climate?
- b. Send your answers /responses to school for class discussion.

Activity 2.11

Watch a video on the concept of climate change. Discuss what you learnt from the video. Base on what you have learnt, suggest definition(s) for climate change.

You can use any of the following links;

<https://www.youtube.com/watch?v=vjZnUI3OkCI>

https://www.youtube.com/watch?v=G9t__9Tmwv4

<https://www.youtube.com/watch?v=d4BFgtU0hJU>

<https://www.youtube.com/watch?v=6ZYU0kB3D4s>

Activity 2.12

Use relevant books or surf the internet to research the causes and effects of climate change over the past fiveyears.

You are expected to bring your findings to class for discussions during the next lesson.

CAUSES AND EFFECTS OF CLIMATE CHANGE

In the previous session, you were guided to understand the words climate and climate change. Changes in the weather conditions could be dangerous to the environment. This session will help you to understand the causes and effects of climate change.

1. Causes of Climate Change:

- a. **Deforestation or lumbering:** Deforestation, sometimes referred to as lumbering, is the deliberate act of humans to clear the forest or the vegetation mostly for agricultural, economic, domestic, or building purposes. The clearing of the vegetation poses a threat to the climate or atmosphere. This is because the trees which are meant to absorb carbon dioxide and in return produce oxygen into the atmosphere have been destroyed due to human activities.

- b. **Bad farming practices:** Farming practices such as the use of pesticides, herbicides (weedicide) have been adopted. In other communities' crop burning has been adopted as the method of clearing land for the next planting season and fertilizers and other agricultural chemicals are used for high yield when farming. These practices directly or indirectly pose a threat to the fertility of the soil and the destruction of the vegetation which further contributes to climate change.
- c. **Fumes from factories:** Some individuals who engage in manufacturing activities end up damaging the atmosphere. This happens because the machines that are used in factories generate fumes or smoke (gases) into the air.
- d. **Release of greenhouse gases:** Greenhouse gases are the bad gases in the air that cause the Earth or our communities to become hot. Some examples of these are carbon dioxide, methane, nitrous, chlorofluorocarbons. Gases generated into the atmosphere because of some human activities gradually damage the ozone layer (a protective covering like a blanket that protects the Earth from the sun's rays or hotness/global warming).
- e. **Bush burning:** This is the practice of setting fire to trees or the vegetation. It is sometimes done intentionally or accidentally. It mostly occurs when hunting or controlling pests such as rat, grasscutter etc. An example of a situation is when farmers burn their harvested fields to prepare their farms or fields for the next planting season. The amount of carbon dioxide produced by fire is directly proportional to the total amount of fuel consumed in the fire. This can lead to deforestation.



Figure 2.19: Image of a Burning Bush

- f. **Burning of fossil fuel (coal, oil, liquefied petroleum gas - LPG):** It is burning oil, natural gas, and coal to generate or obtain energy. The energy obtained is used to generate electricity, to power transportation, e.g., cars, lorries, trains, planes, and industrial processes. When fossil fuels are burnt, they release large amounts of carbon dioxide, greenhouse gas into the air. Greenhouse gases trap heat in our atmosphere, causing global warming (the earth to become hot). Fossil fuels, coal, oil and gas are

by far the largest contributors to global climate change, accounting for over seventy per-cent (75 %) of global greenhouse gas.



Figure 2.20: The burning of fossil fuel to generate energy or power.

- g. **Toxic chemicals from testing of weapons:** Weapons such as guns, tear gas, dynamite etc. produce harmful chemicals which cause climate change.

2. Effects of climate change

- a. **Rise in the sea level leading to floods:** As a result of global warming, ice in the seas melt causing the sea the overflow or rise. As the seas get warmer, they expand causing them to rise. When this occurs, communities around the coast get flooded. Higher sea levels also make coastal infrastructure more exposed to damage from storms.
- b. **Drought:** This is a period drier than normal conditions. It can last for days, months or years. Climate change reduces the rate of rainfall in a particular community or locality. This is because warmer temperatures enhance evaporation, which reduces surface water and dries up soils and vegetation, especially in areas and times or seasons where/when rainfall is low.



Figure 2.21: An image of a drought condition.

