

Workplace Environmental Management

WEEK 8 – Environmental Impact
Assessment

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Objectives

At the end of this topic students will be able to:

- Understand the concept of the climate change and global warming.
 - Understand the aspects, impacts and assessment in line with water, pollution and loss of biodiversity.
 - Understand the environmental impact assessment report EIAR.
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8.1 Global warming

- Global warming is a gradual increase in the earth's temperature generally due to the greenhouse effect caused by increased levels of carbon dioxide, CFCs, and other pollutants.
 - This phenomenon took long time and scientists have proven some facts that temperature of the earth is rising constantly.
 - Many causes of global warming having negative effect on humans, plants and animals are natural or outcomes of human activities.
 - For further and deep readings, the above-mentioned causes can be found in the following resource. (<https://byjus.com/biology/global-warming/>).
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8.1.1 Natural Causes of global warming

- **Volcanoes** are one of the largest natural contributors due to ash and smoke emitted during volcanic eruptions ejected in atmosphere, affecting climate.
 - **Water vapour** is a greenhouse gas from the increase in earth's temperature, as much evaporation from the water bodies results global warming when remained in atmosphere for a long time.
 - **Melting Permafrost**, frozen soil that has gases trapped below Earth's surface several years presents glaciers. The melting results in bringing gases back into the atmosphere, increasing Earth's temperature.
 - **Forest Blazes or forest fires** emit a large amount of carbon-containing smoke which flies in the atmosphere and increase the Earth's temperature resulting in global warming.
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8.1.2 Man-made Causes of global warming

- **Deforestation** has been done for domestic and commercial activities. As plants take carbon dioxide and release oxygen thereby maintaining environmental balance, they cause global warming when depleted.
 - **Use of Vehicles** even for a very short distance results in various gaseous emissions. Vehicles burn fossil fuels which emit a large amount of carbon dioxide and other toxins into the atmosphere resulting in a temperature increase.
 - **Chlorofluorocarbon** results from the excessive use of air conditioners and refrigerators. humans have been adding CFCs into the environment which affects the atmospheric ozone layer. The ozone layer protects the earth surface from the harmful ultraviolet rays emitted by the sun.
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8.1.2 Man-made Causes of global warming cont'd

- **Industrial Development** contribute to the rapid increment in temperature of the earth due to harmful emissions from the factories.
 - **Agriculture** or farming activities produce carbon dioxide and methane gas accumulating the greenhouse gases in the atmosphere and increase the temperature of the earth.
 - **Overpopulation** means more people breathing with an increase in the level of carbon dioxide, the primary gas causing global warming, in the atmosphere.
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8.1.3 Effects of Global Warming

- **Rise in Temperature** increased by ~1 degree then melting glaciers led to an increase in the sea level. This could have devastating effects on coastal regions.
 - **Threats to the Ecosystem** has affected the coral reefs that can lead to the loss of plant and animal lives. Increase in global temperatures has made the fragility of coral reefs even worse.
 - **Climate Change** or change in climatic conditions. There are droughts at some places and floods at some. This climatic imbalance is the result of global warming.
 - **Spread of Diseases** due to change in the patterns of heat and humidity resulting in the movement of mosquitoes that carry and spread diseases.
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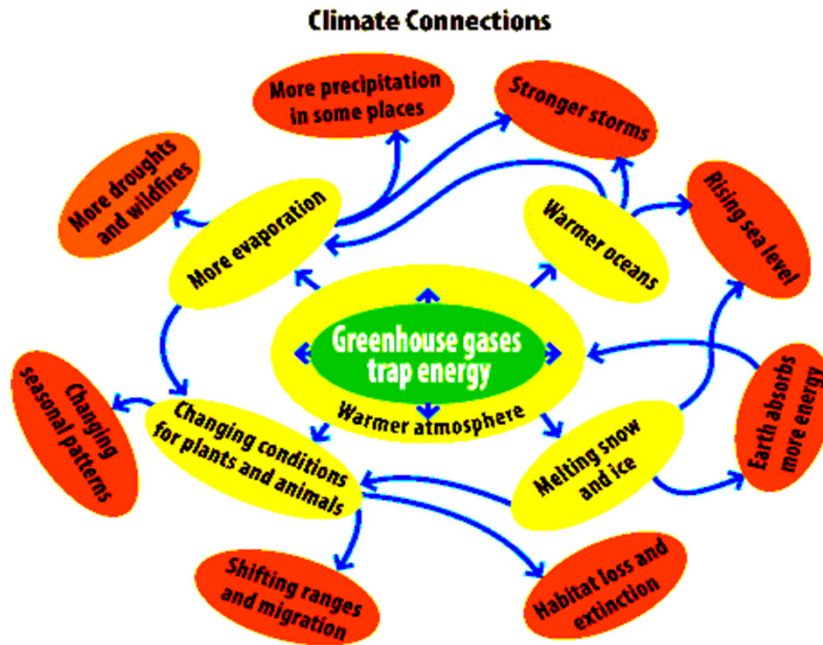
8.1.3 Effects of Global Warming cont'd

