

Topic: **Ecological Transfer**
Subject: **Biology**
Level: **Matthayom Suksa 6**
Time: **6 Hrs.**
Teacher: **Ms. Ferlie Agraviador**

Objectives

By the end of this lesson, students will be able to:

1. Describe a food chain.
2. Create a simple food chain.
3. Classify organisms as herbivores, carnivores, and omnivores.
4. Describe a food web.
5. Create a food web.
6. Identify organisms according to their trophic levels.
7. Construct an energy pyramid and label each trophic level.
8. Illustrate the transfer of biomass and energy at each trophic level in the food pyramid.
9. Differentiate between vegetable eaters and meat eaters.
10. Describe the transfer of energy through the trophic levels.

1. Elicit

- **Activity:** Start with a discussion on what students already know about food chains and food webs. Ask questions like:
 - What do you think happens to plants and animals in nature?
 - Can anyone name some animals and what they eat?
- **Materials:** Chart paper and markers for students to write down their ideas.

2. Engage

- **Activity:** Show a short video clip (3-5 minutes) about a specific ecosystem (e.g., a forest or ocean) highlighting the interactions between plants and animals.
- **Discussion:** After the video, ask students:
 - How do plants and animals depend on each other?
 - What did you notice about the different organisms?

3. Explore

- **Activity:** Divide students into small groups and provide them with pictures of various animals and plants. Each group will categorize these organisms into herbivores, carnivores, and omnivores.
- **Materials:** Pictures of various organisms, sticky notes, and a large poster board for each group.

4. Explain

- **Presentation:** Introduce the concepts of food chains, food webs, and trophic levels using a PowerPoint presentation. Explain the definitions and importance of each concept.
- **Discussion:** Clarify the difference between herbivores, carnivores, and omnivores, and introduce the energy pyramid.

5. Elaborate

- **Activity:** Have students create a simple food chain using the organisms they categorized earlier. Then, challenge them to create a food web by connecting multiple food chains together.
- **Materials:** String, scissors, and poster boards for visual representation.

6. Evaluate

- **Assessment:** Conduct a quiz covering the key concepts:
 - Define food chain and food web.
 - Classify a list of organisms as herbivores, carnivores, or omnivores.
 - Identify and label the trophic levels of a given food chain.
- **Feedback:** Provide immediate feedback on their understanding.

7. Extend

- **Project:** Assign students to create a poster that illustrates an energy pyramid, labeling each trophic level and demonstrating the transfer of biomass and energy. They should include examples of organisms at each level.
- **Localization:** Encourage students to use local flora and fauna in their projects to make connections to their environment.

Content Standard

Students understand the interdependence of organisms in food chains and food webs and recognize the significance of energy transfer in ecosystems.

Performance Standard

Students can construct and analyze food chains and food webs, classify organisms, and illustrate energy transfer through trophic levels.

Learning Competencies

- Describe the roles of producers, consumers, and decomposers in an ecosystem.
- Illustrate food chains, food webs, and energy pyramids.
- Identify and classify organisms based on their feeding habits and trophic levels.

Topic: Understanding the Relationship Between Population Growth and Carrying Capacity

Subject: Biology

Level: Matthayom Suksa 6

Time: 4 Hrs.

Teacher: Ms. Ferlie Agraviador

Objectives:

- **Content Standard:** Learners demonstrate understanding of the relationship between population growth and carrying capacity in various ecosystems.
 - **Performance Standard:** Learners can analyze real-world scenarios to determine how population growth affects resources and sustainability.
 - **Learning Competencies:**
 - Explain the concept of carrying capacity.
 - Identify factors that influence population growth.
 - Analyze case studies to relate population growth with carrying capacity.
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1. Elicit

- **Activity:** Start with a brainstorming session. Ask students to share their thoughts on "What is population?" and "Why do we need to consider the environment when talking about population growth?"
- **Contextualization:** Use local examples, such as the population of their place, to make it relatable.

2. Engage

- **Activity:** Show a short video clip about population growth in Thailand and its impact on local resources. Follow up with questions to spark discussion.
 - **Localization:** Discuss how population growth in their area affects local resources, such as water supply and food availability.
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3. Explore

- **Activity:** Divide students into small groups and provide them with different case studies of regions in Thailand facing population growth challenges. Have them investigate the effects of population growth on carrying capacity in these areas.
- **Materials:** Case study handouts, charts, and graphs.

4. Explain

- **Activity:** Groups present their findings to the class. Facilitate a discussion to clarify concepts of carrying capacity and population growth.
- **Key Concepts:** Define carrying capacity, factors affecting it (e.g., food availability, space, water), and how human activities can influence these factors.

