Teacher’s Manual of Agro-Biodiversity Conservation

“Harnessing Schools and Community Partnership through Agro-Biodiversity Conservation”

Davao del Norte Provincial Government
Thai Education Foundation
KASAKALIKASAN, National IPM Program
Department of Education
FAO-ICP on IPM for Vegetables

Teacher’s Manual of Agro-Biodiversity Conservation
Prepared and Edited by

Mario Corado, Coordinator, Agro-Biodiversity Conservation and Pesticide Impact Assessment Project
Marilyn U. Balagtas (PhD), Professor, Philippine Normal University
Marut Jatiket, Executive Director, Thai Education Foundation

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Preface

The FAO Regional IPM Programme and the Thai Education Foundation supported the pilot implementation of Schools and Community Agro-Biodiversity Conservation and Pesticides Impact Assessment activities in selected schools and FFS groups in Davao del Norte Philippines. The project activities were implemented in collaboration with the Provincial Government and the DepEd and the PAGRO of Davao del Norte. The Provincial Davao Government and FAO under projects (GCP/RAS/2009/NOR and GCP/RAS/229/SWE) provided funding and technical support for the project from September 2007 to April 2010.

In general the project aimed to build the capacity of local trainers, farmers, teachers, and school children in agro-biodiversity conservation and assessment of the hazards of pesticides. It provided activities for the development of learning materials to support the integration of agro-biodiversity conservation concepts in the basic education curriculum included of the project activities.

An offshoot of the project’s activities is this Teacher's Manual on Agro-Biodiversity Conservation which is a compilation of concepts, learning processes, and session guides to facilitate agro-biodiversity conservation activities.

FAO-ICP on IPM for Vegetables and the Thai Education Foundation hopes that this manual will serve as a useful guide for teachers and agriculture extension workers in integrating environmental issues and concerns in the basic education and farmers’ education programs.

Many people provided support, suggestions, and comments in the preparation of this manual. Sincere thanks are extended to the following:

Jan Willem Ketelaar, CTA of the FAO ICP for providing funding and technical backstopping support to the Agro-BD and PIA activities in Davao del Norte;

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Mario E. Corado
Coordinator
Agro-BD and PIA Project
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Chapter One

Introduction

Biodiversity generally refers to all living things that we find in our environment. It is an important concept among development workers specifically when we talk of ways to conserve it. This section provides an introduction to the basic concepts related to biodiversity, agro-biodiversity, ecological services and biodiversity conservation. It also includes the steps in developing a biodiversity conservation program with farmer groups, communities, and schools.

1. Biodiversity

Biodiversity is the variation of taxonomic life forms within a given ecosystem, biome or for the entire Earth. Biodiversity is often used as a measure of the health of biological systems.

**Biodiversity** or biological diversity, is the sum of all the different species of animals, plants, fungi, and microbial organisms living on Earth and the variety of habitats in which they live. Scientists estimate that more than 100 million—different species inhabit the Earth. Each species is adapted to its unique niche in the environment, from the peaks of mountains to the depths of deep-sea hydrothermal vents and from polar ice caps to tropical rain forests.

According to Vergara (2001), biodiversity is important for the following reasons:

- Food, most medicines, and industrial products are derived from the wild and domesticated components of biological diversity;
- It is needed to provide greater resilience to our environment;
- It improves our food crops by providing genetic sources for disease resistance, improved productivity, and tolerance to different environments; and
- It is needed for sustenance, health and well-being, and enjoyment of life.
2. Ecosystem Services

The concept of *ecosystem services* is important when one discusses biodiversity conservation. Daily (1997) defines the term as the conditions and processes through which natural ecosystems, and the species that make them up, sustain and fulfill human life. Accordingly, ecosystem services maintain biodiversity and the production of ecosystem goods, such as seafood, forage, timber, biomass fuels, natural fiber, and many pharmaceuticals, industrial products, and their precursors. The harvest and trade of these goods represent an important and familiar part of the human economy. In addition to the production of goods, ecosystem services are the actual life-support functions, such as cleansing, recycling, and renewal, and they confer many intangible aesthetic and cultural benefits as well.

The important functions of ecosystem services to humans include the following:

a) Purification of air and water  
b) Mitigation of floods and droughts  
c) Detoxification and decomposition of wastes  
d) Generation and renewal of soil and soil fertility  
e) Pollination of crops and natural vegetation  
f) Control of the vast majority of potential agricultural pests  
g) Dispersal of seeds and translocation of nutrients  
h) Maintenance of biodiversity, from which humanity has derived key elements of its agricultural, medicinal, and industrial enterprise  
i) Protection from the sun’s harmful ultraviolet rays  
j) Partial stabilization of climate  
k) Moderation of temperature extremes and the force of winds and waves  
l) Support for diverse human cultures  
m) Giving of aesthetic beauty and intellectual stimulation that lift the human spirit.

The concept of ecosystem services becomes more relevant if we want to characterize the ways by which humanity benefits from natural ecosystems. Likewise, we have to advocate to the wide group of audience the importance of biodiversity conservation which is the key for ensuring sustainable ecosystems.

There are three important aspects when one talks about the ecosystem services (Daily, 1997). First, the goods and services flowing from natural ecosystems are greatly undervalued by society. Second, anthropogenic disruptions of natural ecosystems – such as alteration of the gaseous composition of the atmosphere, introduction and establishment of exotic species, and extinction of native species – are difficult or impossible to reverse on any time scale of relevance to society. Finally, if current trends continue, humanity will dramatically alter or destroy virtually all of earth’s remaining natural ecosystems within a few decades.
3. Agro-Biodiversity

The Asian *farmscape* is a mosaic of diverse ecosystems (Kemp, 2007). The Sustainable Agriculture for Environment (SAFE) Project of Thailand has divided the farmland into the following sub-ecosystems.

- Rice Fields
- Other crops and Orchard
- Field Borders and Dikes
- Rivers, Canals, Wetlands and ditches
- Ponds
- Homestead
- Trees and Forest Areas
- Roadsides

The biodiversity of flora and fauna species in the farmland serves as the natural capital for most Asian farmers. Benefits derived from this natural capital are:

- Ecological Services – mostly beneficial to crops such as predators, parasitoids, pollinators, soil buildings
- Direct benefits – food, income, environmental quality, medicine, building materials, social/cultural uses

4. Organizing Agro-Biodiversity (BD) Conservation Activities

Suggested steps in organizing agro-BD conservation activities are provided below. Guides on how to facilitate each step is included in Chapter IV of this manual. The steps listed herein are largely based from the experiences of the SAFE Project in Thailand which have been adapted based on the requirements of the agro-biodiversity conservation activities in Davao del Norte.

4.1 Groundworking –

This activity includes preliminary meetings with farmers groups, school officials, PTA, local government units and other stakeholders. This is done to introduce the general objectives of the project and invite stakeholders to attend a meeting where details of the project could be discussed.

4.2 Briefing

During the meeting, objectives, importance, and processes of agro-BD are discussed. Support of commitment of different stakeholders is also explored. Participants to the agro-biodiversity conservation activities are also finalized during this stage.
4.3 Mapping

Mapping includes field visits and survey of different ecosystems in a given farmland. Participants visualize such ecosystems through a map which serves as the basis for collection of biodiversity species.

4.4 Survey and collection of organisms

Participants collect samples of different ecosystems identified during the mapping activity.

4.5 Analysis and Summary

Analysis and summary of specimens collected from different ecosystems in a farmland include:

- Classification and ranking of species
- Life cycle, habitat, food chain, threats, present conditions (no. of population)

4.6 Develop the Plan

One of the outputs of ranking activity is for the group to decide on what biodiversity species to conserve. Once a decision is made, preparation of conservation and sustainable utilization plan starts.

4.7 Task Force Formation

The group may also elect their officers who will enforce the agro-biodiversity conservation and sustainable utilization protocols.

4.8 Implement the Plan

Once the plan and enforcement protocols are in place, the group can now proceed to actual conservation of species they have selected.

4.9 Document the entire process

Important events and activities of the project should be recorded for purposes of presenting important phases of project implementation.

4.10 Share results

To get feedback and generate support for agro-biodiversity conservation activities, it is important to share results/milestones of activities. Field days, IPM congresses, advocacy seminars, among others, are some of the appropriate fora for sharing agro-biodiversity conservation experiences.
4.11  *Sustain and Up-scale activities*

Project plans should include provisions for sustaining and up-scaling locally-supported schools and community agro-biodiversity conservation activities.
Chapter Two

Integrative Teaching

Introduction

Integrative Teaching Approach is advocated in the Agro-BD and PIA project implementation. This approach enables teachers and students to engage in a learning process that allows them to have greater appreciation on the importance of integrating environmental concepts in the basic education curriculum. Moreover, this learning approach facilitates the integration of learning topics such as hazards of pesticides on humans and other living organisms in the environment. This chapter provides basic concepts and strategies of integrating Agro-BD and PIA concepts in core subjects areas.

1. What is integrative teaching approach?

Integrative Teaching Approach is a way to teach students in a more meaningful way by breaking down barriers between subjects. It allows two or more concepts or skills within or across subject areas to be integrated in one lesson. In this approach, knowledge from all of the traditional subjects is accessed without labeling them as such. The concepts or skills are embedded in real-life situations where students are given problem solving tasks that necessitate connection of ideas already known to them with those they encounter for the first time.

Integration of ideas is also possible through themes. This is the reason why some call Integrated Teaching as Thematic Approach. Themes are broad topics whose meaning could cut across areas. The idea is to teach around themes or organizing ideas that students can identify with. Examples of themes are environment, change, poverty, peace, and love. Specific concepts of a subject area are culled from these broad themes, and activities are planned to teach them.

To illustrate integrated approach through thematic teaching, let’s take the unit on “The Environment”. In this topic, students’ learn about the concept of conservation through activities like starting their own recycling program, conducting a campaign for environmental awareness, and conducting a survey on how local businesses advocate conservation. In the BD and PIA project, the themes are the biodiversity and pest impact assessment concepts which should be integrated in the ideas taught in the different subject areas in the basic education curriculum. The concepts that could be integrated are as follows:
1. biodiversity
2. agro-biodiversity
3. habitat
4. specie
5. natural capital
6. ecosystem
7. rainforest
8. ecology
9. ecological services
10. predator
11. parasites
12. pollinators
13. soil builder (fungi, bacteria)
14. micro-organisms
15. decomposers
16. environmental conservation
17. environmental degradation
18. mapping
19. ranking
20. ecological conservation
21. uses of biodiversity
22. life cycle
23. food chain
24. decomposers
25. herbivores
26. herbicides
27. symptoms/signs
28. pesticides
29. pesticide poisoning
30. spraying precautions
31. storage disposal
32. classes of pesticides
33. health impact

Integrative teaching also allows two or more individuals in different fields to be connected with each other to broaden perspectives in one’s field or area of interest. Thus, for BD and PIA concepts to be possibly integrated in the basic education curriculum, agriculture specialists and workers serve as resource persons for teachers handling academic subject areas in the basic education curriculum.

2. Why Integrate?

Integrated teaching adds problem-solving, real-world application and social consciousness to the learning process, making it a more comprehensive way of educating and learning. It is done for the following purposes:

- To promote collaboration
- To reflect the real world
- To try an exciting approach
- To connect school subjects
- To have fun
- To motivate self
- To involve the community
- To respond to collegial and administrative support
3. What are the techniques in integrating?

3.1 Integration Within a Single Subject

The integration within a single subject allows concepts and skills learned within a subject area in different periods or from different teachers to be integrated as one lesson. This can be done in three ways: fragmented; connected; and nested.

a. **Fragmented.** In fragmented technique, lessons of a specific subject area or different subject areas are taught separately. In this design, BD and PIA concepts could be integrated in any topic of a subject area where they are fit.