- **High Mortality Rates** due to an increase in floods, tsunamis and other natural calamities, the average death toll usually increases. Also, such events can bring about the spread of diseases that can hamper human life.
 - **Loss of Natural Habitat** resulting from global shift in the climate, it has led to the loss of habitats of several plants and animals. In this case, the animals need to migrate from their natural habitat and many of them even become extinct. (<https://byjus.com/biology/global-warming/>).
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8.2 Climate change

- It refers to significant, long-term changes in the global climate. The global climate is the connected system of sun, earth and oceans, wind, rain and snow, forests, deserts and savannas, as well as everything people.
 - The climate of a place is described as its rainfall, changing temperatures during the year and so on while the global climate is more than the “average” of the climates of specific places.
 - Fossil fuels – coal, oil and gas – are by far the largest contributor to global climate change, accounting for over 75 per cent of global greenhouse gas emissions and nearly 90 per cent of all carbon dioxide emissions.
 - As greenhouse gas emissions blanket the Earth, they trap the sun’s heat leading to global warming and climate change. Warmer temperatures over time are changing weather patterns and disrupting the usual balance of nature. (<https://www.un.org/en/climatechange/science/causes-effects-climate-change>).
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8.2 Climate change cont'd



The picture illustrates the interconnection between all the sources of the climate change. (https://www.warmheartworldwide.org/what-is-climate-change.html?gad_source=1&gclid=EAlaIQobChMIwdXUr_qHhgMVRJKDBx176g7cEAAYASAAEgLiJ_D_BwE).

8.2.1 Causes of Climate Change

- Generating power: Burning fossil fuels (coal, oil, and gas) for electricity generation.
 - Manufacturing goods: Energy-intensive production processes for making things like cement, iron, steel, electronics, plastics, clothes, and other goods.
 - Cutting down forests: Deforestation for agriculture, grazing, and timber result in keeping much Carbon dioxide in atmosphere.
 - Using transportation: Fossil fuel-powered vehicles (cars, planes, ships) due to the combustion of petroleum-based products, like gasoline, in internal combustion engines, transportation contribute to emitting Carbon dioxide.
 - Producing food: Agricultural practices, including livestock farming using machineries, fishing using boats, digestion of animals, use of fertilizers etc.
 - Powering buildings: Growing energy demand has a significant consumption in both residential and commercial buildings.
 - Consuming too much: Overconsumption of resources including goods and services
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8.2.2 Effect of climate change