- c. **Desertification:** It is the process by which vegetation in drylands such as grasslands or shrublands decreases and finally disappears. Climate change affects rainfall patterns around the world or globe which contributes to desertification. The reason is that rainfall has a cooling effect on the land surface. A decrease in rainfall can cause soil to dry out in the heat period.
- d. **Food security due to low yield of farm product:** Food security is the measure of individuals to have access to food that is nutritious and sufficient in quantity. Heat stress is likely to have a negative impact on animal health, production of daily produces, meat, and reproduction. Climate change could be considered as one of the main factors that impact food security our communities, nation and the world at large.
- e. **Poverty and displacement of people and animals:** Unexpected rainfall and extreme weather situations can cause competition for food and water. The decline in agricultural output can lead to loss of income for a broad part of the population. The settlements of some people are affected, causing them to move from one place to the other trying to find shelter. Drought, floods, storms, and the rise in sea level as an effect of climate change are some of the factors responsible for the poverty of and displacement of people and animals in the community.
- f. **Depletion of living organisms:** Humans, animals, plants fungi (e.g., mushrooms), and microorganisms (e.g. bacteria, viruses etc.) life face challenges for existence or extinction due to climate change.
- g. **Torrential rainfall leads to flooding, damage to infrastructure and the spread of disease:** Heavy rainfall can lead to many hazards, for example, flooding, which poses a risk to human, plant and animal life. Severe rains could result to the spread of diseases such as cholera, malaria etc. Buildings are destroyed, and human activities are greatly affected.
- h. **Melting of ice in the temperate regions:** Climate change also causes significant melting of ice in temperate regions leading to many consequences. For instance, a major reason for the rise in sea level is the melting of ice in the sea. This eventually causes the sea to overflow and flood the community around its shores. It also puts coastal communities at risk of flooding and habitat destruction.
- i. **Soil Erosion:** In most communities, a combination of drier weather, more heavy rainfall, and deteriorating soil health can result from climate change. This is very likely to increase the rate of soil erosion, especially in areas that experience heavy downpours. Topsoil is washed away causing a defect in crop nutrients. Gutters are also created which impedes movement, especially for persons with visual impairment and the physically challenged

Activity 2.13

Carry out research into why there is a change in the climate and the specific impact of climate change on your own neighbourhood. You can use different sources for your research. It could be from the internet, other relevant sources, friends, neighbours or members of the RMEC committee

Use the template below to write about the specific impacts of climate change and the reason/s for that impact

Table 2.3: Impact of climate change

The impact of climate change	Reason for the impact
<i>Example: It leads to hunger</i>	<i>As farmers or people set fire to bushes or waste, the smoke that goes up destroys the layer that covers the sun's heat. This may reduce the rate of rainfall.</i>

WAYS OF MINIMISING THE NEGATIVE IMPACTS OF CLIMATE CHANGE

This session will suggest possible solutions to minimise the negative effects of climate change. The purpose of this session is to make you aware of the possible ways to reduce the negative impact of climate change. This should help you adjust to the changes in weather patterns. It will help you to make good choices to protect the environment.

1. Ways of minimising the negative impacts of climate change

To create a more sustainable future, we must involve ourselves in activities that can reduce the negative outcomes of climate change.

- a. **Promote afforestation and reforestation practices:** This is one vital way to minimize climate change. Trees produce oxygen, absorb carbon dioxide, and avoid soil erosion. Trees also sustain ecosystem services. This assists in controlling the climate, retaining water cycles and supporting human well-being. The planting of trees should be encouraged. Persons who engage in the illegal cutting down of trees when caught should be punished to serve as a check to prevent our deforestation.
- b. **Adoption of environmentally friendly farming practices:** These farming practices sustain the environment as they minimize the negative impact of climate change. It involves the use of proper farming methods such as crop rotation, organic farming and livestock grazing management in farming activities. Engaging in such farming will help keep the air, water and soil clean. The environment will therefore be kept healthy for future generations.