Examples in Language Lessons

<table>
<thead>
<tr>
<th>Lesson on Cause and Effect Relationship</th>
<th>Lesson on Getting the Main Idea</th>
</tr>
</thead>
<tbody>
<tr>
<td>Effects of the application of pesticides integrated in a Language lesson</td>
<td>Information about the different ecosystems in a Language lesson teaching the students</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Lesson on Writing Persuasive Letter</th>
<th>Lesson on Outlining</th>
</tr>
</thead>
<tbody>
<tr>
<td>The deteriorating condition of the farmland biodiversity could be disseminated through a Language</td>
<td>Practices for biodiversity conservation could be integrated in a language lesson</td>
</tr>
</tbody>
</table>
b. **Connected.** In this design, the related skills are taught one at a time and then BD and PIA information could be used to connect them.

**Example:**

![Diagram showing connected skills](image)

The illustration shows that in teaching the students how to construct a paragraph about the biodiversity in the rice field, they should have first a lesson about the plants and animals living in the rice field. Then they should be taught of the parts of a sentence, then moving on to making a paragraph.

c. **Nested.** This design of integration shows ideas taught in one subject area are embedded in one topic by making natural overt connections. A very good vehicle in integrating concepts learned in one subject area is by putting them in real situations so that the students will see their applications in real-life.

**Example: A Lesson in Math on Problem Solving**

*Mang Jose has 1000 fingerlings. He placed 2/5 of these fingerlings in a circular pond with a diameter of 8.5 meters. The remaining fingerlings were placed in a rectangular pond that is 5 meters wide and 8 meters long. Which pond is a better habitat for the fingerlings? Justify your answer.*

**Illustration:**

![Diagram showing nested skills](image)
In the example above, the concept *habitat*, which is the pond or the place for the fingerlings to grow, is used as the context for the integration of the ideas on fraction and geometry, which are learned in Mathematics. To answer the problem posed, one should know the visual image of circle and rectangle to know what formula applies in computing their area. Then the number of fingerlings placed in each pond should be computed by determining what is 2/5 of 1000, which is the number of fingerlings in the circular pond and the remaining number that is placed in the rectangular pond. Then to know which is a better habitat for the fingerlings, one should divide the area of the pond by the number of fingerlings in it. To justify which pond is better, one should be able to state that the greater the allotted space for each fingerling, the better habitat the place is for the fingerlings.

### 3.2 Integration Across Subjects

Another technique of integration is putting together concepts and skills learned between or across subject areas in one lesson. This can be done in four ways: sequenced; shared; webbed; and threaded.

a. **Sequenced Model.** This design shows related topics or units from different subject areas are taught one at a time and unified by the ideas on BD and PIA.

Example:

```plaintext
<table>
<thead>
<tr>
<th>Lesson in Makabayan</th>
<th>Lesson in Math</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lesson about Mindanao with highlight on its know</td>
<td>Computing Area using Banana Plantation as a</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Lesson in Science</th>
<th>Lesson in English</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elements of an Ecosystem using banana plantation as the sample</td>
<td>Outlining with the information about aerial spray in banana plantation</td>
</tr>
</tbody>
</table>
```
b. **Shared.** The topics or units from different subject areas that are common or overlap are identified to be taught as one.

Example:

![Diagram showing shared topics]

This could be taught once in a lesson teaching the students to make a community map showing different ecosystems in the community.

c. **Webbed.** This is commonly known as thematic where broad themes such as change, environment, systems, etc. are used as topics to integrate subject areas.

Example:
d. **Threaded.** This is a metacurricular approach where ideas from a subject area are enlarged by threading thinking skills, social skills, study skills, graphic organizers, technology, and multiple intelligences with content information.

Example:

![Diagram](image)

**3.3 Integration Within and Across Learners**

Another technique for integration shows learners relate or apply curricular contents with real-life experiences or with their own area of interest. This could be done in two ways: immersed; and networked

a. **Immersed.** A method where a student immerses or applies in a real setting all curricular contents in one’s area of interest.

![Diagram](image)
b. **Networked.** A method that requires a learner to work with experts or various information sources/systems that will further develop one’s interest or broaden one’s knowledge.

Example:

```
Lesson in Technology and Livelihood Education on how to Control Weeds in the Farmland

Students ask farmers on their practices in controlling weeds in their rice plant
```
# Chapter Three

## Integrating Agro-Biodiversity Conservation and Pesticide Hazards Concepts in the Basic Education Curriculum

### Introduction

A scope and sequence chart is necessary in integrating agro-biodiversity and pesticide hazards concepts in the basic education curriculum. The scope is the amount of material to be taught while sequence is the order in which the content should be taught (ABD, 1999).

The basic concepts and competencies for different grade levels in the basic education curriculum serve as the bases for developing the scope and sequence chart of agro-biodiversity conservation and PIA. An example of scope and sequence chart that serves as a guide in integrating agro-biodiversity conservation and pesticide hazards concepts in Science for Grade Six is provided in this chapter.

This chapter also provides sample lesson plans to guide teachers in integrating agro-biodiversity conservation and pesticide hazards in the different subject areas and in facilitating different learning activities.

### 1. Scope and Sequence Chart for Selected Subjects in the Basic Education Curriculum

#### 1.1 Scope and Sequence Chart in Science – Grade VI

<table>
<thead>
<tr>
<th>Learning Competencies</th>
<th>BD-PIA concepts</th>
</tr>
</thead>
<tbody>
<tr>
<td>II. Animals, Plants and Environment</td>
<td>• Ecology</td>
</tr>
<tr>
<td>1. Demonstrate an understanding of interrelationship in an ecosystem.</td>
<td>• Ecosystem</td>
</tr>
<tr>
<td>1.1 Identify the living things and non-living things in a mini- ecosystem.</td>
<td>• Ranking of different species</td>
</tr>
</tbody>
</table>
1.2 Describe interdependence between living and non-living component in higher ecosystem.

2. Present through a diagram the feeding interrelationship among the living organisms.

2.1 Differentiate Food Chain from Food Web

2.2 Illustrate the cycling of biodegradable garbage.

2.3 Explain the food nutrient cycle.
2.4 Explain the importance of decomposers in making nutrients available to plants.

3. Illustrate the interdependence of plants and animals for gasses through the oxygen-carbon dioxide cycle.

3.1 Construct a diagram of the oxygen-carbon dioxide cycle.
3.2 Interpret the diagram of the oxygen-carbon dioxide cycle.

4. Explain that some activities of people affect the cycles of a bigger ecosystem.

4.1 Discuss the consequence of certain activities on events that disturb the interrelationship in an ecosystem such as:
   - Deforestation, destruction of coral reef, destructive method of fishing, over use of chemical pesticide, improper disposal of garbage, overpopulation.

4.2 Create a scenario to depict the effects of deforestation, destruction of coral reef, destructive method of fishing, over use of chemical pesticide, improper disposal of garbage, crowded human settlements (overpopulation).

4.3 Demonstrate commitment and concern in preserving/conserving the balance in the

- Biodiversity
- Habitat
- Mapping
- Species
- Parasites
- Predator and Prey
- Food Chain
- Food web
- Herbivore
- Decomposer
- Micro-organisms

- Uses of Biodiversity
- Ecological Services
- Rainforest

- Environmental degradation
- Pesticide
- Classes of pesticide

- Pesticide Poisoning
- Sign and symptoms of pesticide poisoning

- Environmental conservation
4.3.1 Enumerate ways of addressing the harmful effects of human activities to the environment.
4.3.2 Participate in campaign and activities for improving/ managing one’s environment.

III. Materials:

2. Explain the importance of observing precautionary measure in using, storing and disposing household materials.

2.4 Practice proper use of pesticides.
   - Refrain from using insect sprays and other insecticide that can be inhaled.
   - Wear gloves when handling pesticides.
     - Wash exposed body parts after using pesticides.

2.5 Discuss disorders and diseases that affect the nervous system.

2.6 Practice health habits to prevent ailments of the nervous system

IV. Energy

4.1 Observe how energy be transferred from one body to another
4.2 Cite evidences when energy transfer occurs

1.2 Scope and Sequence in English – Grade VI

<table>
<thead>
<tr>
<th>Learning Competencies</th>
<th>BD – PIA Concepts</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Write a model composition showing Introduction, Body, conclusion</td>
<td>Environmental Conservation</td>
</tr>
<tr>
<td>2. Follow a series of directions listened to</td>
<td></td>
</tr>
<tr>
<td>2.1 Labeling diagrams</td>
<td>Ranking of Species</td>
</tr>
<tr>
<td>2.2 Completing a chart</td>
<td>Food Chain</td>
</tr>
<tr>
<td>2.2 Follow a series of directions in prescriptions</td>
<td>Storage and Disposal</td>
</tr>
<tr>
<td>2.3 Write specific directions on given situations e.g.</td>
<td>Spraying precautionary measures</td>
</tr>
<tr>
<td>interpret the diagram/road map</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mapping</td>
</tr>
</tbody>
</table>
3. Ask and answer questions using pictures/dialogues/comic strips
   3.1 Use tag questions negative and positive e.g. We get food from the forest, don’t we? You don’t ignore the importance of biodiversity, do you? • All Concepts Possible

4. Retell a selection listened to
   4.1 Read orally/recite poems cast for a verse choir
   4.2 Give a report based on an interview • Environmental Conservation
      • Survey/Mapping
      • Signs and symptoms

5. Give possible cause/effect to a situation • Pesticide Poisoning
   • Environmental Degradation

6. Analyze ideas as to what could happen next from the stories heard
   6.1 Analyzes ideas/foresee what will happen next by drawing a picture • Signs and symptoms
   • Environmental Degradation

7.1. Write an ending to a given situation • Pesticide Poisoning
   • Signs and symptoms

7.2 Perceive relationship • Food Chain
   • Predator – Prey Relationship
   • Interdependence

7.3 Use a variety of sentences as to structure
   7.3.1 Using connectors “and” and “but” in compound sentences • Environmental Conservation
2. Sample Lesson Plans Integrating BD and PIA in the Basic Education Curriculum

2.1 A Lesson Plan in Science I (First Year High School)

Integrating Agro-Biodiversity Conservation

Competency:
*II 1.2 Apply the scientific method in conducting a simple investigation

BD-PIA Concepts
Surveying, mapping, ranking of species, ecological services

Time Frame 2 periods

I. Objective:
Conduct a simple investigation applying the scientific method

II. Subject Matter
Scientific Method of a simple investigation

III. Materials
A. For the teacher: Puzzles, strips of cartolina
B. For the students: manila paper, ruler, colouring materials, felt tip pen, Magnifying glass

IV. Lesson Proper

A. Recall
Instruction
a. The teacher asks 2 representatives each from the boys and the girls.
b. Posted on the board are strips of cartolina written on each are the steps of the scientific method of investigation.
c. In 30 seconds, the students should be able to arrange the strips in proper order.

B. Motivation: 5 WORD PUZZLES each of which are placed in an envelope.
Instruction:
a. Divide the class into 5 groups
b. Give each group a word puzzle to solve
c. Give each group 30 seconds to form the puzzle correctly.
C. Pre-Activity Discussion
   a. Each group will be given an activity sheet.
   b. Require students to follow precautionary standards to follow while doing the activity.
      i. Be careful in going to the field
      ii. Don’t destroy/kill the organisms

D. Activity Proper
   Outdoor Activity
   The students will be allowed to go to their assigned areas. They have to accomplish the activity sheets that follow.
   Guide Questions
      i. What group of organisms has the biggest population? Least?
      ii. What is/are the organisms common to the five areas being surveyed?
      iii. What are the common observations of each group while conducting the activity?
      iv. Considering the environmental condition today, how will the area you surveyed look like 10 years from now?