- Hotter temperatures: Global warming leads to rising temperatures, causing heatwaves and impacting ecosystems.
 - More severe storms: Climate change intensifies storms, resulting in extreme weather events like hurricanes and cyclones.
 - Increased drought: Changing precipitation patterns lead to prolonged droughts, affecting water availability.
 - Warming oceans: Ocean temperatures rise, affecting marine life, coral reefs, and ocean currents.
 - Loss of species: Habitats change, endangering various plant and animal species.
 - Food scarcity: Climate impacts disrupt agriculture, affecting food production and availability.
 - Health risks: Extreme weather events and changing disease patterns pose health risks.
 - Poverty and displacement: Vulnerable communities face economic losses and forced migration due to climate-related impacts
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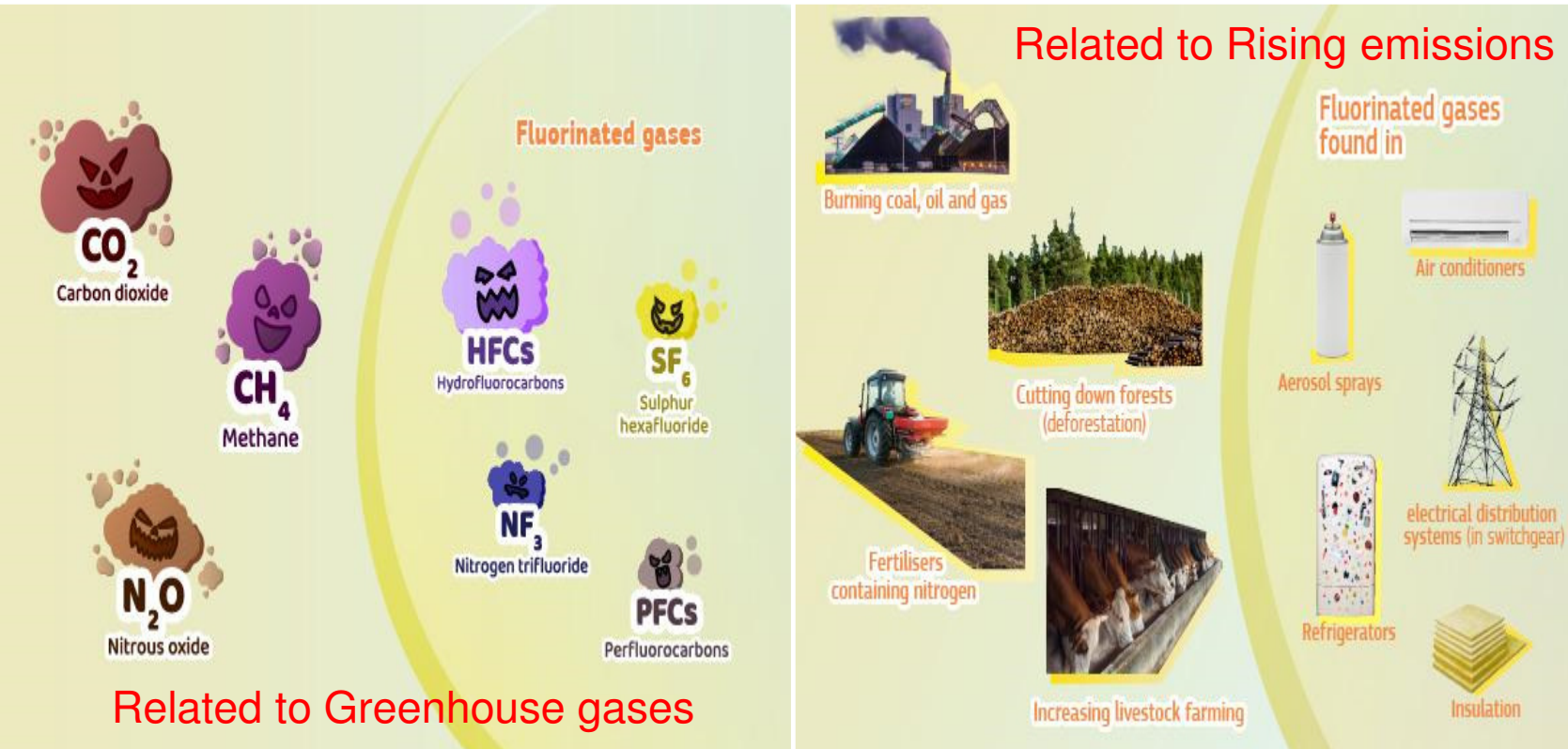
8.2.3 Climate change in Rwanda

- Rwanda like other countries worldwide, faces the climate change.
 - The causes are like global causes except that the case of Rwanda is the rapid change in the impacts due to its development agenda. (<https://climatechange.gov.rw/index.php?id=73>).
 - Usually, Rwanda has a tropical temperate climate due to its high altitude and the average of temperature is between 16⁰C and 20⁰C annually.
 - Nowadays, the rain is not falling in usual way due to the climate change and the country like others in the region, is suffering from floods, landslides, wildfire, etc.
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8.2.3 Climate change in Rwanda cont'd

