UNIT THREE

NATURAL RESOURCE BASE OF ETHIOPIA

Introduction to the Natural Resource Base of Ethiopia

This unit covers the natural resources of Ethiopia, focusing on soils, water, natural vegetation, and wildlife. These resources are essential for economic development, food security, and other necessities in Ethiopia.

3.1 Meaning of Natural Resources

Key Terms:

- **Renewable Resources:** Resources that can be replenished naturally, such as plants, animals, soil, water, and solar energy.
- **Non-Renewable Resources:** Resources that cannot be regenerated by nature, such as minerals, coal, crude oil, and natural gas.

Explanation:
Natural resources are assets found in nature used for economic production or consumption. In Ethiopia, these resources are under pressure from factors like population growth, agricultural expansion, urbanization, climate change, and pollution. This has led to serious degradation of land, water, forests, rangelands, and wildlife.

3.2 Drainage Systems of Ethiopia

Definition:
Drainage systems refer to the flow direction and destination of rivers. Ethiopia's drainage systems result from structural events in the Cenozoic era.

Major Drainage Systems:

1. **Western (Mediterranean Sea) Drainage System:**
    - **Main Rivers:** Tekezze, Abbay (Blue Nile), and Baro-Akobo.
    - **Characteristics:** Largest in area and water volume, contributes 60% of Ethiopia's annual water discharge. These rivers flow into the Nile and ultimately reach the Mediterranean Sea.
2. **Southeastern (Indian Ocean) Drainage System:**
    - **Main Rivers:** Genalle and Wabe Shebelle.
    - **Characteristics:** Second largest, contributes 32% of annual water flow. Wabe Shebelle does not reach the Indian Ocean, but Genalle does.
3. **Inland (Rift Valley) Drainage System:**
    - **Main Rivers:** Awash and Omo-Gibe.
    - **Characteristics:** Smallest in area and water volume, with rivers flowing into lakes or terminating within Ethiopia.

3.3 Water Resources of Ethiopia

Major Rivers: Ethiopia is rich in rivers, earning it the nickname "Water Tower of Northeastern Africa." The rivers are numerous and energetic, flowing from highlands to lowlands and seas. Some major rivers include Wabe Shebelle, Abbay, Genalle, Awash, and Tekezze.

Characteristics of Ethiopian Rivers:

- Seasonal fluctuations in water volume.
- Steep profiles, with rivers flowing from high altitudes to lowlands.
- Presence of rapids and waterfalls.
- Rivers run through steep-sided valleys and gorges.
- Some rivers serve as international and domestic boundaries.

Lakes of Ethiopia: Ethiopia has many lakes, especially in the Rift Valley and highland areas. These lakes are formed by tectonic activities and volcanic eruptions, with major ones like Lake Tana, Lake Abbaya, and Lake Shalla.

Significance of Ethiopian Lakes and Rivers:

1. **Hydroelectric Power (H.E.P.) Generation:** Rivers are the primary sources of H.E.P. in Ethiopia, with projects on rivers like Gibe, Awash, Fincha, and Tekezze.
2. **Fishery:** Lakes and rivers provide fish, essential for local diets.
3. **Irrigation:** Rivers are crucial for irrigation, especially the Awash River.
4. **Navigation:** River Baro and some lakes are used for transportation.
5. **Tourism and Recreation:** Lakes and rivers offer scenic beauty, attracting tourists and providing recreation opportunities.

3.4 Major Soil Types of Ethiopia

Key Terms:

- **Conservation**: The protection and preservation of natural resources.
- **Parent Material**: The original rock or organic material from which soil is formed.
- **Humus**: The organic component of soil, created by the decomposition of plant and animal material.
- **Soil**: The top layer of the Earth's surface in which plants grow, consisting of a mixture of organic substances, clay, and rock particles.

3.4.1 Formation of Soils in Ethiopia

Soil is a vital natural resource consisting of small particles of minerals and organic matter. It supports plant and animal life and plays a crucial role in agriculture. The formation of soils in Ethiopia involves several factors:

1. **Parent Material**: This refers to the rock or organic material from which soil is derived. Weathering and decomposition of these materials break them down into soil particles.
2. **Climatic Conditions**: Climate influences the rate and nature of soil formation. For example, high temperatures can speed up weathering processes, while moisture levels affect soil structure and nutrient availability.

3. **Vegetation Cover**: Plants contribute organic matter (humus) to the soil as they decompose. Vegetation also supports soil organisms that help in soil formation.
4. **Topography**: The physical landscape impacts soil depth and quality. Steep slopes often lead to shallow soils due to erosion, while flatter areas may have deeper, more fertile soils.