5. Elaborate

- **Activity:** Conduct a role-play where students simulate a town meeting discussing solutions to manage population growth and its effects on local resources.
- **Contextualization:** Emphasize local laws or initiatives that address population and resource management.

6. Evaluate

- **Activity:** Administer a quiz with multiple-choice and short answer questions on the relationship between population growth and carrying capacity.
- **Performance Assessment:** Evaluate group presentations based on clarity, depth of analysis, and understanding of concepts.

7. Extend

- **Activity:** Assign a project where students create a proposal for a local initiative aimed at managing population growth sustainably. They can present this to the class.
- **Localization:** Encourage students to consider local culture, resources, and needs in their proposals.

Topic: **Biochemical Cycle**

Subject: **Biology**

Level: **Matthayom Suksa 6**

Time: **6 Hrs.**

Teacher: **Ms. Ferlie Agraviador**

Objectives:

1. Identify the roles of organisms involved in the water cycle, oxygen-carbon cycle, and nitrogen cycle.
2. Analyze the roles of organisms in the cycling of materials.

Components:

- **Content Standard:**
Students demonstrate understanding of the interdependence of organisms and their roles in the cycles of matter in the environment.
- **Performance Standard:**
Students can create a visual representation (e.g., poster or infographic) that illustrates the roles of organisms in the water cycle, oxygen-carbon cycle, and nitrogen cycle.
- **Learning Competencies:**
 - Describe the processes involved in the water cycle.
 - Explain the roles of producers, consumers, and decomposers in the oxygen-carbon cycle.
 - Analyze the significance of nitrogen-fixing bacteria in the nitrogen cycle.

1. Elicit

- **Activity:** Begin with a class discussion. Ask students questions about their observations related to water, air, and soil. For example: "What do you think happens to rainwater after it falls?" or "How do plants and animals depend on each other?"
- **Goal:** Activate prior knowledge and gauge students' understanding of cycles in nature.

2. Engage

- **Activity:** Show a short video clip illustrating the water cycle, oxygen-carbon cycle, and nitrogen cycle. Follow this with a question: "What role do you think living organisms play in these cycles?"
- **Goal:** Capture students' interest and encourage them to think critically about the topic.

3. Explore

- **Activity:** Divide students into small groups and provide them with different materials (e.g., diagrams, articles, and videos) about each cycle. Each group will focus on one cycle and explore the roles of organisms in that cycle.
- **Goal:** Allow students to investigate and discover information collaboratively.

4. Explain

- **Activity:** Each group presents their findings to the class. Provide a guided discussion to clarify concepts and ensure understanding of terms like producers, consumers, and decomposers.
- **Goal:** Solidify knowledge through peer teaching and direct instruction.

5. Elaborate

- **Activity:** Engage students in a hands-on activity where they create a simple model or diagram of one of the cycles using local materials (e.g., leaves for plants, small stones for soil). Encourage them to label the roles of organisms in their models.
- **Goal:** Deepen understanding by applying knowledge to create a tangible representation.

6. Evaluate

- **Activity:** Conduct a quiz or a reflective journal entry where students answer questions about the roles of organisms in the cycles discussed. Use a rubric to assess their group presentations and models.
- **Goal:** Measure students' understanding of the content and their ability to communicate their learning.

7. Extend

- **Activity:** Assign a project where students research a local ecosystem and identify the roles of organisms in the cycles within that ecosystem. They can present their findings in a format of their choice (e.g., poster, report, digital presentation).
- **Goal:** Encourage students to connect classroom learning to real-world applications and promote further inquiry.

Contextualization and Localization

- Incorporate local examples, such as the roles of specific plants and animals in the environment (e.g., rice paddies, mangroves).
- Encourage students to share their personal experiences or observations related to the cycles in their communities.

Assessment

- Formative assessment through group discussions and presentations.
- Summative assessment via quiz and project presentation.

Topic: **Population Growth and Biodiversity**

Subject: **Biology**

Level: **Matthayom Suksa 6**

Time: **6 Hrs.**

Teacher: **Ms. Ferlie Agraviador**

Activity: Begin with a short discussion. Ask students:

- "What do you understand by the term 'population growth'?"
- "Can you think of examples in our community that show changes in population?"

Contextualization: Connect to local current events, such as migration patterns or local population data.

2. Engage

Activity: Present a short video showing population growth trends globally and locally.

Discussion: After the video, ask students:

- "What surprised you about the population growth in our area?"
 - "How do you think this growth impacts our resources?"
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3. Explore

Activity: Divide students into small groups and provide them with local population data (e.g, resource availability).

