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Theme: Interrelationships

S4 New Curriculum Biology-Chapter 9– Human beings and the natural environment.

Sustainable development

Sustainable development refers to meeting present needs without compromising the ability of future generations to meet their own needs. It balances economic growth, environmental protection, and social well-being. Here are its key principles:

Importance of Sustainable Development

- **Protects Natural Resources** – Prevents overuse of water, forests, and minerals to ensure long-term availability.
- **Reduces Climate Change Effects** – Encourages eco-friendly practices to lower carbon emissions.
- **Improves Quality of Life** – Enhances living conditions, reduces poverty, and promotes economic fairness.
- **Supports Future Generations** – Ensures future societies inherit a stable and livable world.

Ways to Promote Sustainability

- Using renewable energy sources (solar, wind, hydro)
- Reducing waste through recycling and conservation
- Encouraging sustainable agriculture and responsible consumption
- Implementing policies for clean technology and green infrastructure

Natural resources found in Uganda

Natural resources are materials and substances that occur naturally in the environment and are essential for life and economic activities. Natural resources in Uganda are classified as renewable and nonrenewable natural resources.

Nonrenewable natural resources cannot be replaced; in Uganda they include minerals (copper, limestone, cobalt and gold) and fossil fuel such as petroleum

Renewable natural resources are replaceable when used up. In Uganda nonrenewable natural resources include forest, soil, water and wildlife.

Pollution

Pollution refers to the contamination of the environment by harmful substances, negatively affecting air, water, soil, and living organisms. Here are its main types and impacts:

Types of Pollution

- **Air Pollution** – Emissions from industries, vehicles, and burning fossil fuels release harmful gases like carbon dioxide and sulfur dioxide, contributing to climate change and respiratory diseases.
- **Water Pollution** – Waste from factories, agriculture, and households pollutes rivers, lakes, and oceans, harming aquatic life and reducing drinking water quality.
- **Soil Pollution** – Chemicals, pesticides, and waste disposal contaminate land, affecting food production and ecosystems.
- **Noise Pollution** – Excessive noise from traffic, industries, and urban activities disrupts wildlife and human well-being.
- **Plastic Pollution** – Non-biodegradable plastic waste clogs water bodies, landscapes, and harms animals that mistakenly consume it.

Effects of Pollution

- Health problems such as respiratory diseases, heart conditions, and infections.
- Loss of biodiversity due to habitat destruction and poisoning of organisms.
- Climate change acceleration, leading to extreme weather patterns.
- Water scarcity due to contamination of freshwater sources.

Ways to Reduce Pollution

- Transition to renewable energy sources like wind and solar power.
- Reduce waste through recycling and sustainable consumption.
- Implement stricter environmental regulations and promote eco-friendly practices.
- Encourage tree planting and conservation efforts.

Human activities that harm or damage the environment include:

Human activities can negatively impact the environment in various ways. Here are some major contributors to environmental damage:

- **Deforestation** – Cutting down forests for agriculture, urbanization, and logging leads to habitat loss, reduces biodiversity, and increases carbon dioxide levels.
- **Pollution** – Air, water, and soil pollution from industrial waste, chemicals, plastics, and emissions harm ecosystems and human health.
- **Overfishing & Habitat Destruction** – Unsustainable fishing practices deplete marine populations and damage coral reefs and other aquatic habitats.
- **Climate Change Contributions** – Burning fossil fuels for energy and transportation releases greenhouse gases, causing global warming and extreme weather patterns.
- **Excessive Waste & Landfills** – Non-biodegradable waste, such as plastics, accumulates in landfills and oceans, disrupting ecosystems.

- **Water Overuse & Contamination** – Over-extraction of water resources and pollution from agricultural runoff, sewage, and oil spills degrade water quality.
- **Soil Degradation** – Intensive farming, overgrazing, and excessive pesticide use weaken soil health, leading to desertification and reduced crop yields.
- **Loss of Biodiversity** – Urban expansion, habitat destruction, and poaching threaten plant and animal species, pushing some toward extinction.

Human activities that improve environment include:

Humans can take various positive actions to protect and restore the environment. Here are some key activities that improve ecological health:

Conservation Efforts

- **Reforestation & Afforestation** – Planting trees helps absorb carbon dioxide, improve air quality, and restore wildlife habitats.
- **Wildlife Protection** – Establishing national parks and nature reserves safeguards endangered species.
- **Wetland Restoration** – Preserving wetlands enhances biodiversity and improves water filtration.

Sustainable Practices

- **Renewable Energy Adoption** – Using solar, wind, and hydroelectric power reduces reliance on fossil fuels.
- **Eco-friendly Farming** – Organic farming, crop rotation, and sustainable irrigation minimize environmental damage.
- **Water Conservation** – Efficient water use, such as rainwater harvesting and wastewater treatment, protects freshwater sources.

Pollution Reduction

- **Waste Management & Recycling** – Reducing, reusing, and recycling materials lower pollution and landfill waste.
- **Clean Transportation** – Electric vehicles, bicycles, and public transport decrease carbon emissions.
- **Plastic Reduction** – Cutting down single-use plastics helps prevent ocean and land contamination.

Community & Policy Initiatives

- **Environmental Education** – Raising awareness fosters responsible behavior toward nature.
- **Sustainable Urban Planning** – Green spaces, energy-efficient buildings, and pollution control improve urban environments.
- **Strong Environmental Laws** – Regulations on emissions, waste, and conservation promote long-term sustainability.

Conservation is the responsible management and protection of natural resources, ecosystems, and biodiversity to ensure their sustainability for future generations. It focuses on preserving environmental health while balancing human needs.

Types of Conservation

- **Wildlife Conservation** – Protecting endangered species and maintaining healthy ecosystems through habitat restoration, anti-poaching laws, and breeding programs.
- **Forest Conservation** – Preventing deforestation, promoting reforestation, and sustainably managing forests for timber, oxygen production, and biodiversity support.
- **Water Conservation** – Reducing water wastage, managing freshwater sources efficiently, and preventing pollution in lakes, rivers, and oceans.
- **Soil & Land Conservation** – Preventing land degradation through sustainable farming, erosion control, and responsible land management.
- **Energy Conservation** – Encouraging the use of renewable energy sources, improving energy efficiency, and reducing dependence on fossil fuels.

Importance of Conservation

- Maintains biodiversity and ecological balance.
- Reduces environmental degradation and climate change effects.
- Supports sustainable development and food security.
- Protects natural beauty and resources for future generations.

Garbage management

Garbage management is the process of handling waste responsibly to minimize environmental impact and promote sustainability. Here are some key aspects of proper waste management:

Methods of Garbage Management

- **Waste Reduction** – Reducing the amount of waste generated through mindful consumption and sustainable practices.
- **Recycling & Reuse** – Processing materials like plastic, glass, paper, and metal to be used again instead of being discarded.
- **Composting** – Turning organic waste (food scraps, leaves, and biodegradable materials) into nutrient-rich compost for gardening and agriculture.
- **Proper Disposal** – Using sanitary landfills and incineration methods for non-recyclable waste while ensuring minimal environmental harm.
- **Waste Segregation** – Separating waste into categories such as organic, recyclable, hazardous, and electronic waste for better disposal and processing.
- **Biogas Generation** – Converting organic waste into energy through anaerobic digestion, producing biogas as a renewable energy source.

Importance of Effective Waste Management

- Reduces pollution and environmental degradation.
- Helps conserve natural resources through recycling and reuse.
- Improves public health by preventing the spread of diseases.
- Supports sustainable cities and communities.

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