In Ethiopia, soils vary widely based on these factors:

- **Plateaus**: Areas with volcanic rocks, such as in the North, Northwest, Southwest, Central, and Southeast Ethiopia, have red and black basaltic soils. Red basaltic soils are fertile, while black basaltic soils, with high clay content, are less suitable for farming.
- **Hararghe Plateaus and Borena Lowlands**: Soils here are derived from hard crystalline rocks, resulting in thin, rocky, and acidic soils.
- **Afar Region**: Recent volcanic deposits and dried-out lake beds create shallow, saline-dominated soils that are less fertile.
- **Southeastern Lowlands**: Sedimentary rocks result in soils rich in phosphorus and potash but low in nitrogen and humus.
- **Lower Course of Major Rivers**: Alluvial soils, formed from transported materials, are fertile and well-suited for agriculture.

Effective soil management is crucial for sustaining agriculture and supporting livelihoods in Ethiopia.

3.4.2 Types of Soil in Ethiopia

Ethiopian soils are classified into various types based on their formation, texture, and suitability for agriculture. The seven major types are:

1. **Nithosols (Red Basaltic Soils)**:
    - **Coverage**: About 12% of Ethiopia.
    - **Characteristics**: Associated with high rainfall and former forested areas. Found in Western Highlands, Southern Highlands, and Central and Eastern Highlands. Rich in iron and aluminum but low in soluble minerals. Ideal for agriculture, especially coffee, inset, and cereals.
2. **Vertisols (Black Basaltic Soils)**:
    - **Coverage**: About 10% of Ethiopia.
    - **Characteristics**: High clay content makes them sticky and difficult to manage. Good nutrient content but poorly drained. Found in Arsi, Bale, and Central Hararghe. Limited agricultural use due to drainage issues.
3. **Cambisols**:
    - **Characteristics**: Young, shallow soils from recent lava deposits. Found on rugged terrain in Shewa Plateau and Chercher Highlands. Not highly developed, but can support some agricultural activities.
4. **Regosols**:
    - **Characteristics**: Shallow, coarse-textured, and young soils with low agricultural value. Found in Danakil and Ogaden plains. Limited suitability for farming.
5. **Xerosols**:
    - **Characteristics**: Young, shallow soils in arid and semi-arid regions. High salt content and low humus. Found in Northeastern escarpment, Northwestern, and Southeastern Lowlands. Agriculture is limited without irrigation.

6. **Luvisols**:
    - **Characteristics**: Well-developed in regions with distinct wet and dry seasons. Rich in nutrients and suitable for agriculture. Found around Lake Tana, Northern Central Highlands, and Southern Lowlands.
7. **Lithosols**:
    - **Characteristics**: Poorly developed soils on steep slopes with low precipitation. Found in Northeastern and Chercher Highlands. Not very suitable for agriculture due to erosion and low nutrient content.
8. **Fluvisols**:
    - **Characteristics**: Formed from river deposits. Highly fertile and cover about 10% of Ethiopia. Found in lower regions of the Omo, Awash, Abbay, and Baro-Akobo Rivers. Ideal for agriculture due to rich nutrients and water availability.

3.5 Major Mineral Resources and Their Distribution in Ethiopia

Key Terms:

- **Coal**: A fossil fuel used for energy production.
- **Non-metallic Minerals**: Minerals that do not contain metal and are used in various industrial processes.
- **Gold**: A valuable metal used in jewelry, electronics, and currency.
- **Petroleum**: A liquid fossil fuel used for energy and as a raw material in chemical industries.
- **Metallic Minerals**: Minerals that contain metal and are used in manufacturing and construction.
- **Platinum**: A precious metal used in electronics, jewelry, and industrial applications.

3.5.1 Overview of Mineral Resources in Ethiopia

Ethiopia has a rich variety of mineral resources, including both metallic and non-metallic minerals. While some minerals are produced and exported, many remain untapped. Here is an overview of the major mineral resources and their distribution:

1. **Gold**:
    - **Description**: Gold has been mined in Ethiopia since ancient times. It is found in volcanic veins and alluvial deposits.
    - **Major Locations**: Adola, Bule Hora, Arero, Moyale, Akobo, Lega Dembi, and Tigray regions.
2. **Platinum**:
    - **Description**: Used in electronics and jewelry, platinum is a key resource.
    - **Major Locations**: Identified in the western parts of Ethiopia, including northeast Yubdo, north of Gimbi, and the Akobo area of Gambella.
3. **Tantalum**:
    - **Description**: Used in electronic equipment, including mobile phones.
    - **Major Locations**: Kenticha, southeast of Shakiso in Adola, with additional deposits found in the region.

4. **Non-metallic Minerals**:
    - **Potash and Salt**: Found in the Danakil depression (Dallol) of the Northern Rift Valley. Rich deposits of both minerals are present.
    - **Soda Ash**: Reserves found in rift valley lakes like Abijata and Shalla, with significant potential for production.
    - **Limestone**: Used in construction and cement production. Reserves are located in Tigray, Shewa, and Harerghe.
    - **Clay**: Found in many regions, used for pottery and brick making.
    - **Silica**: Essential for glass industries. Reserves located in Harer, Shewa, Gondar, Gojjam, Sidamo, Arsi, Tigray, and Wollega.
    - **Crude Oil and Natural Gas**: Believed to be in the Ogaden basin.
    - **Coal**: Lignite deposits are found in Shewa (Debre Brihan-Dessie road, Sululta, and near Mojo), Sidama, and Wollega.