   Time allotment: 30 minutes

E. Post –Activity
   a. Each group will tabulate the data gathered
   b. Presentation of output by group

V. Abstraction (The teacher will guide the students to formulate the generalization)
   In conducting a simple scientific investigation, one should follow the step-by-step process of the scientific method.
   Intervention of humans may affect the number of organisms in a locality.
   Biodiversity Conservation of the organism will help maintain the ecological balance

VI. Valuing/Application
   a. What will you gain from using scientific method in solving problem?
   b. Give a daily activity at home or school using scientific method.
   c. Give the benefits we can derive from the different organisms listed in your survey.

VII. Evaluation
   Checklist: Place a check (/) mark in the column where scientific method was applied during the conduct of your investigation. Be honest in answering the checklist.
<table>
<thead>
<tr>
<th>Steps in a Scientific Investigation</th>
<th>Applied</th>
<th>Not Applied</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. State the problem.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Formulate a hypothesis.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Gather information about the problem.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Test the hypothesis.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. State a conclusion.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Communicate the results.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

VI. Assignment

1. Conduct a simple investigation using the scientific method in your own home garden.
2. Compare and contrast the traditional from the SI unit of measurement.
3. List down the SI Unit of measurement.

Prepared by:

**Marlyn D. Manganaan** – Teacher, Asuncion NHS
**Zeniffer S. Otig-** Teaher, Asuncion NHS
**Judy F. Babor** – Teacher, Carmen NHS
ACTIVITY SHEET
SURVEY, MAPPING, RANKING OF SPECIES

Materials
Meter stick
Pencil
Colouring materials
String
Hand lens
4 pointed sticks

Procedure
1. Proceed to your respective area in the school for your survey.
2. Enclose a small area (1mx1m) using a stick and string. All observations will be focused within these boundaries.
3. List down the entire organism that you can find within your enclosed area. Indicate the number of each type of living things. You might need to look closer into the soil and even beneath the surface. You can do this using a pointed stick and the hand lens. (Each type or species found in an ecosystem is called population.)

Table  Population of living things

<table>
<thead>
<tr>
<th>Plants</th>
<th>Number</th>
<th>Ecological Services</th>
</tr>
</thead>
<tbody>
<tr>
<td>weeds</td>
<td>40</td>
<td>medicines</td>
</tr>
<tr>
<td>kangkong</td>
<td>30</td>
<td>food</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Animals</th>
<th>Number</th>
<th>Ecological Services</th>
</tr>
</thead>
<tbody>
<tr>
<td>worms</td>
<td>18</td>
<td>Decomposers/enhancing soil porosity</td>
</tr>
</tbody>
</table>

Note: Ranking of Species= rank the species according to its population in a decreasing manner.
Mapping: Draw the physical features of your respective area. Indicate also the land markers.
2.2 A Lesson Plan in English Grade VI

I. Learning Objectives:

- Identify the appropriate connectors in compound sentences.
- Use the connectors and and but with compound sentences.
- Identify best practices that promote the protection of animals.

II. A. Subject Matter: Using Compound Sentences with And and But
   B. References: PELC II.8.2
   C. Materials: Charts, Strips of Sentences
   D. BD – PIA Concept: Environmental Conservation
      Values Integrated Preservation of Natural Enemies in the field

III. Procedure:

A. Preparatory Activities

1.) Review

   Tell whether the underlined subject or predicate is simple or compound.
   _____a. Air pollution is one of the major problems the world is experiencing
   _____b. The grade six pupils join the tree planting activity of the community
   _____c. Lawaan and Lamio belong to endemic species of trees
   _____d. Climate change and global warming are very alarming.
   _____e. Trees are getting scarce these days.

2.) Motivation:

A. Who among you have pet animals at home? What do you do to take good care of them?

B. Guessing game: Guess what vertebrate animal is being described.

a. What group of vertebrate animals has feathers and can fly? (aves)
b. What group of vertebrate animals has scales or thick body covering? (reptiles)
c. What group of vertebrate animals has mammary glands and bear their young alive? (mammals)
d. What vertebrate animals can live in water but have no scales? (amphibians)
e. What vertebrate animals have gills and live in water? (fishes)
B.1. Presentation:

Study the matrix:

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Mammals</th>
<th>Aves</th>
<th>Amphibians</th>
<th>Reptiles</th>
<th>Fishes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mammary Glands</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Gills</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>Oviparous (Hatched from Eggs)</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Viviparous (Born Alive)</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Cold - Blooded</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
</tbody>
</table>

Legend: + present; - absent

2. Comprehension Check – up

a. What are the vertebrate animals in the matrix? (Ans. Mammals, aves, amphibians, reptiles and fishes)

b. Differentiate oviparous animals from viviparous ones? (Oviparous animals are hatched from eggs while viviparous animals are born alive)

c. Which vertebrate are warm – blooded? (Mammals, aves are warm – blooded)

3 Analysis and Discussion

Questions:

1.) Which groups in the matrix are warm – blooded? And what do both have?
   Ans. Mammals and aves are warm – blooded and they have lungs.

2.) In what group do whales and elephants belong?
   Ans. Whales and elephants are mammals and they are viviparous.

3) What are the similarities of fishes and the amphibians? Which of them have gills?
   Ans. Fishes and amphibians are both cold – blooded but only fishes have gills.

4.) Bats fly like birds can fly but which group do they belong?
   Ans. Bats like birds can fly but they belong to the group of mammals.

   * Teacher asks, which sentences or ideas carry similar ideas? Have opposite ideas?

Study the chart above. How many complete ideas or simple sentences are there in the chart?

a.) How are the sentences in the chart called?
   * They are called compound sentences.

b.) How are the two ideas or 2 simple sentences joined?
   * They are joined by the connectors and and but.

c.) What ideas are joined by connectors and?
   * Similar ideas.

d.) What ideas are joined by the connector but?
   * Opposite ideas.
4. Generalization:

A compound sentence is made up of two complete or simple sentence joined by connectors “and” and “but”. “And” is used to join similar ideas. “But” is used to join opposite ideas.

C. Post Activity

Activity 1 (Substitution drill)

Substitute the underlined ideas with another appropriate ones. Choose answers from the given options. (Options are in the pocket chart)

a.) Snakes have scales but some cannot swim like fishes do.
b.) Dolphins are also mammals and they have lungs.
c.) *Tangigue* is a fish but it has no scales.
d.) Crocodiles are reptiles and they crawl.

Application options: (Write in strips and place in the pocket chart)

* But it has less bones than the milkfish
* And they have their young born alive
* But unlike tilapia, it lives in salty water
* And they have mammary glands
* But they are not fish
* And they lay eggs

Activity 2 – Field Walk (Forest tree project visitation)

Group the pupils into five. Have them visit the forest tree conservation area and come with answers to the following questions.

1) What are the species of trees that you saw? (mahogany, acacia, fire tree, narra, etc.)
2) Do you think these species of trees are also present in other places?
3) Are they abundant or diminishing in number?
4) What are the factors that affect the scarcity of these species? (human activities e.g. utilization through housebuilding, furniture, lumber, kaingin).
5) What good things do these trees give to mankind? (ecological services – food, lumber, medicine, shade)
6) What should we do to protect them?
7) What particular animal species rely on these trees for survival?
8) Name some of the endangered species of animals in our country (kalaw, eagle, native hito, gurami, puyo, etc.)
9) How can we prevent some animal species from being endangered from extinction? (We can prevent some animal species from being extinct by not killing them, and not making them source of income)
IV. Evaluation

A. Fill in the blank using correctly the connectors "and" or "but".

1. Ducks are birds ___ they cannot fly high.
2. Tigers and horses are both mammals ___ not both are carnivore.
3. Imported dogs are better pets than the native dogs ___ they are expensive pets.
4. Dolphins are smart ___ they amuse people
5. Rats are small ___ they move fast.

B. Put a check mark (/) before the number if the following sentences show best practices in caring the animals.
   ___1. Providing shelter and food to pet animals.
   ___2. Whipping and kicking stray animals.
   ___3. Limiting the food of animals but feeding them on time.
   ___4. Bringing the pet animals to a veterinarian for vaccination and check up.
   ___5. Slaughter dogs for food and additional income.

Prepared by:

RAZEL C. LAGRADA
T – 3 – BD Facilitator
Marcos Estoque Elementary School
Kapalong, Davao del Norte
2.3 A Lesson Plan in Hekasi VI

Banghay – Aralin sa Hekasi VI
(Integrating BD – PIA Concepts)

Takdang Panahon: Tatlong Sesyon
Kaisipan: Napapangkat ang mga likas na yaman ayon sa anyo at gamit

I. Layunin:

A. Natutukoy ang mga likas na yaman.
B. Napapangkat – pangkat ang mga likas na yaman ayon sa uri.
C. Natutukoy ang mga yamang matatagpuan sa iba’t ibang pook ng bansa sa tulong ng mapang pangkabuhayan.

II. Paksang – Aralin:
Mga Likas na Yaman ng Bansa ayon sa Uri

Sanggunian:
Yaman ng Pilipinas 6, pp. 57 – 61
PELC II.c.1, II.C.2, II.C.3

Kagamitan: Larawan ng Puno ng Niyog, iba’t ibang likas na yaman
Mapang Pangkabuhayan ng Pilipinas
Balangkas ng pagpapangkat ng uri ng likas na yaman

BD Concepts: Natural Resources
Mapping

III. Mga Gawain sa Pagkatuto:

A. Panimulang Gawain

1. Balitaan: Magpalitan ng balita tungkol sa mga likas na yaman ng bansa.
2. Balik – Aral:
   Itanong: Anu – ano ang mga halimbawa ng topografiya ng ating bansa?
3. Pagsasanay:
   a.) Ipabasa ang tula.

   Likas na Yaman

   Lupang sakahan ito’y yaman
   Sa mga magsasaka ito’y tatamnan
   Bigas, gulay, at prutas na mainam
   Mula sa lupang nasa kapaligiran.

   Pook pangisdaan sa buong kapuluan
Sa mga mangingisda ikaw naman
Isda, perlas at kabibe sa dagat laman
Buhay natin, buhay ng tahanan.

Tubigan sa mga tahanan
Panlinis, panghugas, at inuming mainam
Mga ilog, talon, at bukal upang mapaliguan
Aalagaang malinis at marapat ingatan.

Kagubatan ikaw ay kanlungan
Mga puno magiging silungan at tirahan
Para sa mga ibon at hayop mailap man
Masarap na prutas at kakaibang halaman
Namumukod at natatangi, dito matatagpuan.

b.) Itanong:
• Ayon sa tula, anu – ano ang mga likas na yamang matatagpuan sa Pilipinas?
• Paano napapakinabangan ng mga Pilipino ang mga likas na yaman na yaman ng bansa?

B. Panlinang na Gawain:

1. Paglalahad
   a. Pangkatin ang mga bata sa pagkakalap ng Impormasyon
   Pangkat 1 – Yamang Pansakahan
   Pangkat 2 – Yamang Gubat
   Pangkat 3 – Yamang Pangisdaan
   Pangkat 4 – Yamang Mineral

   b. Paglalahad ng mga halimbawa sa bawat anyo ng likas na yaman.
   c. Pagsangguni sa mapang pangkabuhayan at pagtutukoy sa mga lalawigan na mapagkukunan ng iba't ibang uri ng mga likas na yaman.
   d. Pagbubuo ng balangkas na nagpapakita ng pagpapangkat ng uri ng likas na yaman.
   e. Pagtutukoy sa anyo at gamit ng produktong galing sa bawat likas na yaman.
   f. Pagbibigay ng halimbawa ng mga produktong mula sa iba’t ibang yamang likas
      (Ipakita ang larawan ng punong niyog at iba pang likas na yaman)
   g. Pagsasagawa ng bawat pangkat ng isang mapang pangkabuhayan ng Pilipinas
      ayon sa uri ng yaman na kanilang kinalap.
2. Pagtatalakay

- Talakayin ang mga natutunan habang nag-uulat ang bawat pangkat sa klase.
- Ipabasa din ang “Bigyan Pansin at Suriin” sa sanggunian/batayang aksyon at talakayin ito

3. Paglalahat:

- (Gabayan ang mga bata sa pagbuo ng konsepto/ kaisipan)
  “Ang mga likas na yaman ay napapangkat ayon sa anyo at gamit.”
- Ipabuo ang balangkas ng mga uri ng likas na yaman batay sa talakayan

C. Pangwakas na Gawain:

1. Paglalapat:

   Ibigay ang sumusunod:

   a. Halimbawa ng yamang nauubos at di – napapalitan
   b. Halimbawa ng yamang napapalitan
   c. Halimbawa ng tatlong uri ayon sa anyo at gamit ng likas na yaman

2. Pagpapahalaga:

   Itanong: Paano ka makatulong sa pangangalaga ng mga likas na yaman?