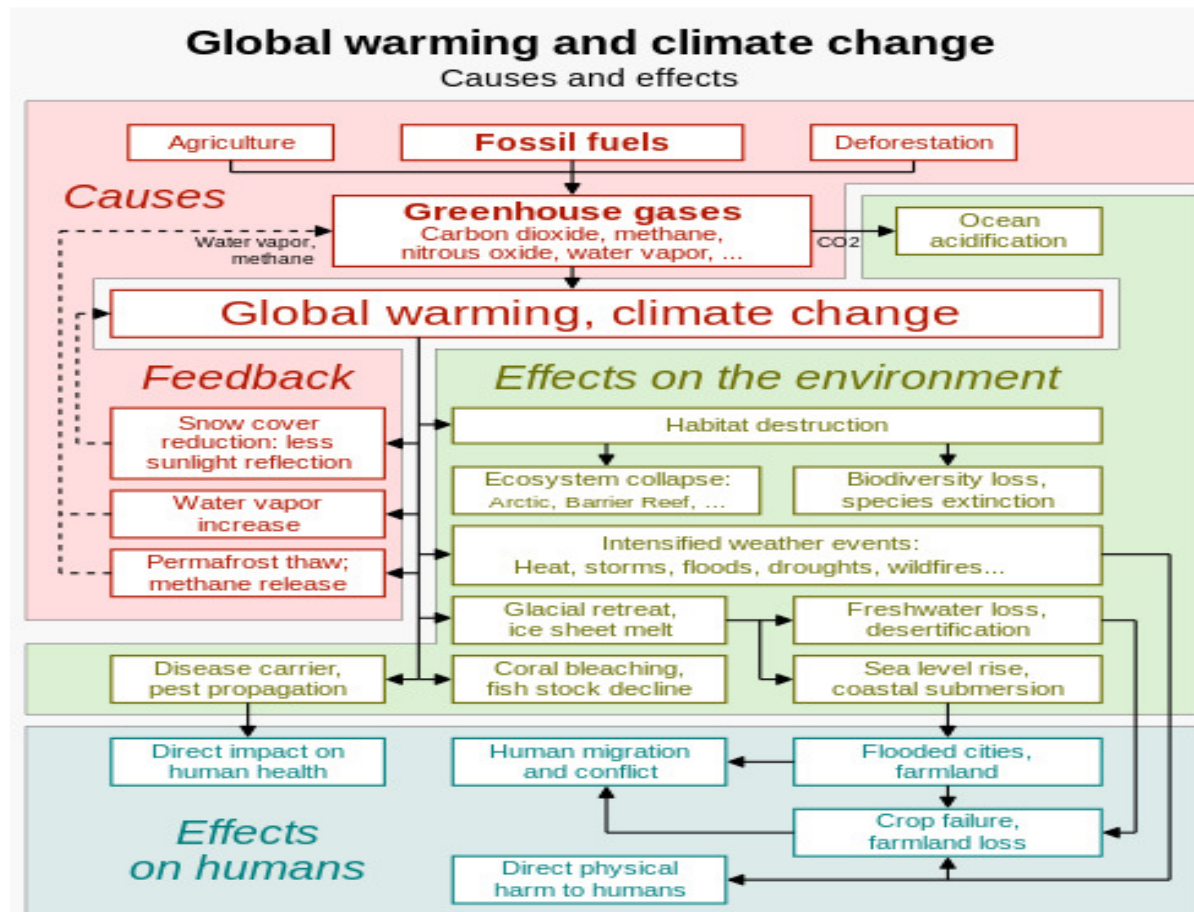
- A policy which incorporates the climate change was introduced in 2019 to address the country's efforts to build a low carbon nation resilient to the impacts of a warming planet.
 - It has the following objectives:
 1. Greening economic transformation
 2. Enhancing functional natural ecosystems and managing biosafety
 3. Strengthening meteorological and early warning services
 4. Promote climate change adaptation, mitigation and response
 5. Improve environmental well-being for Rwandans
 6. Strengthen environment and climate change governance
 7. Promoting green foreign and domestic direct investment and other capital inflows. (Ministry of Environment: Rwanda introduces new Environment and Climate Change Policy, Ministry of Environment, Government of Rwanda, 2019).
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8.2.4 Summary of causes and effects