3.6 Biotic Resources of Ethiopia

Learning Objectives: By the end of this section, you should be able to:

1. Describe the major types of natural vegetation in Ethiopia.
2. Explain variations in the distribution of wildlife in Ethiopia.

Key Terms:

- **Afroalpine**: High mountain vegetation found at very high altitudes.
- **Game animals**: Wild animals that are hunted for sport or food.
- **Biotic resource**: Living organisms within an ecosystem.
- **Endemic animals**: Species that are native to and found only in a specific region.
- **Savanna woodlands**: Grasslands with scattered trees and shrubs.
- **Xerophytes**: Plants adapted to survive in dry conditions.

What are Biotic Resources?

Biotic resources are living organisms that make up an ecosystem. They are classified into three main categories:

1. **Producers**: Green plants that produce food through photosynthesis.
2. **Consumers**: Animals that consume plants or other animals for energy.
3. **Decomposers**: Organisms like bacteria and fungi that break down dead organisms and recycle nutrients.

3.6.1 Major Types of Natural Vegetation in Ethiopia

Natural vegetation refers to plants that grow naturally in a region. The types of natural vegetation in Ethiopia are influenced by altitude, climate, soil type, and drainage. Here are the main types of vegetation:

A. Afroalpine and Sub-Afroalpine Vegetation

- **Afroalpine Vegetation**: Found above 3300 meters above sea level (m.a.m.s.l.) in the highlands of Semein and Bale Mountains. This vegetation is similar to European Alpine vegetation and includes tussock grasslands, serules, mosses, and lichens.

- **Sub-Afroalpine Vegetation**: Located between 3000 and 3300 m.a.m.s.l. It features woodland scrubs with dominant species like Gibra (Lobelia rhynchopetalum) and Asta (Erica arborea).

B. Forests

Forests in Ethiopia vary with altitude and rainfall:

- **Highland Forests**: Grow between 1500 and 3300 m.a.m.s.l. They include:
  - **Kerkha** (Arundinarial) at 2800–3000 m.a.m.s.l.
  - **Tid** (Juniperus procera) at 2200–2800 m.a.m.s.l.
  - **Zigba** (Podocarpus) at 1800–2200 m.a.m.s.l.
  - **Woira** (Olea africana) and **Kosso** (Hagenia abyssinica) at 1500–1800 m.a.m.s.l.
- **Lowland Forests**: Found below 1500 m.a.m.s.l., these forests grow along riverbanks and are known as gallery or riverine forests. Predominant trees include Sholla and Warka.

C. Savanna Woodland

Savanna woodlands are characterized by grasslands mixed with scattered trees and shrubs. They are found in both highland and lowland areas with annual rainfall between 200 and 1400 mm. Types include:

- **Juniperious Woodlands**: Mountain grasslands with Tid trees.
- **Acacia Woodlands**: Grasslands with Ghirar trees.
- **Mixed Deciduous Woodlands**: Grasslands with trees like Sholla and Warka.

Savanna grasslands are prominent at lower elevations and drier climates. They form attractive park-like areas in regions with more than 1000 mm of rainfall.

D. Semi-desert and Desert Vegetation

In arid regions with less than 600 mm of annual rainfall, xerophytic plants dominate. These include short acacia, thorn bushes, succulent plants, and rough grasses. This vegetation is found in the Afar lowlands and the Ogaden lowlands.

3.6.2 Main Kinds of Wildlife in Ethiopia

Ethiopia's diverse environments support a wide variety of wildlife. The country is home to:

- **277 species of mammals**
- **862 species of birds**
- **201 reptile species**
- **63 amphibian species**

Among these, 7 mammal species and 25 bird species are endemic to Ethiopia, meaning they are found nowhere else.

Wildlife can be categorized into:

1. **Common Wild Animals**: Found in various regions, e.g., hyenas, jackals.
2. **Game Animals**: Includes herbivores like giraffes and zebras, and carnivores like lions and cheetahs.
3. **Arboreals (Tree Animals)**: Such as the colobus monkey and baboons found in rainforests.
4. **Aquatic Animals**: Like hippopotamuses, fish, and crocodiles in lakes and rivers.
5. **Birds**: Includes both endemic and migratory species like fish eagles and flamingoes.
6. **Endemic Animals**: Unique to Ethiopia and at risk of extinction, such as the Walia Ibex, Mountain Nyala, and Gelada baboon.

Unit Summary

Ethiopia's varied physical environment results in diverse natural vegetation and wildlife. The types of vegetation are closely linked to altitude and rainfall, and the country's wildlife includes a mix of common, game, arboreal, aquatic, and endemic species. This rich biodiversity highlights the importance of preserving these natural resources.