- c. **Ensure proper mining practices:** Appropriate mining practices are important to lessen the environmental challenges of mining operations. To reduce the impact of mining on the environment, mining companies must be careful in their operations. They should use less energy, reduce waste, save water and protect animals and plants.
- d. **The use of clean energies (e.g. Solar, hydro, biogas etc.) to power factories, automobiles, homes:** Using these forms to produce energy helps to reduce hazards that are related to the use of non-environmentally friendly forms of producing energy. Clean energy will give us power, prevent dirty fuels and produce less pollution.
- e. **Walk, bike or take public transport to reduce the burning of fossil fuel:** The use of bicycles, walking or public transport as means of transportation helps to create a cleaner and sustainable environment. It helps to reduce the number of cars on the roads which are sources of air pollution through the burning of fossil fuels.



Figure 2.22: School children use bicycles as a means of transport.

- f. **Increase public education for attitudinal change:** Agencies such as the National Commission for Civic Education (NCCE) should increase their effort to educate the public on the actions of citizens which negatively impact the climate. School curriculums could also be designed to educate students on the need to develop positive attitudes towards protecting the climate.
- g. **Ensure sound and sustainable management of natural resources in the environment:** To help sustain the climate, measures could be put in place to protect the natural resources. The measures adopted should aim at providing proper supervision of the natural resources.
- h. **Adoption of proper waste management practices:** Effective waste management such as recycling helps to fight against climate change. People should be enlightened on the proper ways of disposing of waste to protect the environment and reduce the damage caused by landfill sites and burning waste products
- i. **Enforcement of sustainable environmental laws to protect forest and water resources:** Laws with their corresponding punishments should be established to check the activities of individuals involved in the destruction of natural resources. Agencies such as the forestry department should be equipped with the appropriate knowledge, skills and resources to aid in proper supervision of natural resources.

Activity 2.14

<https://www.youtube.com/watch?v=8T-stkjXHKQ>

This is a short video on climate change in Ghana. Double-click the link or copy it into your Google search address and watch.

1. Reflect on the challenges you have noticed in your community that are caused by a change in the climate and create a poem, song rap or short story on how those challenges could be reduced.
2. Share your poem with your colleagues in school to spread the awareness.

Below is a guide to assist you if you would like to compose a poem, song rap as an example.

Steps in Writing a Poem

1. Start with a theme or idea (What the poem is about)
2. Think about words and phrases related to the theme
3. Determine the tone. For example, serious or playful
4. Choose a rhyme scheme. (This is optional)
5. Write your first draft (flow) as you look around to identify images that will assist in providing detailed information about the idea.
6. Review the poem and structure so that it flows when recited.
7. Edit for grammar, punctuation and clarity.

Extended Reading

- Durgasilakshmi Hari(2021), Lecture Notes on Environmental Science, Vardhaman College of Engineering
- <https://vardhaman.org/wp-content/uploads/2021/03/ENVIRONMENTAL-SCIENCE-1.pdf>
- The influence of the environment on child's growth and development: https://www.momjunction.com/articles/environment-influence-on-child-growth_00332016/
- Creation is like a family of Allah
- Imam Bukhari in his Sahih (Volume 8, Book 73, Number 42)
- Imam Muslim in his Sahih (Book 45, Number 284)
- Imam Tirmidhi in his Jami` (Book 27, Number 140)
- Religions and environmental protection
- <https://www.unep.org/about-un-environment-programme/faith-earth-initiative/religions-and-environmental-protection>
- Rights of animals in Islam
- [Abu Amina Elias / February 29, 2016 ---https://www.abuaminaelias.com/rights-on-animals-in-islam/](https://www.abuaminaelias.com/rights-on-animals-in-islam/)
- [Animals \(Basel\). 2017 Feb; 7\(2\): 11. Published online 2017 Feb 17. doi: 10.3390/ani7020011](https://doi.org/10.3390/ani7020011)
- The concept of climate change
- <https://www.youtube.com/watch?v=EuwMB1Dal-4>
- <https://www.youtube.com/watch?v=EuwMB1Dal-4>
- Making Bicycle a Safe Means of Transport in Ghana: <https://www.modernghana.com/news/1029343/making-bicycle-a-safe-means-of-transport-in-ghana.html>
- **NB:** Read the first two paragraphs https://link.springer.com/chapter/10.1007/3-540-26590-2_6
- <https://climate.nasa.gov/vital-signs/sea-level/?intent=121#:~:text=Global%20sea%20levels%20are%20rising,of%20seawater%20as%20>