IV. Pagtataya:

A. Gawin ang sumusunod:

1. Tukuyin mula sa loob ng kahon ang halimbawa ng mga likas na yaman.

<table>
<thead>
<tr>
<th>Ginto</th>
<th>Plantsa</th>
<th>Niyog</th>
<th>Saging</th>
</tr>
</thead>
<tbody>
<tr>
<td>“Iggi”</td>
<td>Pinya</td>
<td>Sinulid</td>
<td>Marmol</td>
</tr>
<tr>
<td>Tanso</td>
<td>Sinarapan</td>
<td>Bahay</td>
<td>Kotse</td>
</tr>
</tbody>
</table>

2. Pangkatin ang mga likas na yaman na nasa talahanayan ayon sa uri.

<table>
<thead>
<tr>
<th>Papaya</th>
<th>Mais</th>
<th>Isda</th>
<th>Ahas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ginto</td>
<td>Mga gulay</td>
<td>Agila</td>
<td>Perlas</td>
</tr>
<tr>
<td>Ibon</td>
<td>Alimango</td>
<td>Bukal</td>
<td>Seaweeds</td>
</tr>
</tbody>
</table>

B. Pag – aralan ang mapang pangkabuhayan ng Pilipinas at hanapin ang mga lalawigang sagana sa sumusunod na mga uri ng likas na yaman. Isulat ang pangalan ng lalawigan at lagyan ng tsek ang angkop na kolum.
C. Punan at buuin ang balangkas ng mga uri ng likas na yaman.

<table>
<thead>
<tr>
<th>Lalawigan</th>
<th>Marmol, tanso</th>
<th>Niyog, lupang sakahan</th>
<th>“Iggi” Sinarapan</th>
<th>Kakahuyan</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

V. Takdang – Aralin:

Gumawa ng album ng mga likas na yaman. Pangkatin ang maga larawan o ilustrasyon ayon sa uri nito.

Ito ay proyektong dapat pagtulungan ng limang bata bawat album.

Prepared by:

**Mr. Reynaldo M. Longay**
Principal/Facilitator
Jesus Lumain Elementary School
Sto. Tomas, Davao del Norte
2.4  

I. Objectives:

a. Observe how energy is transferred from one body to another.
b. Cite evidence when energy transfer occurs.

II. Subject Matter:  ENERGY

Methods of Energy Transfer

A. Science Concepts/ Ideas
   1. Heating and cooling involve transfer of heat from one material to another.
   2. Heat travels through solids. A material through which heat passes easily is called a conductor.
   3. Both air and water move because of differences in temperature and convection current.
   4. Energy can be transferred from one body to another.

B. Processes
   - observing
   - comparing
   - classifying
   - communicating
   - identifying

C. Materials
   Glass, spoon, hot wire, big bottle jars and small bottle
   Manila paper, pentel pen, crayons

D. References
   PELC in Science and Health 6, IV.1.1, IV.1.2
   Into the Future 6

E. Integration
   BD – PIA Concepts- food web, predator-prey relationship, food chain (transfer of energy)
   English: Communicate effectively in both oral and written
   Value Focus: Being observant and accurate in doing things.

III. Procedure:

A. Preparatory Activities

   1. Motivation
      Form the jumble word (The word is ENERGY)
2. Review

What is sound energy?
Where does it originate?
Will you appreciate the beauty of nature without sound?

B. Developmental Activities

Activity 1

Field walk – forest conservation area inside the school campus
  1.1. Observe and list down organisms found the conservation area.
  1.2. What is the source of all energy?
  1.3. Can energy be destroyed or can be transferred from one body to another?

Presentation

What is considered the God of the Japanese people? It is also the symbol of their flag. (Elicit answers from the pupils and see to it to lead them to the expected answer, which is the sun)

Show the picture of the sun and say; what can you say about the sun? What does it give us? What role is played by the sun? (transfer of energy)

3. Lesson Proper:

Present a Lecturette. (see session content attached)

4. Discussion:

1.) What is the main source of energy? (Sun)
2.) Is energy transformation important? Why? (There is a need to form energy from a form which cannot be used directly to a form which can be used directly).
3.) In the energy transformation, what energy could be lost in a form of what? (Heat)
4.) Cite instances where heat is transferred to another solid material. (Cite examples of conductors)
5.) What kind of heat transfer do you experience when you are directly exposed to the heat of the sun? (Radiation)
6.) What kind of heat transfer occurs only in liquids and gases brought about by temperature? (Convection)
7.) In the food, what is being transferred from one body to another? (Energy)

5. Generalization: Ask: What have you learned about energy?
   1. The sun is the primary source of energy in the food chain
   2. Energy can be transferred in a form that is useful and can do work.
   3. There is a transfer of energy from the producer to a series of consumer.

7. Application
   Turn – on the light in the classroom. Identify the changes that happen.

IV. Evaluation

A. Directions:

   1. Which of the following is an example of heat transfer or conduction?
      a. boiling water
      b. a warm room
      c. hot handle of a tea pot
      d. your warmth as you stay near the stove
   2. What is being produced when energy is transformed?
      a. light
      b. heat
      c. water
      d. spark
   3. What energy is being transferred when you are walking under the heat of the sun?
      a. conduction
      b. convection
      c. radiation
      d. transformation

B. Answer the following questions.

   1. What organisms consume the stored energy in the green plants? (the consumers)
   2. How do these organisms utilize their energy? (through work)

V. Assignment:
   Illustrate a food chain in a mini forest area.
Annex – Topic Content

“HEAT”

Green plants transform the sun’s energy to chemical energy, which is stored in food. The food materials that you eat combine with oxygen in the blood to produce chemical energy. Then as food combines with oxygen, heat is transformed to heat energy.

When the muscles move to do some work, energy of these muscles is transformed to moving or mechanical energy. As the muscles do some activities, heat is produced in the body.

When energy is transferred, heat is always produced.
(Let the pupils read the text in Appendix A)

The illustration below is an example of food chain. What is the role of bacteria in the food chain?

When living things die, bacteria act on their remains. This results in the breakdown of tissue in simplest form. This process is called decay or decomposition. Bacteria and fungi cause dead organisms to decay. They are referred to as decomposers. Decomposers are microorganisms that change complex substance, which include protein and carbohydrates. Complex substances are changed into simple components such as carbon and phosphorus. These substances mix with the soil. They are used by the plants for their growth.
Consumers get energy from the food we eat. In the food chain, diagram shows there is a transfer of energy from one organism to another. The main source of energy on earth is the sun. Without the energy from the sun, the plant will not be able to manufacture food.

Methods of Heat Transfer

Heating and cooling involve the transfer of heat from one material to another. How is heat transferred?

1. Conduction

A material through which heat passes easily is called a conductor. We use metals in cooking utensils so that cooking will be faster and more convenient. The passing of heat from molecule to molecule is called conduction.

2. Convection

Both air and water move because of differences in temperature. The movement of gas or liquid brought about by temperature differences produces convection current. Heat is transferred by convection when a gas or liquid moves from one place to another.

3. Radiation

Whenever you stand outdoors facing the sun, you are warmed not by conduction or convection but by radiation. The heat you feel on your face is the result of heat transfer by radiation. Scientists define radiation as transfer of heat through space by infrared rays.

Prepared by:

Marilou A. Llemit
Teacher/Facilitator
Conception Elementary School
Asuncion, Davao del Norte
2.5 Lesson Plan in English for Grade Five Elementary Pupils

I – Learning Objectives:

A. English Objectives:
   1. Get the main idea
      1.1. Give the heading to a set of related ideas
      1.2. Identify the key sentence in the paragraph
      1.3. Identify the details that support the key sentence
      1.4. Skim to get general idea on what the paragraph is about.

B. BD objectives:
   1. Define ecosystem
   2. Identify different ecosystem
   3. Explain the importance of ecosystem
   4. Name ways to protect ecosystem

II – Subject Matter:

A. Topic in English: Main Idea
B. BD Integrated Concepts: Ecosystem
C. Value focus: Environmental protection
D. References: BEC 2002 English for better Living 5
E. Materials: Chart, worksheets

III – Learning Activities:

A. Preparatory Activities
   1. Review
   2. Motivation
      a. Ask the following questions.
         - Were you able to go around the school campus?
         - What have you observed?
         - Write on the board the things that you saw around the campus.
   3. Group the students into 5:

B. Development Activities:
   1. Activity
      a. Present the paragraph about ecosystem (see attachment A)
      b. Let the students read orally the paragraph by group, by two’s and then select an individual student to read orally.

   2. Analysis
      Ask the following questions.
      a. What is the main idea of the paragraph?
      b. On what part of the paragraph is the key sentence located?
c. Where could you find the main idea?
d. What are the sentences that make the main idea more clear?
e. What do you call these sentences?
f. Based on the paragraph read, what is an ecosystem?
g. What are the different ecosystems? Why?
h. Is ecosystem important? Why?
i. What are the ways on how to conserve our ecosystem?
j. How can you conserve ecosystem?
k. What do you think is the appropriate heading of the paragraph presented?

3. Abstraction:
   a. Where the main idea is usually located in the paragraph?
   b. What do you call the set of related ideas that support the main idea?
   c. In giving headings of a paragraph, on what sentence do you base your heading?
   d. What is ecosystem?
   e. What are the different ecosystems?
   f. Why is it important to conserve our ecosystem?
   g. What should you do to protect our environment?

   c. Application: (Reporting by group)
   Distribute by group set of related ideas about ecosystem (see attachment B) and have them supply the appropriate heading. Have them also identify the main and the supporting details.

IV – Evaluation:
Read a set of related ideas about ecosystem (see attachment c). Supply the appropriate heading of each selection, box the key sentence and underline the supporting details.

V – Assignment
Compile clippings on articles about ecosystem. Give alternative headings to the articles. Put work in bond papers.

Attachment A

Some activities of man are proven to be harmful to the environment. The balance of nature in the ecosystem is disturbed by these activities. The continuous destruction of the environment must be stopped.

Massive deforestation has brought about the destruction of the natural habitats of our wildlife. This action leads to the extinction of some living things. It has also caused floods and
soil erosion. It has contributed to the presence of too much material like carbon dioxide in the environment.

Water pollution has caused our rivers and lakes to stink. It has also killed the fish and other forms of marine life. It has limited the source of safe water for man.

Polluted air fills a person's lungs with poisonous gases. How can mankind restore the balance in nature?

**Attachment B**

When one says “A Wonder Tree”, what comes to mind is the coconut tree. But Edwin C. Villar of the Philippine Council for Agriculture, Forestry and Natural Research and Development is referring to another tree.

He calls the fast growing “Kukawate” or “madre cacao” a “wonder tree”

He writes about the wonders of Kakawate. The tree has a lot of uses. It is used as live fence to surround property boundaries. It is also used as shade trees, wind breakers and as food resource for livestock raisers.

Some farmers use the leaves of Kakawate as fertilizers in fields and gardens. Folk medicine practitioners in remote areas use the juice of the Kakawate leaves, bark and root itches and wound.

In a survey conducted in the Philippines, 72% of farmers said they put Kakawate branches in their rice field to keep bugs and other pests away.