(https://climate.ec.europa.eu/climate-change/causes-climate-change_en)

8.2.4 Summary of causes and effects cont'd



([https://en.wikipedia.org/wiki/File:20200118 Global warming and climate change - vertical block diagram - causes effects feedback.svg](https://en.wikipedia.org/wiki/File:20200118_Global_warming_and_climate_change_-_vertical_block_diagram_-_causes_effects_feedback.svg))

8.3 Water pollution

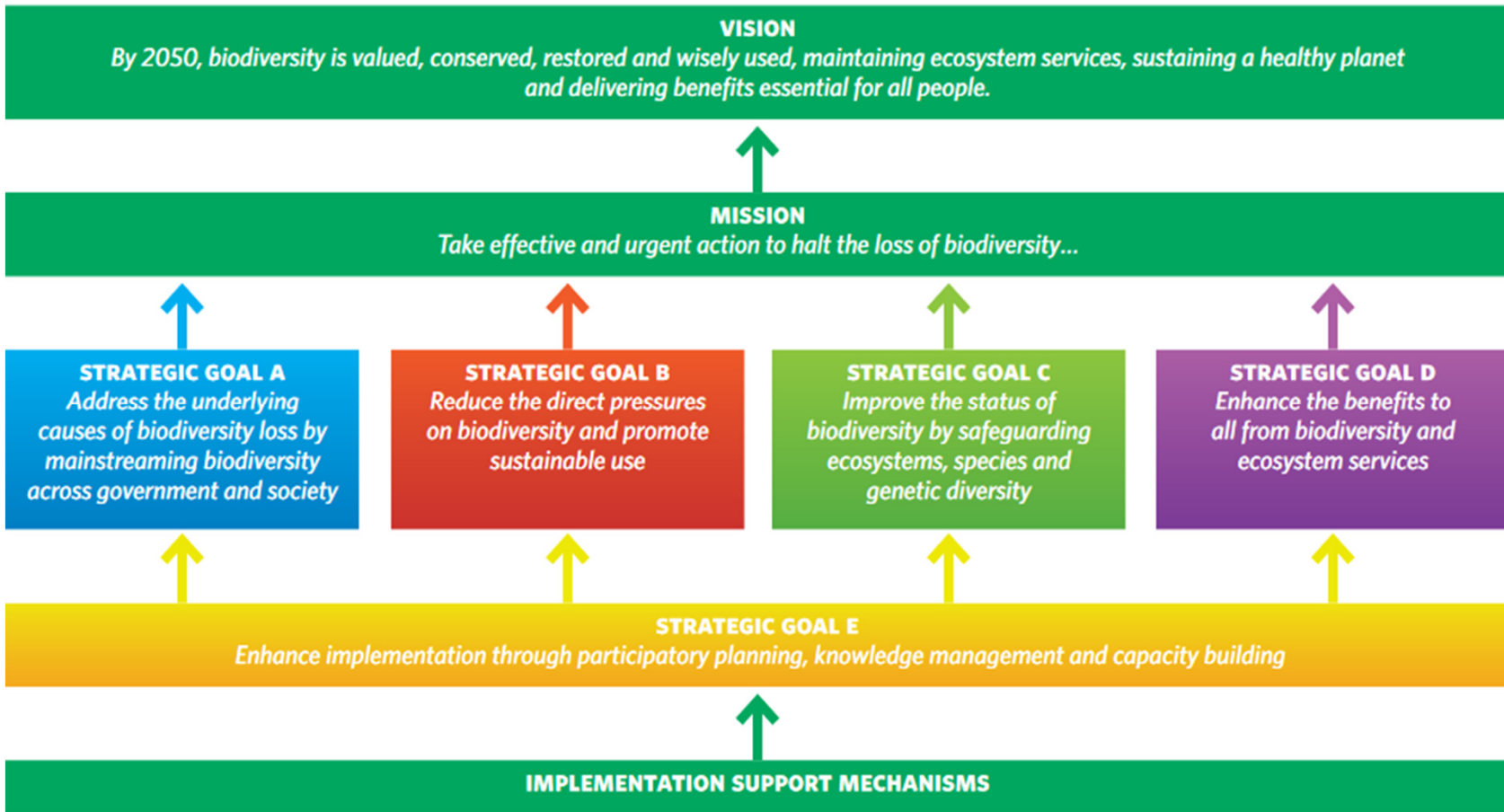
- Water pollution occurs when substances interfere with the beneficial use of water or the natural functioning of ecosystems.
 - These substances include chemicals, trash, microorganisms, and more with much contribution coming from human activities .
 - Water pollutants coming from point sources which are specific outlets like pipes or channels from industrial facilities or city sewerage systems can be controlled easily because the contaminated water is collected and treated.
 - Water pollutants coming from dispersed or nonpoint sources are broad, in unconfined areas where pollutants enter water bodies like agricultural runoff and urban stormwater. (<https://www.britannica.com/topic/Environmental-Protection-Agency>)
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8.3 Water pollution cont'd