References

- Adger, W. N., & Barnett, J. (2009). Climate change, human security and violent conflict. *Political Geography*, 26(6), 639-655.
- Allen, M. R., & Ingram, W. J. (2002). Constraints on future changes in the hydrologic cycle. *Nature*, 419(6903), 224-227.
- Alokwu, C. O., & Emeka, E. E. (2015). African Indigenous Knowledge System and Environmental Sustainability. *International Journal of Environmental Protection and Policy*, 3(4), 88-96. doi: 10.11648/j.ijep.20150304.12
- Atigah C. N. (2015), Unpublished thesis, on Biomedical Solid Waste Management in TaMA, submitted to Institute of Local Government Studies (affiliated to KNUST) for an award of MSc. Environmental Science Policy and Management.
- Bala, G., & Duffy, P. B. (2005). Augmented climate change and its implications for climate sensitivity. *Journal of Geophysical Research*, 110(D18), D18103.
- Barnett, J., & Adger, W. N. (2007). Climate change, human security and violent conflict. *Political Geography*, 26(6), 639-655.
- Barrow, C. J. (2005), *Environmental Management and Development*, Routledge, London
- Berry, T. (2006). *Evening thoughts: Reflecting on earth as sacred community*. Sierra Club Books.
- Brown, T. A. (2011). Engineering the climate: The ethics of solar radiation management. *Journal of Applied Philosophy*, 28(2), 164-177.

- Caldeira, K., & Myhrvold, N. P. (2013). Projections of future sea level. In *Sea Level Rise and Coastal Subsidence* (pp. 13-22). American Geophysical Union.
- Canadell, J. G., & Schulze, E. D. (2014). Global potential of terrestrial carbon sequestration. In *Terrestrial Ecosystems in a Changing World* (pp. 149-164). Springer.
- Climate Action
- Climate Action: The Causes and Effects of Climate Change
- Crutzen, P. J. (2006). Albedo enhancement by stratospheric sulfur injections: A contribution to resolve a paradox. *Climatic Change*, 77(3-4), 211-219.
- Diffenbaugh, N. S., & Giorgi, F. (2012). Climate change hotspots in the CMIP5 global climate model ensemble. *Climatic Change*, 114(3-4), 813-822.
- Field, C. B., & Lobell, D. B. (2010). Global food security under climate change. *Proceedings of the National Academy of Sciences*, 107(49), 20451-20456.
- Gottlieb, R. S. (2006). *A greener faith: Religious environmentalism and our planet's future*. Oxford University Press.
- [H Kenneth Walker](#), [W Dallas Hall](#) & [J Willis Hurst](#) (editors)(1990). *Social environment: Clinical Methods: The History, Physical, and Laboratory Examinations* (3rd edition). Boston: Butterworths.
- Hansen, M. C., & Loveland, T. R. (2012). A review of large area monitoring of land cover change using Landsat data. *Remote Sensing of Environment*, 122, 66-74.
- Hillel, D. (2007). *The natural world: A biblical perspective*. Jewish Lights Publishing.
- <https://unfccc.int/resource/docs/convkp/conveng.pdf>
- <https://www.un.org/en/climatechange/science/causes-effects-climate-change>
- <https://www.un.org/en/climatechange/science/causes-effects-climate-change>
- IPCC (2013). *Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*.
- Jenkins, W. (2008). *Ecologies of grace: Environmental ethics and Christian theology*. Oxford University Press.
- Keith, D. W. (2000). Geoengineering the climate: History and prospect. *Annual Review of Energy and the Environment*, 25, 245-284.
- Khalid, F. (2009). Islam and the environment. In A. Abdelzaher & A. Faruqui (Eds.), *Islam and the environment* (pp. 1-15). Islamic Foundation for Ecology and Environmental Sciences.
- Lenton, T. M., & Vaughan, N. E. (2009). The radiative forcing potential of different climate geoengineering options. *Atmospheric Chemistry and Physics*, 9(15), 5539-5561.
- M. D Enaikele, T.A. Adekele, R.A. Adeoye, *KIU Journal of humanities*, 2022, Kampala International University, ISJN: 2415, 7(3): 101-112
- Maatman, R. (1974). "First Things First." *Journal of the American Scientific Affiliation*, 26(1), 18-19.
- MacNeill, Jim, et al. (1991). *Beyond Interdependence: The Meshing of the World's Economy and the Earth's Ecology*. New York: Oxford University Press.
- Malone, N. M. (Ed.). (1989). "Repurposing Education: The American College in the Ecological Age." *Religion and Intellectual Life*, 6, pp. 7-69.
- Maloney, G. A. (1968). *The Cosmic Christ*. New York: Sheed and Ward.
- Marshall, Paul. (1984). "Is Technology Out of Control?" *Crux*, 20(3), pp. 3-9.
- Marshall, Paul. (1993). "Does the Creation Have Rights?" *Studies in Christian Ethics*, vol. 2, pp. 31-49.
- Martensen, D. F. (1970a). "Concerning the Ecological Matrix of Theology." *Zygon*, 5(4), pp. 353-369.
- Martensen, D. F. (1970b). "Theologizing in an Ecological Matrix." *Dialog*, 9(Summer), pp.