Kakawate leaves are also used to help ripen the banana. In Davao and other places, farmers store unripe bananas in a box with kakawate leaves. Doing so shortens the ripening period. The tree on the other hand is well adapted to humid areas and in fertile soil. It can be grown easily together with other grasses. It can also be used for controlling weed species and soil conservation.

**Attachment C**

Human activities such as illegal fishing, deforestation and pollution from industrial and agricultural discharge contribute to the destruction of coral reefs.

When there is protein food shortage, our intake for protein becomes less. The food shortage then affects our health and well being.

If the reefs are destroyed, we likewise lose building materials, eliminate shoreline protection against storms, and limit sources of medicine.

***** end *****
Coral reefs can be saved through the following ways: (a) Seagrass bed protection; (b) Controlled logging activities; (c) industrial / agricultural waste control; (d) siltation control; (e) reforestation; and (f) good fishing method.

Seagrasses protect the coral reefs. They reduce the water energy and motion. They regulate the chemical composition of coastal wastes and sediments. Also they maintain the capability of the coast to support life. Because of the importance of seagrasses to the growth and development of the coral reef, they have to be conserved /saved.

Controlled logging activities also protect the coral reef. Controlled logging activities can control siltation.

Industrial / agricultural wastes control is another way of saving the coral reefs. When the coastal water is not polluted due to wastes, coral reefs grow.

Siltation control also protects the corals reefs. If the water becomes shallow due to siltation, the coral reefs eventually die.

Reforestation is another way of saving the coral reefs. Reforestation controls siltation. Siltation destroys the corals reefs.

Good fishing methods do not destroy the coral reefs. The coral reefs are allowed to serve as breeding and nursery ground for fishers.

Participating actively in effort to save the coral reefs is a timely and good practice. The effort to save the coral reef must be the concern of all.

Prepared by: Razel C. Lagrada
Teacher II
Marcos Estoque Elementary School
2.6 Lesson Plan in English for Grade Five Elementary Pupils

I – Learning Objectives:

A. English Objectives:
   1. Write an outline of a paragraph read.
      1.1. Write a 2 – 3 point sentence outline.

B. BD objectives:
   1. Enumerate the country’s natural resources
   2. Define rainforest
   3. Explain the importance of rainforest
   4. Name ways to stop the abuses against rainforest

II – Subject matter:

A. Topic in English : Writing an outline
B. BD Integrated Concepts : Rainforest
C. Value focus : Conservation of Natural Resources
D. References : PELC
   BEC 2002 English for All Times 5
   Good English Purple Book
   Environmental Science for Phil. High School
E. Materials : chart, drawing of forest, worksheet

III – Learning Activities:

A. Preparatory Activities
   1. Review
   2. Motivation
      Ask the following questions.
      a. Have you gone to the mountains?
      b. What have you observed in the mountains?
      c. Are there still many trees?
      d. Can you name species of trees you saw there?

B. Development Activities:
   1. Activity
      a. Present the paragraph “Our Forest and What is Happening to them? (see attachment A)
         b. Let the students read orally the paragraph first, by group, by two’s and individually.
   2. Analysis
      Ask the following questions:
      a. What do you mean by natural resources?
b. What are some natural resources our country possesses?
c. Among them, which natural resources help us build houses, railroads and others?
d. What other good things, our forest could give us? In what way?
e. Based on your observation, what is happening to our forest today?
f. Who do think is the culprit of all these destructions?
g. Why do you think are they doing this?
h. Do you want that our forest will be totally destroyed?
i. Name ways to minimize if not eradicate these malpractices to our forests.

3. Study the outline below. Write the idea asked for the outline.

Our Forest and what is Happening to Them?

I. First Main Idea ____________________________________
   A. A smaller idea ____________________________________
      1. Supporting detail 1 _____________________________
      2. Supporting detail 2 _____________________________

II. Second Main Idea __________________________________
    A. A smaller idea ________________________________
       1. Supporting detail 1 ___________________________
       2. Supporting detail 2 ___________________________

III. Third Main Idea _________________________________
     A. A smaller idea ______________________________
        1. Supporting detail 1 _________________________
        2. Supporting detail 2 _________________________
3. Abstraction

a. What is an outline?
b. What is the use of an outline?
c. What are the parts of a good outline?
d. How are Roman numerals used in an outline?
e. How are capital letters used?
f. When are Arabic numerals used?
g. What should one do to protect our rainforest?
h. What are the government agencies that could help us protect our environment?

c. Application: (Group Activity) (See attachment B)
1. Distribute to the group the paragraph about TROPICAL RAIN FOREST BIOME.
2. Make an outline using the format below and write the ideas asked for in the outlines.

TROPICAL RAINFOREST BIOME

I. ________________________________________________________________
   A. ________________________________________________________________
   B. ________________________________________________________________

II. ________________________________________________________________
    A. ________________________________________________________________
    B. ________________________________________________________________
    C. ________________________________________________________________
    D. ________________________________________________________________

IV – Evaluation: (See attachment C)
Study the outline below. Write the ideas asked for in the outline on a piece of paper.

I. ________________________________________________________________
   A. ________________________________________________________________
   B. ________________________________________________________________

II. ________________________________________________________________
    A. ________________________________________________________________
    B. ________________________________________________________________

III. ________________________________________________________________
    A. ________________________________________________________________
    B. ________________________________________________________________
IV

A. ________________________________________________
B. _______________________________________________

V. Assignment: Draw a picture of a tropical rain forest

Scoring Rubric:

4 – Excellent such that work satisfies all of the following:
   • presents complete features of a tropical rainforests.
   • Color harmony
   • Neatly done.

3 – Very Satisfied such that work satisfies only 2 of the following indicators:
   • Presents complete features of a tropical rainforests.
   • Color harmony
   • Neatly done.

2 – Not Satisfied such that the work satisfies only 1 of the following indicators:
   • Presents complete features of a tropical rainforests.
   • Color harmony
   • Neatly done.

1 – Need improvement such that the work fails to satisfy any of the following indicators:
   • Presents complete features of a tropical rainforests.
   • Color harmony
   • Neatly done.
Attachment A

Our Forests and What is Happening to Them

Our forests are among our country’s important natural resources. We depend upon them for our timber products. They provide raw materials for our houses and furniture, building, railroads and ships. They provide the pulp for our books and newspapers and fiber for our clothing. Most of our food and medicine also come from them.

Forests help develop and preserve the soil on which our crops are grown. If there are no trees on hillsides and sloping lands, the soil can easily be carried down by rain water. Then its fertile part is washed away.

The forests provide your homes for animals and birds. Our bird friends make their nests on the branches of trees. Some animals live and sleep in the hollows of big trees. They also feed on leaves and fruits.

But our forests have not always been used with care. Many kaingenerous and loggers have cut down trees carelessly. The kaingenerous usually burn and destroy trees larger than their need. New trees do not grow quickly in burned forests. If we do not take care of our trees, obey forest laws and plant more trees, we might lose our forests soon.

Attachment B

TROPICAL RAIN FOREST BIOME

Tropical rainforests are found in warm, wet areas near the equator. Rain forests are rich in species of plants and animals. They are the most diversified of the biomes, the most exploited and endangered too.

Its temperature is fairly constant throughout the year and does not fluctuate very much during the day and nights. Annual average temperature is greatest than 17°C (50F); mean temperature is 28°C (82F).

Tropical rain forests soil lacks minerals and contains little remains of dead plants and animals. When organisms die and fall to the ground, immediately large number of molds and bacteria attack them. Decomposition is rapid on warm wet soil. Minerals released by the decomposers are quickly taken up by the plants. As a consequence, the soil is not very fertile. Drying soil from a tropical rainforest gives rise to the rocky or crusty soil, an indication of lack of minerals. Rainfall average is 240 cm and occurs almost daily.

Numerous species of trees grow to about 50 to 60 in tall; some have broad and leatherly leaves. The shorter trees branch widely at the top forming a canopy layer. The canopy prevents much sunlight from reaching the ground orchids that grow in tree branches and trunks. Vines cling on the branches.
Monkey and other mammals reside at the canopy layers. Other animals present are snakes, lizards, frogs and numerous insects. Amphibians, reptiles and birds are abundant.

Brood and leatherly leaves absorb more sunlight for photosynthesis; orchids growing in trunks and branches take in moisture from humid air.

Asean countries like Philippines, Northern Southern America, Central America, Central America, Northwest Costal Australia and various islands in the Indian and Pacific oceans have tropical rain forests.

Attachment C

The Vanishing Forests

Approximately one – third of the earth’s surface is desert; one – third is forest, savanna and wetlands; and one – fifth is glacial ill and tundra. The remaining area is occupied by humans. The world’s forests are now being depleted at a rate faster than we can imagine.

The Philippines for example, has about 30 million hectares of land. Out of this, 18 million hectares are eligible forest land. Fifty years ago, we had 15 million hectares and in the 1980s we barely have a million hectares of a virgin forest. We lost more than 70 percent of our forest! Trees are cut down at a rate of 17 trees per hour.

In Africa, about 30 percent of its forests has been destroyed. Brazil and Europe have lost 40 percent and 50 percent, respectively.

In South America, forests are being destroyed at a rate of 30 million acres every year. In the United States, only about 15 percent of their once vast forest remains. Forest destruction is at a rate of 129,500 square kilometers per year.

Globally, the forests are destroyed at a rate of about 50 million acres – every year. Half or 50 percent of the forests of the world has been cut down. If this trend of forest destruction continues, the world’s forests and their inhabitants will be nearly gone by the middle of the next century.

These data on forest destruction are enough reasons to cause alarm among us. Even the monkeys have reasons to be alarmed! Why do you think so?

Prepared by: Razel C. Lagrada
Teacher II
Marcos Estoque Elementary School
Chapter Four

Authentic Assessment for Agro-BD Conservation and PIA

Introduction

The Agro-BD and PIA program promotes the use of authentic assessment using student’s portfolios or teacher implementer’s portfolios as possible evidences in gauging the impact of the program to the different stakeholders. Portfolio assessment is done to allow the students to document all the evidences of their participation in the project and their reflections or insights when they were exposed to Agro-BD and PIA lessons facilitated by teacher implementers. Likewise, teacher implementer’s portfolio could be used to see evidences of how one’s projects for the biodiversity conservation and pesticides impact assessment have been done and the results of their implementation.
1. Authentic Assessment

1.1 What is Authentic Assessment?

Authentic assessment refers to the process of gathering information about what one knows and is capable of doing captured by tasks that simulate real-life situations. This is done not just by assembling disconnected pieces of information but rather doing a meaningful task that embeds content to provide connection between school-based ideas and real-world experiences. This assessment requires students to apply or synthesize information learned, and perform or demonstrate their understanding of the material according to specific criteria. Burke (1999) synthesizes the following features of authentic assessment.
The diagram shows six (6) important criteria in judging the authenticity of an assessment procedure.

1.1 Meaningful Performance Task. This criterion requires that assessment should be done through performance task. Performance tasks either demand for demonstration of skills or creation of products of learning. There are actually two modes of assessment that meet this requirement. These are listed as performance-based and portfolio assessment. These modes will be elaborated later in this reference material as they are the methods emphasized in this Agro-BD and PIA project.

1.2 Quality Product and Performance. This criterion requires that teaching should be aimed at helping the students to achieve quality products or high level of performance as this is what everyone wants to make oneself happy and proud. To know what makes a product or a performance of high quality, there should be rubrics to spell out the characteristics of the highest level of performance that students have to show when they are assessed. Rubrics are scoring guide to measure the quality of a product or a performance. In this BD and PIA workshop for teachers, rubrics have been emphasized. Rubrics are used in rating performance-based tasks and in portfolio assessment. Sample rubrics are shown in this reference manual.