- The impacts on human health are diseases, especially in areas lacking clean drinking water.
 - The impacts on aquatic wildlife are contamination or harming aquatic species like fishes, amphibians, and other aquatic organisms.
 - The impacts on ecosystem disruption are to affect the entire ecosystem due to altered water quality.
 - The impacts on the climate change are to affect the water availability while altering the ecosystem in general.
 - The perspective of aspect and impact on water sources their treatment has consequences on biodiversity, this can originate from natural transformation of the environment or artificial transformation of the environment.
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8.3 Water pollution and loss of biodiversity

- Biodiversity has some benefits for the water sector such as well-functioning ecosystems, including forests, grasslands, wetlands, and rivers, that provide essential services that influence water availability and quality.
 - Ecosystems help regulate water flow, filter pollutants, and maintain water quality, like wetlands act as natural filters to remove excess nutrients and pollutants from water.
 - During the summit for Water and Biodiversity, Summary of the findings of the Fourth Edition of the Global Biodiversity Outlook as they, relate to water; a strategic plan was presented with five principal strategic goals as it is illustrated in the following picture (chart).
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(Water and Biodiversity: Summary of the findings of the Fourth Edition of the Global Biodiversity Outlook as they relate to water, Secretariat of the Convention on Biological Diversity, 2015)

8.3 Water pollution and loss of Biodiversity

- Biodiversity is under threat due to human activities which result in pollution, habitat destruction, and climate change that end in species loss.
 - Water pollution contributes to loss of biodiversity affecting aquatic ecosystems, leading to a decline in species diversity. When pollutants enter water bodies, they can harm various organisms and disrupt food chains.
 - **Dead Zones:** Excessive pollution create dead zones in water with low oxygen levels for marine life harming biodiversity and impact overall ecosystem health.
 - **Sensitive Flora and Fauna:** Sensitivity of aquatic plants and animals due to toxic substances harm crucial plant species, affecting the entire ecosystem.
 - **Algae Blooms and Diseases:** Water pollution can lead to toxic algae blooms and the spread of waterborne diseases.
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8.4 Environmental Impact Assessment Report (EIAR)

- The EIA is an instrument or a tool that helps to assess the impact between the development and the environment (how human being develops in the surroundings locally, globally and even beyond due to many factors while environment is suffering from the development).
 - EIAR is a report prepared to provide the information related to the assessment of outputs of the projects, it is prepared by the developer of projects to ensure the EIA process is taken into consideration during the operation of a new project.
 - It ensures that the environmental consequences of the project are clearly stated before deciding to grant planning permission. Environmental effects caused by a project are systematically evaluated and presented in an EIAR.
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8.4.1 The content of EIAR

The content of an EIAR typically includes the following elements:

- Detailed description of the proposed project
- Analysis of potential environmental impacts, covering areas such as air quality, water quality, land use, noise pollution, and biodiversity
- Separate analysis for the proposal and each alternative
- Evaluation of direct, indirect, and cumulative impacts
- Description of the nature, severity, and duration of estimated impacts.

To this end a comprehensive report is prepared, summarizing the findings from the previous stages. It includes details on the project, stressing on the impacts, and proposed mitigation measures.

Thank you for your good attention
Q&A

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