192-199.

- Martin, K. A. (1980). "Biblical Mandates and the Human Condition." *Journal of the American Scientific Affiliation*, 32(2), pp. 74-77.
- Matthews, A. D. (1965). "The Prophetic Doctrine of Creation." *Church Quarterly Review*, 166, pp. 141-149.
- McDaniel, Jay. (1987). "Christianity and the Pursuit of Wealth." *Anglican Theological Review*, 69, pp. 349-361.
- McDaniel, Jay. (1989). *Earth, Sky, Gods and Mortals*. Mystic, Conn: Twenty-Third Publications.
- McDonagh, Sean. (1986). *To Care for the Earth: A Call to a New Theology*. London: Chapman.
- McFague, S. (2013). *Blessed are the consumers: Climate change, consumerism, and the fate of creation*. Fortress Press.
- McFague, Sallie. (1987). *Models of God: Theology for an Ecological/Nuclear Age*. Philadelphia: Fortress Press.
- McFague, Sallie. (1993). *The Body of God: An Ecological Theology*. Minneapolis: Fortress Press.
- Northcott, M. S. (2013). *A political theology of climate change*. SPCK Publishing.
- Rahman SA. *Religion and Animal Welfare-An Islamic Perspective. Animals (Basel)*. 2017 Feb 17;7(2):11. doi: 10.3390/ani7020011. PMID: 28218670; PMCID: PMC5332932.
- Ruether, R. R. (2015). *Integrating ecology and justice: Theology, economics, and the earth*. Orbis Books.
- Salem, M. A., Hasnan, N., & Osman, N. H. (2016). *Some Islamic Views on Environmental Responsibility*. Universiti Utara Malaysia
- Schlyffe, (2023), <https://utopianview.wordpress.com/2021/01/28/environmental-geography-definitions-concept-and-nature-scope/>
- Sinh, Savindra, (2018): *Environmental Geaography*, Pravlika Publication, University Road Allhabad
- Tancredi S. (2023), *Types Of Environment: A Complete Guide* <https://sigmaearth.com/types-of-environment-a-complete-guide/>
- Tucker, M. E. (2015). *Worldly wonder: Religions enter the environmental age*. Open Court Publishing.
- UNEP (1992). *United Nations Framework Convention on Climate Change*.

Glossary

- **Climate Change:** is the long-term shifts in temperatures and weather pattern.
- **Climate:** it is the long-term pattern of weather in a certain area or region.
- **Crop Burning:** The practice of setting fire to the remains of crops after harvest to quickly clear the land for planting.
- **Crop Rotation:** The practice of planting a series of different crops on the same to improve soil fertility.
- **Fossil Fuels:** Is one of the natural sources of energy e.g., oil, natural gas.
- **Greenhouse gases:** The bad gases in the air that make the Earth too hot.
- **Livestock Grazing Management:** The procedures used in managing livestock grazing on pastures to help check the destruction of the land and forest.
- **Methane:** is a greenhouse gas capable of causing global warming.