1.3 Clear Standards and Public Criteria of Excellence. An authentic assessment sets clear standards of excellence that are made public or known to the assessee. These standards are given to the assessee before the actual assessment of skills is done so that it allows one to perfect his/her skill before s/he subjects himself or herself to the assessment task.

1.4 Learning that Transfers. Another criterion in determining the authenticity of assessment is the ability of the task to capture skills learned that could be transferred to other situations outside the classroom or beyond the school. Life is not confined only in the classroom. The classroom should be viewed as the venue for the students to perform the skills required by their actual world which is bigger than the classroom.

1.5 Positive Interaction between the Assessee and the Assessor. An authentic assessment allows the assessee to interact with the assessor because in reality, we interact with each other. In fact, a good test of our survival is if we know how to relate with other people because as the song goes “no one is an island, we need one another”. Assessments that allow the assessee to interact with the assessor include performance-based tasks like oral presentation, question and answer, interviews, and the like.

1.6 Emphasis on Meta-cognition and Self-Evaluation. An authentic assessment allows the students to assess their own learning and their learning processes. Students themselves could assess their own performance based on their own set goals for learning and the strategy they chose to attain these goals.
2. **What are the modes of authentic assessment?**

There are basically three different modes of assessment but they differ in their degree of authenticity. These three modes are pen-and-paper test, performance-based, and portfolio assessment.

2.1 **Pen-and-Paper Test.** This refers to the pen-and-paper objectives tests which are usually used to capture students’ cognitive traits. Knowledge that could be captured through this mode are factual, conceptual, procedural or meta-cognitive (Kratwohl and Anderson, 2001). In 1956, Bloom and his associates set the taxonomy of cognitive behavior which can be used in setting the objectives of tests. This taxonomy has also been used by curriculum planners, assessors, administrators, researchers, and classroom teachers at all levels of education for more than 4 decades. However, in 2001, David Krathwohl, Bloom’s associate in the original taxonomy and his pupil Lorin Anderson revised the taxonomy with changes particularly in the terminology and structure. The terms used for the cognitive behaviors are verbs instead of nouns. Knowledge is viewed as a product, not as a behavior, and this has different dimensions, which were added in the structure of the taxonomy. In an effort to minimize the confusion, comparison images appear below.

![Comparison of Old and New Bloom's Taxonomy](http://www.odu.edu/educ/llschult/blooms_taxonomy.htm)
The Cognitive Process Dimension in the Revised Bloom’s Taxonomy of Cognitive Objectives

<table>
<thead>
<tr>
<th>Remember:</th>
<th>Retrieving, recognizing, and recalling relevant knowledge from long-term memory.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Understand:</td>
<td>Constructing meaning from oral, written, and graphic messages through interpreting, exemplifying, classifying, summarizing, inferring, comparing, and explaining.</td>
</tr>
<tr>
<td>Apply:</td>
<td>Carrying out or using a procedure through executing, or implementing.</td>
</tr>
<tr>
<td>Analyze:</td>
<td>Breaking material into constituent parts, determining how the parts relate to one another and to an overall structure or purpose through differentiating, organizing, and attributing.</td>
</tr>
<tr>
<td>Evaluate:</td>
<td>Making judgments based on criteria and standards through checking and critiquing.</td>
</tr>
<tr>
<td>Create:</td>
<td>Putting elements together to form a coherent or functional whole; reorganizing elements into a new pattern or structure through generating, planning, or producing.</td>
</tr>
</tbody>
</table>

Source: Anderson and Krathwohl, 2001

The Knowledge Dimension of the Revised Bloom’s Taxonomy of Cognitive Objectives

<table>
<thead>
<tr>
<th>Major Types and Subtypes</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>A Factual Knowledge</td>
<td>The basis elements must be acquainted with a discipline or solve a problem in it.</td>
</tr>
<tr>
<td>1 Knowledge of terminology</td>
<td>Technical vocabulary, musical symbols</td>
</tr>
<tr>
<td>2 Knowledge of specific details and elements</td>
<td>Major natural resources, reliable sources of information</td>
</tr>
<tr>
<td>B Conceptual Knowledge</td>
<td>The interrelationships among the basic elements within a larger structure that enable them to function together</td>
</tr>
<tr>
<td>1 Knowledge of classifications</td>
<td>Types of cotyledons, kinds of animals, parts of speech</td>
</tr>
<tr>
<td>2 Knowledge of principles and generalizations</td>
<td>Pythagorean theorem, law of supply and demands, principles of assessment</td>
</tr>
<tr>
<td>3 Knowledge of Theories, models, and structures</td>
<td>Theory of Evolution, Structure of Congress</td>
</tr>
</tbody>
</table>
### C. Procedural knowledge

<table>
<thead>
<tr>
<th>Skil</th>
<th>How to do something, methods of inquiry and criteria for using skills, algorithms, techniques and methods</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Knowledge of subject specific skills and algorithms</td>
</tr>
<tr>
<td>2</td>
<td>Knowledge and subject-specific scientific methods, art of questioning</td>
</tr>
<tr>
<td>3</td>
<td>Knowledge of criteria for determining when to use appropriate procedures</td>
</tr>
</tbody>
</table>

### D. Metacognitive Knowledge

<table>
<thead>
<tr>
<th>Skil</th>
<th>Knowledge of cognition in general as well as awareness and knowledge of one’s own cognition</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Strategic knowledge</td>
</tr>
<tr>
<td>2</td>
<td>Knowledge about cognitive tasks including appropriate contextual and conditional knowledge</td>
</tr>
<tr>
<td>3</td>
<td>Self-knowledge</td>
</tr>
</tbody>
</table>

---

The Matrix of the Revised Bloom’s Taxonomy of Cognitive Objectives According to Krathwohl and Anderson 2001

<table>
<thead>
<tr>
<th>Knowledge Dimension</th>
<th>Cognitive Process Dimension</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Remember</td>
</tr>
<tr>
<td>Factual</td>
<td></td>
</tr>
<tr>
<td>Conceptual</td>
<td></td>
</tr>
<tr>
<td>Procedural</td>
<td></td>
</tr>
<tr>
<td>Metacognitive</td>
<td></td>
</tr>
</tbody>
</table>

Source: [http://www.odu.edu/educ/llschult/blooms_taxonomy.htm](http://www.odu.edu/educ/llschult/blooms_taxonomy.htm)
2.2 Performance-Based Assessment

Why Performance-Based Assessment?

Performance-Based Assessment is a process of gathering information about student’s learning through actual demonstration of essential and observable skills and creation of products that are grounded in real world contexts and constraints. It is an assessment that is open to many possible answers and judged using multiple criteria or standards of excellence that are pre-specified and public.

There are many reasons why emphasis is now given to performance-based learning assessment. These include the following:

- Dissatisfaction of the limited information obtained from selected-response tests.
- Influence of cognitive psychology, which demands not only the learning of declarative but procedural knowledge as well.
- The sometimes negative impact of conventional tests e.g., high-stake assessment, teaching for the test
- It is appropriate in experiential, discovery-based, integrated, problem-based learning approaches.

How to Assess a Performance?

The process in conducting performance-based assessment is just like any method of assessment, which starts from knowing the competency or objective to be measured before developing the assessment instrument. However, in performance-based assessment, one has to determine the performance task that could best gauge the attainment of the identified competency or objective before developing the instrument that would be used in scoring or judging the performance.

1. Identify the competency or objective that has to be demonstrated by the students with or without a product. The competency or objective to be tested should lend itself to performance-based assessment. Otherwise, use a more efficient method of assessment like giving pen-and-paper test.

Example:

**Competency:** Show knowledge, skills, and desirable attitudes in conducting a simple research related to the topics in the BD and PIA project

**Specific Objectives:**
- Conduct a survey to determine the farming practices in the Community
- Utilize research results for effective and increased production of crops
2. Describe the **task** to be performed by the students either individually or as a group, the resources needed, time allotment and other requirements to be able to assess the focused competency. Popham (1999) cited in Burke (1999) offered seven criteria in selecting a performance task that is best in gauging the attainment of a given competency or objective and these are as follows:

- **Generalizability.** This refers to the likelihood that the students’ performance on the task will generalize to comparable tasks.
- **Authenticity.** The task is similar to what the students might encounter in the real world as opposed to encountering only in the school.
- **Multiple Foci.** The task measures multiple instructional outcomes.
- **Teachability.** The task allows one to master the skill that he/she should be proficient in.
- **Feasibility.** The task is realistically implementable in relation to its cost, space, time, and equipment requirements
- **Scorability.** The task can be reliably and accurately evaluated
- **Fairness.** The task is fair to all the students regardless of their social status or gender.

### Examples of Possible Tasks for a Given Competency and Objective

**Competency:** Demonstrate knowledge and skills on weeds management

**Objectives:**

1. Define weeds  
2. Identify weeds present in the rice field  
3. Classify weeds according to types  
4. Explain how weeds affect the growth of the plant  
5. Describe the methods in controlling weeds  
6. Use a specific method in controlling weeds in the ricefield

| Note: Objectives 1-3 are best measured using pen-and-paper test while Objective 4-6 are best measured using performance assessment. However, the first three objectives could also be subsumed when doing performance assessment. |

**Possible Learning Activity 1:** Interviewing Farmers

**Possible Assessment Tasks**

- a. **Interview farmers** to identify ways in controlling weeds then **do a written report** of the information gathered  
- b. **Interview farmers** to identify ways in controlling weeds then **make a graphic organizer** of the information gathered  
- c. **Interview farmers** to identify ways in controlling weeds then **do an oral presentation** of the information gathered  
- d. **Interview farmers** to identify ways in controlling weeds then **role play** the information gathered in the classroom.
e. Interview farmers to identify ways in controlling weeds then show in the field the method to control weeds that works well in a given situation

Possible Learning Activity 2: Reading Text

Possible Assessment Tasks
a. Read the text to identify ways in controlling weeds then prepare a graphic organizer showing the different methods, their advantages and limitations
b. Read the text then do an oral presentation on the methods in controlling weeds, their advantages and limitations using a graphic organizer.

Possible Learning Activity 3: Viewing a Documentary Tape of Ways in Controlling Weeds
Possible Assessment Task: Write a reflective journal indicating personal insights about the tape viewed or personal analysis of the different methods in controlling weeds, their advantages and limitations.

Possible Learning Activity 4: Community Survey
Possible Assessment Task: Let the students develop their own survey form to gather information about the different ways that the people in the community use to control weeds then do an oral presentation of the data gathered.

Note: Although there are many possible tasks for the given objectives, choose the one that satisfies the majority if not all of the criteria in the selection of assessment tasks.

3. Develop a rubric or a scoring guide in distinguishing the different levels of performance or quality of products. A rubric reflects the criteria, levels of performance, and the weight or number of points that corresponds to each criterion or performance level. It is considered the “key to corrections” of a performance assessment task. There are two kinds or rubrics. These are the as follows:
   a. Holistic Rubric. It has a set of indicators describing the overall quality of a performance or product.
   b. Analytic Rubric. It describes the quality of a performance or product in relation to a specific criterion.

Example of an Analytic Rubric

Objective: Describe the methods in controlling weeds
Task: A Group Oral Presentation using any graphic organizer showing the methods in controlling weeds, and at least one advantage and one limitation of each method
  • When to do the work: after listening to a resource person (e.g. farmer, invited expert, teacher)
  • Where to do the work: inside the classroom
  • Duration of the work: 30 minutes (preparation), 10 minutes (oral presentation)
  • Materials needed: manila paper and any other available and affordable resources needed to complete the work.
Scoring Rubric (Analytic)

Step 1: Identify the possible criteria that could describe an excellent product (i.e. an oral presentation using a graphic organizer). You can also specify the weight of each criterion specially if the criteria vary in their degree of importance. In this task, the criteria could be as follows:

a. Group Performance (80%)
   1. Completeness of the Work (20%)
   2. Accuracy of the Given Information (20%)
   3. Organization of Thoughts (10%)
   4. Neatness of Work (5%)
   5. Resourcefulness (10%)
   6. Audience Impact (10%)
   7. Time Management (5%)

b. Individual Accountability (20%)

Step 2: Determine the number of performance levels and the qualitative and quantitative descriptions for each level. An ideal number of a performance level is an even number to avoid the central tendency source of error.