- **Task:** Each group will analyze the data to determine the carrying capacity of their community.
 - **Materials:** Graphs, charts, and tables with local statistics.
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4. Explain

Activity: Groups will present their findings to the class.

Discussion Points:

- Define carrying capacity.
 - Discuss how population growth can exceed carrying capacity.
 - Explain the ecological impacts of exceeding carrying capacity.
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5. Elaborate

Activity: Introduce case studies of local ecosystems affected by population growth (e.g., overfishing in local waters, deforestation).

Task: Groups will create a presentation or infographic that illustrates the relationship between population growth and carrying capacity in their chosen case study.

6. Evaluate

Activity: Conduct a quiz or a reflection paper where students:

- Identify key concepts learned.
- Discuss real-life implications of population growth in their community.

Assessment Criteria: Understanding of concepts, ability to apply knowledge to local contexts, and clarity of expression.

7. Extend

Activity: Encourage students to think of solutions to manage population growth in their community.

Task: Propose community initiatives or awareness campaigns that could help balance population growth with local resources.

Topic: **Population Growth and Carrying Capacity**

Subject: **Biology**

Level: **Matthayom Suksa 6**

Time: 4 Hrs.

Teacher: Ms. Ferlie Agraviador

Objectives

1. **Content Standard:** Students will understand the relationship between population growth and carrying capacity, including factors that affect both.
2. **Performance Standard:** Students will be able to analyze real-life scenarios in the local context to illustrate the relationship between population dynamics and environmental limits.
3. **Learning Competencies:**
 - Define population growth and carrying capacity.
 - Identify factors that influence population growth and carrying capacity.
 - Explain the implications of exceeding carrying capacity in a local context.

1. Elicit

- **Activity:** Begin with a short video clip showing various populations (e.g., humans, animals, plants) in different environments.
- **Questions:**
 - What did you observe about the different populations?
 - Can you think of examples from our local environment where population growth is evident?
- **Purpose:** To activate prior knowledge and gauge students' understanding of population dynamics.

2. Engage

- **Activity:** Conduct a think-pair-share activity where students discuss their thoughts on the effects of population growth in their community.
- **Materials:** Charts showing local population statistics and resources (water, food, land).
- **Purpose:** To make connections to their local context and stimulate interest in the topic.

3. Explore

- **Activity:** Group students to conduct a simple investigation using local data on population growth and resource availability.
- **Materials:** Internet access for research, local government data, worksheets.
- **Purpose:** To allow students to explore the relationship between population growth and carrying capacity through hands-on activities and data analysis.

4. Explain

- **Activity:** Present a short lecture with slides explaining key concepts: population growth, carrying capacity, and factors affecting both.
- **Discussion:** Clarify terms and encourage students to ask questions.
- **Purpose:** To provide structured knowledge and ensure understanding of concepts.

5. Elaborate

- **Activity:** Students create a concept map linking population growth, carrying capacity, and local resources.
- **Task:** Each group presents their concept map to the class, highlighting local examples.
- **Purpose:** To deepen understanding and apply knowledge to their community context.

6. Evaluate

- **Activity:** Conduct a quiz or reflective journaling activity where students answer questions about what they learned.
- **Criteria:** Assess understanding of population dynamics and the implications of exceeding carrying capacity.
- **Purpose:** To measure student understanding and retention of the material.

7. Extend

- **Activity:** Assign a project where students propose a local initiative to manage population growth and resource use effectively (e.g., community garden, awareness campaign).
- **Presentation:** Students present their proposals to the class.
- **Purpose:** To encourage students to think critically and creatively about solutions to real-world problems in their community.

Contextualization and Localization

- **Contextualization:** Use local data, examples, and scenarios to illustrate concepts of population growth and carrying capacity.
- **Localization:** Incorporate local issues such as urbanization, resource management, and environmental sustainability into discussions and activities.

Assessment

- **Formative Assessment:** Observations during group activities and discussions.
- **Summative Assessment:** Performance on the quiz and quality of project proposals.

Materials Needed

- Video clips
- Local population data
- Concept mapping tools (paper, markers, digital tools)
- Access to the internet for research

Reflection

At the end of the lesson, encourage students to reflect on how understanding population dynamics can influence their decisions and actions within their community.

Topic: **Natural resources**

Subject: **Biology**

Level: **Matthayom Suksa 6**

Time: **4 Hrs.**

Teacher: **Ms. Ferlie Agraviador**

Performance Standard

Students will be able to describe and differentiate natural resources, assess human practices regarding these resources, and propose sustainable practices that can be implemented in their community.