- Notable environmental problems: They are the environmental challenges found in a given society such as your school or locality.
- Organic Farming: The use of natural methods of farming.
- Recycling: The process of producing another useful product out of a waste material.
- Sacred Groves: Sacred groves are forests or areas of land considered sacred or spiritually significant, often due to their association with deities, ancestors, or mystical powers. These groves may be protected and preserved for their cultural, ecological, or spiritual importance.
- Solutions to environmental problems: The measures taken to limit or put an end to possible environmental challenges.
- Stewards: Stewards are individuals or groups of persons responsible for managing, protecting and caring for something valuable, such as natural resources among others. Or it is a belief that humans have a responsibility to care for and manage the natural world, as entrusted to them by a higher power. Khalifa is a steward in the Islamic tradition.
- Supreme being: This is a being is believed to be the ultimate reality, creator, and sustainer of the universe.
- Sustainable development; this the type of development that caters for the needs of the current generation and that of generation unborn.
- Totems: Totems are symbols, objects, or animals representing a person, family, or group's identity, beliefs, or values. They can hold spiritual significance, serving as connections to ancestors, nature, or the divine.
- Vegetation: It is the plant life or environment within a particular area.
- Weather: is the description of day-to day changes in the atmosphere.

REVIEW QUESTIONS

REVIEW QUESTION 2.1

Compare the types of environments that you have studied and share your findings with your classmates.

REVIEW QUESTIONS 2.2

1. How do the environmental philosophies of African Indigenous Religion, Christianity, and Islam affect how their adherents treat and interact with the natural world? Give particular instances to demonstrate these influences.
2. Analyse the benefits that the natural environment provides to human societies, encompassing ecological, economic, and social dimensions.

REVIEW QUESTION 2.3

Tick the appropriate answer in the options provided.

Question	Possible answer	Tick the most appropriate answer
1. What is the potential health risk associated with swimming in a polluted water body?	a) Skin irritation b) Respiratory problems c) Waterborne diseases d) All of the above	
2. What is the term for illegal small-scale mining	a) Deforestation b) Pollution c) Galamsey d) Conservation	
3. What is the main environmental concern related to refuse sites?	a) Air pollution b) Water pollution c) Soil pollution d) Waste management	

4. What can individuals do to help mitigate environmental issues in their communities?	<ul style="list-style-type: none"> a) Recycle and properly dispose of waste b) Conserve water and reduce plastic use c) Support organizations working on environmental issues d) All of the above 	
5. Which human Activity is the main cause of deforestation and habitat destruction?	<ul style="list-style-type: none"> a) Industrialisation b) Galamsey c) Urbanization d) Agriculture 	
6. What human Activity is responsible for releasing greenhouse gases and contributing to climate change?	<ul style="list-style-type: none"> a) Burning fossil fuels b) Pollution c) Overfishing d) Deforestation 	
7. What can be done to prevent water pollution?	<ul style="list-style-type: none"> a) Implement sustainable agriculture practices b) Upgrade wastewater treatment infrastructure c) Promote water conservation d) All of the above 	
8. How can we prevent soil erosion and land degradation?	<ul style="list-style-type: none"> a) Implement sustainable agriculture practices b) Plant vegetation buffers c) Use erosion-control measures d) All of the above 	
9. What can be done to reduce deforestation and habitat destruction?	<ul style="list-style-type: none"> a) Implement sustainable urban planning b) Promote reforestation efforts c) Support conservation organizations d) All of the above 	

10. How can ocean pollution be prevented?	<ul style="list-style-type: none"> a) Implement recycling programs b) Use biodegradable alternatives c) Reduce single-use plastics d) All of the above 	
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REVIEW QUESTIONS 2.4

1. Make a visit with a friend or your colleagues around your school buildings and grounds and identify/note three problems that have been caused by environmental challenges.
2. Explain how these environmental problems can be addressed.

REVIEW QUESTION 2.5

“Why is there over exploitation of the environment in spite of religious teachings on environmental preservation conservation?”

REVIEW QUESTION 2.6

Natives of a nearby community are blaming God/Allah/The Ancestors for the long period of drought. Explain to the community that the drought might be linked to climate change and describe its effects?

REVIEW QUESTION 2.7

The people in your community are complaining about a change in the rainfall pattern (a change in weather). Describe ways that the community can minimise the effects of climate change.

Acknowledgements



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