Example:

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Performance Levels</th>
<th>Weight</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>4 (Excellent)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3 (Very Satisfactory)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2 (Satisfactory)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1 (Poor)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

A. Group Performance (80%)

1. Completeness of the Graphic Organizer
   - Given are all the three methods +2 or more advantages +2 or more limitations of each
   - Given are all the three methods +1 advantage +1 limitation of each
   - The work lacks 1-2 needed information
   - The work lacks 3 or more needed information

2. Accuracy of the Given Information
   - All information given are true and acceptable based on the input of
   - All information given are true or acceptable based on the input of
   - 1-2 information is/are unacceptable based on the input of the
   - 3 or more information are unacceptable based on

<table>
<thead>
<tr>
<th>Weight</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>20%</td>
<td></td>
</tr>
</tbody>
</table>
the resource person with additional information taken from other sources

| 3. etc | B. Individual Accountability | All the members of the group have a clear role in the work | One member of the group has no clear role in the work. | Two members of the group have no clear role in the work. | Three or more members of the group have no clear role in the work. | 20% |

Example of a Holistic Rubric

**Objective:** Describe the parts of a rice plant at different stages

**Task:** A Bar Graph of the Recorded Data about Growth of the Rice Plant

4 – **Excellent** such that the work satisfies all of the following:
- presents complete information
- uses indigenous materials
- is neatly done

3 – **Very Satisfactory** such that the work satisfies only 2 of the following indicators:
- presents complete information
- uses indigenous materials
- is neatly done

2 – **Satisfactory** such that the work satisfies only 1 of the following indicators:
- presents complete information
- uses indigenous materials
- is neatly done

1 – **Poor** such that the work FAILS to satisfy any of the following:
- presents complete information
- uses indigenous materials
- is neatly done
2.3 Portfolio Assessment

What is Portfolio Assessment?

Portfolio Assessment is a purposeful, ongoing, dynamic, and collaborative process of gathering multiple indicators of the learner’s growth and development after his exposure to Agro BD and PIA concepts.

Why Portfolio Assessment?

The following are the reasons why portfolio should be considered in assessing the impact of this project:

For the students
- It tests what is really happening in the classroom.
- It offers multiple indicators of students’ progress.
- It gives the students the responsibility of their own learning.
- It offers opportunities for students to document reflections of their learning.
- It demonstrates what the students know in ways that encompass their personal learning styles and multiple intelligences.

For the teachers
- It affords teachers new role in the assessment process.
- It allows teachers to reflect on the effectiveness of their instruction.
- It provides teachers freedom of gaining insights into the student’s development or achievement over a period of time.

Principles Underlying Portfolio Assessment

- Content Principle – It reflects the subject matter that is important for the students to learn.
- Learning Principle – It enables students to become active and thoughtful learners.
- Equity Principle – It allows students to demonstrate their learning styles and multiple intelligences.

Types of Portfolio

1. Working Portfolio. This refers to a collection of a student’s day-to-day works which reflect one’s learning (process oriented). In the Agro-BD and PIA Portfolio, this could refer to what the students have used to learn Agro-BD and PIA concepts while learning the content of their curriculum.

2. Show Portfolio. This is a collection of a student’s best works (product oriented). In the Agro-BD and PIA Portfolio, this could be this all the best outputs or products of the students when they were exposed to the project.
3. **Documentary Portfolio.** This combines the working and a show portfolio (process and product oriented). In the Agro-BD and PIA Portfolio, this could include both the things the students used to learn and those that they were able to produce as a result of learning.

**The Portfolio Process**

```
Set Goals

<table>
<thead>
<tr>
<th>Collect</th>
<th>Confer/Exhibit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Select</td>
<td>Evaluate</td>
</tr>
<tr>
<td>Organize</td>
<td>Reflect</td>
</tr>
</tbody>
</table>
```

**Set Goals**

This is the first step in portfolio assessment in which the students set their goals in developing a learning portfolio. To guide the students in stating their goals, the teachers may articulate first the goals of the course, his/her expectations to students. Students could also ask what their parents expect from them. They could also be given goal-setting planners.
Goal-Setting Planner

I participate in this program because:

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

I am doing this work because:

________________________________________________________________________

What I target to accomplish are:

________________________________________________________________________

Collect

In this stage, the students should start collecting all possible entries in their portfolio. They should be told to have a temporary container for all their entries and this should be placed in the school so that keeping of entries will be part of the daily activities of the students. A good practice in collecting the portfolio entries is to have a log of all entries with a few descriptions how they were obtained and why they were kept in the portfolio.

Select

This is the stage where the students are asked to select what will finally be used to gauge their success from all their collections of possible entries in a portfolio. The selection usually depends on what the teacher requires them to do, their parents’ choice and the entries that they personally chose as the best gauge of their accomplishment in the program. Selections could include evidences that show in-and out-of class activities participated in by the students in relation to the program.

Organize

This is the stage where the students decide on how they will organize their entries. The teachers should guide them by telling them to make a table of contents for their portfolio entries and a direction on where to find them. The organization of the portfolio could vary depending on the style of the students. Some teachers take this stage as the opportunity for the students to develop or hone their creativity and resourcefulness. The organizer could also be of any material but it is suggested that the container is something flexible that it could allow one to add, modify or delete any entry anytime. Examples of materials used in making portfolios are clearbook, album, accordion bag, box with dividers, envelopes, colored magazines.
Reflect

An important trait of a portfolio is the presence of student's reflections of his/her experiences. Making reflective journals, log of entries, and labeling an evidence in a portfolio are just some of the different ways to show one's knowledge, understanding, attitudes, values, writing skills and creativity of ideas of the students. This is the opportunity for the students to reflect on the meaningfulness of their experiences as well as the impact of their teacher's styles and methodology in teaching.

Evaluate

This is the stage where the students, their peers and teachers, or even the parents are involved in rating the achievement of the students based on their evidences of learning, their reflections of their experiences, and the organizations of their portfolio. Rubrics are often used in rating students' performance using their portfolios. Rubrics in rating portfolios should be given to the students even at the beginning of the portfolio process so that they are guided on what to put in their portfolio and how to organize them based on the criteria and indicators of a quality product or excellent performance. Evaluation of the portfolio could be done by individual entry on a specified date or when the development is completed. However, most teachers prefer rating the students required evidences when they are expected to be there in the portfolio so that the students can be given immediate feedback on their work. What are usually rated at the end when the portfolio development is completed are the students’ selected evidences of their learning as well as the packaging of the portfolio from which the teacher could infer the personal traits of the students.

Confer

This is the stage when the teachers confer with the students or parents to discuss the performance of the students. This is also the time to congratulate the students for their accomplishment or to help the students identify areas for improvement.

Exhibit

This is the time to celebrate success in the form of an exhibit of students’ portfolios. In this training program, the highlight of the exhibit is the awarding of the best trainee's portfolio.
Portfolio Rubric

A. The Student’s Portfolio Rubric

Targets:

In this portfolio, the student should be able to show evidences of knowledge, skills, attitudes and values gained from participating in the BD and PIA Project. In particular, s/he should be able to document attainment of the following competencies:

<table>
<thead>
<tr>
<th>LEARNING COMPETENCIES</th>
<th>POSSIBLE PORTFOLIO ENTRIES</th>
</tr>
</thead>
</table>
| Show knowledge and understanding of biodiversity conservation and pesticides’ impact to the community | • Reflective Journals  
• Accomplished worksheets prepared by their teachers for the BD and PIA integration in their lessons |
| Identify the different ecosystems and the species present in them | • Scrapbook of different plant species  
• Scrapbook of insect collection |
| Conduct a community survey on the use of pesticides/herbicides in different farmlands | • Community Map  
• Community Survey Results |
| Participate in activities/campaigns for farmland biodiversity conservation and control of pesticides application in different ecosystems | • Posters  
• Pictures of participation in BSD and PIA projects |
The Scoring Rubric:

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Performance Levels</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>4 Outstanding</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3 Very Satisfactory</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2 Satisfactory</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1 Poor</td>
<td></td>
</tr>
<tr>
<td>A. Time Management</td>
<td>• Submitted the portfolio before the set date for the final evaluation of the program</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Submitted the portfolio during the evaluation program of the project</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Submitted the portfolio 1 day after the evaluation program of the project</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Submitted the portfolio 2 or more days after the evaluation of the program</td>
<td></td>
</tr>
<tr>
<td>B. Visual Appeal</td>
<td>1.PRACTICALITY IN THE CHOICE OF THE CONTAINER</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Allows deletion and addition of entries</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Handy</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Satisfies both indicators</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Satisfies only the first indicator</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Satisfies only the second indicator</td>
<td></td>
</tr>
<tr>
<td></td>
<td>None of the indicators was satisfied</td>
<td></td>
</tr>
<tr>
<td>2. Cover</td>
<td>• Has unique design</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• With cover Concept Explanation</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• With all the important information about the portfolio (e.g. portfolio title, name of the owner)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Satisfies all the three given indicators</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Satisfies only two indicators</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Satisfies only one indicator</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Satisfies none of the indicators</td>
<td></td>
</tr>
<tr>
<td>3. Organization of Entries</td>
<td>• With a statement of</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Satisfies all the three given indicators</td>
<td></td>
</tr>
</tbody>
</table>
### Partial Portfolio Grade

<table>
<thead>
<tr>
<th>Purpose</th>
<th>Satisfies only two indicators</th>
<th>Satisfies only two or one of the indicators</th>
<th>Satisfies none of the indicators</th>
</tr>
</thead>
<tbody>
<tr>
<td>With table of contents</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Has codes in locating entries</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Entries are labeled</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### C. Evidences and their Indicators of Quality

<table>
<thead>
<tr>
<th>Levels of Quality</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outstanding</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Poor</td>
</tr>
<tr>
<td>Very Satisfactory</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Poor</td>
</tr>
<tr>
<td>Satisfactory</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Poor</td>
</tr>
<tr>
<td>Poor</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Poor</td>
</tr>
</tbody>
</table>

#### 1. Poster Making

- Submits work on time
- Illustration communicates the effects of pesticides to the environment
- Artistically done
- Neat and well written
- With written reflection at the back of the poster.