Learning Competencies

1. Describe Earth's natural resources.
2. Differentiate renewable from nonrenewable resources.
3. Determine which human practices in using natural resources are sustainable and not sustainable.
4. Suggest ways on how to use natural resources sustainably.

1. Elicit

- **Activity:** Begin the lesson with a question: "What are natural resources?" Allow students to share their prior knowledge and experiences. Use a KWL chart (What I Know, What I Want to Know, What I Learned) to gather their inputs.

2. Engage

- **Activity:** Show a short video or slideshow about the natural resources found in Thailand (e.g., minerals, forests, water, etc.). Afterward, ask students to discuss in pairs what they found interesting or surprising.

3. Explore

- **Activity:** Divide students into small groups and provide them with various materials (articles, pictures, infographics) on renewable and nonrenewable resources. Each group will categorize the resources and prepare a brief presentation.

4. Explain

- **Activity:** Groups present their findings. As a class, discuss the definitions of renewable and nonrenewable resources, using examples from Thailand. Highlight the significance of these resources in the country's economy and environment.

5. Elaborate

- **Activity:** Facilitate a discussion on human practices related to natural resources. Present case studies of sustainable and unsustainable practices in Thailand (e.g., responsible fishing vs. illegal logging). Encourage students to analyze the impact of these practices on the environment and communities.

6. Evaluate

- **Activity:** Conduct a quiz or a reflection activity where students write a short paragraph on what they learned about natural resources, sustainability, and Thailand. Use a rubric to assess their understanding based on the learning competencies.

7. Extend

- **Activity:** Assign a project where students must propose a sustainable plan for their local community regarding the use of natural resources. They can create posters, presentations, or digital content to share their ideas. This can be presented in the next class.
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Contextualization and Localization

- **Contextualization:** Use local examples of natural resources and practices to make the lesson relevant to students' lives. Discuss local issues related to resource management.
- **Localization:** Encourage students to reflect on their own community's natural resources, practices, and challenges, promoting a sense of responsibility and stewardship.

Assessment

- Participation in discussions and group activities
- Quality of presentations and categorization of resources
- Written reflection or quiz results
- Project proposal quality and creativity

Topic: **Narural resources**
Subject: **Biology**
Level: **Matthayom Suksa 6**
Time: **4 Hrs.**
Teacher: **Ms. Ferlie Agraviador**

Performance Standard

Students will be able to create a presentation that highlights the importance of water, identifies different water resources, and proposes actionable steps for Senior High School students to conserve and protect these resources.

Learning Competencies

1. Describe the role of water in daily life and its significance to the environment.
2. Identify and categorize various water resources on Earth (e.g., rivers, lakes, groundwater, oceans).
3. Discuss the responsibilities of Senior High School students in protecting and conserving water resources.

1. Elicit

- **Activity:** Begin with a short interactive discussion. Ask students questions like:
 - "What do you think would happen if we ran out of water?"
 - "Can you name some places where we find water?"
- **Purpose:** To activate prior knowledge and gauge students' understanding of water's importance.

2. Engage

- **Activity:** Show a short video or infographic illustrating the water cycle and the importance of water in daily life.
- **Purpose:** To capture students' interest and motivate them to learn more about water resources.

3. Explore

- **Activity:** In small groups, students will research different types of water resources (surface water, groundwater, saline water, etc.) using tablets or textbooks.
- **Purpose:** To allow students to investigate and discover information collaboratively.

4. Explain

- **Activity:** Each group presents their findings on the types of water resources they researched. Facilitate a class discussion to clarify concepts and ensure understanding.
- **Purpose:** To provide a clear explanation of the types and roles of water resources.

5. Elaborate

- **Activity:** Discuss the role of Senior High School students in water conservation. Students can brainstorm and list actions they can take in their school and community.
- **Purpose:** To deepen understanding of their responsibilities and the impact of individual actions on water conservation.

6. Evaluate

- **Activity:** Conduct a quick quiz or a reflective journal entry where students answer questions about what they learned regarding water resources and their role in conservation.
- **Purpose:** To assess students' understanding of the lesson objectives.

7. Extend

- **Activity:** Assign a project where students create a campaign (posters, social media posts, or presentations) to promote water conservation in their community.
- **Purpose:** To encourage students to apply their knowledge and take action beyond the classroom.

Contextualization and Localization

- **Contextualization:** Relate the importance of water to local issues such as water scarcity in certain regions of Thailand, particularly during dry seasons.
- **Localization:** Encourage students to investigate local water sources, such as rivers or lakes, and discuss how these resources are managed in their community.