- Satisfies all the given indicators
- Satisfies only 4 of the given indicators
- Satisfies only 2-3 of the given indicators
- Satisfies 1 or none of the given indicators
### 2. Written reflections about one’s experiences in BD and PIA activities

- a. identified at five (5) most liked activities in the program.
- b. give explanation for the most liked activities.
- c. presented reflections in unique or creative way (e.g. poem, songs, story etc.)
- d. work is free from errors (e.g. grammar or spelling)
- e. handwriting is neat and legible

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Satisfies all the given indicators</th>
<th>Satisfies only 4 of the given indicators</th>
<th>Satisfies only 2-3 of the given indicators</th>
<th>Satisfies 1 or none of the given indicators</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 3. Scrapbook of plant species

- a. Submits work on time
- b. presents at least 10 specimens
- c. classifies all specimens accurately
- d. labels all specimens correctly (according to their correct scientific and local name and correct spelling)
- e. uses indigenous/recycled/low-cost materials
- f. work is neat and displayed artistically

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Satisfies all the given indicators</th>
<th>Satisfies only 4 or 5 of the given indicators</th>
<th>Satisfies only 2-3 of the given indicators</th>
<th>Satisfies 1 or none of the given indicators</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### 4. Scrapbook of Insect Species

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Satisfies All the Given Indicators</th>
<th>Satisfies Only 4 or 5 of the Given Indicators</th>
<th>Satisfies Only 2-3 of the Given Indicators</th>
<th>Satisfies 1 or None of the Given Indicators</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Submits work on time</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. Presents at least 10 specimens</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. Classifies all specimens accurately</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>d. Labels all specimens correctly (according to their correct scientific and local name and correct spelling)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>e. Uses indigenous/recycled/low-cost materials</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>f. Work is neat and displayed artistically</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 5. Self-Selected Entries

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Satisfies All the Given Indicators</th>
<th>Satisfies Only 3 of the Given Indicators</th>
<th>Satisfies Only 2 of the Given Indicators</th>
<th>Satisfies 1 or None of the Given Indicators</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. At least 2 entries are added</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. Entries are related to BD and PIA</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. The entries are properly labelled</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>d. The importance of these entries are reflected</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Final Rating

---

lx

---
**B. The Teacher’s Portfolio Rubric**

---

**Targets**

In this portfolio, the teachers should be able to show evidences of knowledge, skills, attitudes and values gained from participating in the BD and PIA Project. In particular, s/he should be able to document attainment of the following competencies:

<table>
<thead>
<tr>
<th>LEARNING COMPETENCIES</th>
<th>POSSIBLE PORTFOLIO ENTRIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Show knowledge, understanding, and attitude towards biodiversity conservation</td>
<td>• Certificates of Participation in the training programs organized for the participants of the progress</td>
</tr>
<tr>
<td>and pesticides’ impact to the community</td>
<td>• Reflections/Insights gained</td>
</tr>
<tr>
<td></td>
<td>• Reference materials</td>
</tr>
<tr>
<td>Show skills in integrating farmland biodiversity conservation and pesticides</td>
<td>• Matrix of Integration</td>
</tr>
<tr>
<td>impact assessment in the basic education curriculum</td>
<td>• Lesson Plans Created</td>
</tr>
<tr>
<td></td>
<td>• Output of students trained</td>
</tr>
<tr>
<td>Conduct a community survey on the use of chemical substances (e.g. pesticides,</td>
<td>• Community Map</td>
</tr>
<tr>
<td>herbicides, and others) in different farmlands</td>
<td>• Community Survey Results</td>
</tr>
<tr>
<td>Participate in activities/campaigns for farmland biodiversity conservation and</td>
<td>• Students’ Posters</td>
</tr>
<tr>
<td>control of pesticides application in different ecosystems</td>
<td>• Pictures of participation in BD and PIA projects</td>
</tr>
<tr>
<td>Develop a project plan for biodiversity conservation and pesticides impact assessment</td>
<td>• Project Proposals</td>
</tr>
<tr>
<td>in the school system</td>
<td></td>
</tr>
<tr>
<td>Implement the proposed project for biodiversity conservation and pest impact</td>
<td>• Project Final Report</td>
</tr>
<tr>
<td>assessment in the school system</td>
<td></td>
</tr>
</tbody>
</table>
## The Scoring Rubric

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Performance Levels</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>4 Outstanding</td>
<td>3 Very Satisfactory</td>
</tr>
<tr>
<td>A. Time Management</td>
<td>• Submitted the portfolio before the set date for the final evaluation of the program</td>
<td>• Submitted the portfolio during the evaluation program of the project</td>
</tr>
</tbody>
</table>

### B. Visual Appeal

#### 1. Practicality in the choice of the container
- Allows deletion and addition of entries
- Handy

<table>
<thead>
<tr>
<th></th>
<th>Satisfies both indicators</th>
<th>Satisfies only the first indicator</th>
<th>Satisfies only the second indicator</th>
<th>None of the indicators was satisfied</th>
</tr>
</thead>
</table>

#### 2. Cover
- Has unique design
- With cover concept explanation
- With all the important information about the portfolio (e.g. portfolio title, name of the owner)

<table>
<thead>
<tr>
<th></th>
<th>Satisfies all the three given indicators</th>
<th>Satisfies only two indicators</th>
<th>Satisfies only one indicator</th>
<th>Satisfies none of the indicators</th>
</tr>
</thead>
</table>

#### 3. Organization of Entries
- With a statement of purpose
- With table of contents

<table>
<thead>
<tr>
<th></th>
<th>Satisfies all the three given indicators</th>
<th>Satisfies only two indicators</th>
<th>Satisfies</th>
</tr>
</thead>
</table>
Has codes in locating entries
Entries are labeled

Partial Portfolio Grade

<table>
<thead>
<tr>
<th>C. Evidences and their Indicators of Quality</th>
<th>Levels of Quality</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>1. Reflective Journal of one’s experiences in BD and PIA activities</td>
<td>Outstanding</td>
<td>Very Satisfactory</td>
</tr>
<tr>
<td>a. reflected on at least 5 activities done in this project</td>
<td>Satisfies all the given indicators</td>
<td>Satisfies only 4 of the given indicators</td>
</tr>
<tr>
<td>b. give insights gained from all these activities</td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. presented reflections in unique or creative way (e.g. poem, songs, story etc.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>d. work is free from errors (e.g. grammar or spelling)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>e. handwriting is neat and legible</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. Community Survey Report
The following information are

Provided all the needed information
given:

<table>
<thead>
<tr>
<th>Given Information</th>
<th>Failed to Provide 1-2 of the Needed Information</th>
<th>Failed to Provide 3-4 of the Needed Information</th>
<th>Failed to Provide 5 or More of the Needed Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Village map of the movements of pesticides from store to village with labels and legends</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. Type of chemicals used by the farmers (trade name, common name, hazard level, chemical family, type)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. Farmers spraying behavior (sprayer’s name, activities done before, during and after spraying)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>d. Amount of Pesticides Used (crops and the pesticides used, tank size, no. of tanks used, spray/cropping season, cropping season year, total liter used/yr)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>e. Storage and disposal of pesticides by farmers in the village (detailed description of the activities are reported)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>f. Additional information on pesticides use in the area (arial sprays, etc- given are common name, type, hazard level, spray cycle, amount used/cycle/ha)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3. Project Proposal

It has the following information
<table>
<thead>
<tr>
<th>a. With background information</th>
<th>Provided all the needed information</th>
<th>Failed to provide 1-2 of the needed information</th>
<th>Failed to provide 3-4 of the needed information</th>
<th>Failed to provide 5 or more of the needed information</th>
</tr>
</thead>
<tbody>
<tr>
<td>b. With clearly stated objectives</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. Strategies and outcomes to include: activities undertaken, persons involved, timeframe, budgetary requirements</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>d. Activities undertaken should include: orientation and homeroom and community meeting on the project; BD mapping inside and outside the school campus; conduct of survey in community farmland; identifying threats to biodiversity; ranking and selection of BD species for conservation; and pesticides impact assessment; implementation of the project proposal</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>e. Indicators are given (e.g. quizzes, periodical test papers, monthly test papers,</td>
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</table>
f. The duration of the project is extended not just within the duration of the funded project.
g. Budget is detailed to include itemized expenses per activity

<table>
<thead>
<tr>
<th>4. Matrix of Integration and Lesson Plans</th>
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<tbody>
<tr>
<td>a. The matrix of integration is given</td>
</tr>
<tr>
<td>b. Lesson plans made are for topics in the matrix</td>
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<tr>
<td>c. There are at least 5 lesson plans made</td>
</tr>
<tr>
<td>d. The lesson plan shows focus on the subject matter of the area with the integration of BD and PIA concepts and information</td>
</tr>
<tr>
<td>Satisfies at least 3 of the given indicators</td>
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<td>Satisfies only 2 of the given indicators</td>
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<td>Satisfies only 1 of the given indicators</td>
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<tr>
<td>Satisfies none of the given indicators</td>
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<tr>
<th>5. Final Project Report</th>
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<tbody>
<tr>
<td>The following information are included:</td>
</tr>
<tr>
<td>a. General information (e.g. name of the</td>
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<tr>
<td>Provided all the needed information</td>
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<tr>
<td>Failed to provide 1-2 of the</td>
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<tr>
<td>Satisfies none of the given indicators</td>
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</tbody>
</table>
### School and Address, Number and Grade or Year Level of the Students Involved, Name of the Teacher and IP Facilitator

- b. Brief descriptions of the biodiversity conservation project (include name of the project, reasons for selecting the project)
- c. Status of the project
- d. Accomplishments
- e. Activities to integrate BD and PIA in the classroom
- f. Sustainability mechanism for the project
- g. Issues and constraints
- h. Stakeholders of the project
- i. Impact indicators.
- j. Conclusions drawn from the data
- k. Recommendations given for the next implementation of the project

<table>
<thead>
<tr>
<th>6. Documentation/Pictures of the Projects</th>
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<tbody>
<tr>
<td>Implementation to include the following:</td>
</tr>
<tr>
<td>a. Photo of</td>
</tr>
<tr>
<td>signage/billboards with proper caption</td>
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<tr>
<td><strong>b.</strong> Photo orientation with farmers and barangay officials with proper caption</td>
</tr>
<tr>
<td><strong>c.</strong> students activities with proper caption</td>
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<td><strong>d.</strong> others, please specify:</td>
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| **7. Self-Selected Entries**          |                  |                                          |                                       |
| **e.** At least 2 entries are added   |                  |                                          |                                       |
| **f.** Entries are related to BD and PIA |                  |                                          |                                       |
| **g.** The entries are properly labeled |                  |                                          |                                       |
| **h.** The importance of these entries are reflected |                  |                                          |                                       |

| Final Rating                          |                  |                                          |                                       |
Ballot Box Test

A Sample Ballot Box Test Items for Agro-Biodiversity Conservation

1. Which is a local frog species? (with actual specimen)
   a) Taiwan frog
   b) local frog
   c) American frog

2. Which one is edible species of paddy snail?
   a) Golden apple snail
   b) Iggi species
   c) Tree snail

3. Which one is a native species of catfish?
   a) African catfish
   b) Local catfish species
   c) Thai catfish species

4. Which one is the seed of Dao tree?
   a) Seed of Dao
   b) Seed of Raintree
   c) Seed of Ipil-Ipil

5. Which one can be considered as exotic species?
   a) Snakehead fish
   b) local catfish species
   c) golden apple snail

6. Which one provides ecological service to a rice farmers?
   a) Spider specimen
   b) insect pest specimen
   c) weeds
7. Which one can be considered indicator of healthy ecosystem?
   a) bee
   b) ear of hybrid corn
   c) Cavendish banana

8. Which pesticide is considered high in acute toxicity properties?
   a) pesticide container with yellow label
   b) pesticide container with blue label
   c) pesticide container with red label

9. Which one is required for the development of the shell of snails?
   a) weeds
   b) lime
   c) water

10. Which of the following is commonly feed on by frogs?
    a) water bugs
    b) seeds
    c) weeds

11. Which of the following is an indigenous species of vegetables?
    a) Cabbage
    b) forest fern species
    c) weed

12. Which of the following tree seedlings is an indigenous forest tree species?
    a) Mahogany seedling
    b) "malapapaya" seedling
    c) Indian tree seedling

13. Which of the following represent ecological services?
    a) Parasited larva
    b) golden apple snail
    c) urea

14. Which of the following is not part of a rice ecosystem?
    a) Aquatic beetle
    b) duck weed
    c) fingerling of tilapia
15. Which could be an indicator of a healthy pond ecosystem?

   a) Native eel species
   b) bull frog
   c) Empirata cylindrica
Chapter Five

Session Guides on Agro-Biodiversity Conservation

Introduction

The following session guides are compilation of activities intended to facilitate the introduction of basic concepts and principles in agro-biodiversity conservation. These session guides include all the important topics in building the capacity of learners and farmers. Such topics are integrated in the basic education curriculum or on the farmer’s field school learning activities.

The learning activities in each of the session guides are anchored on the principles of discovery-based and participatory learning. The learners go through the learning processes that focused on group learning, hands-on activities and conduct of participatory action research.

Most of the session guides were developed by the DANIDA-Thailand SAFE Project and the Thai Education Foundation and these session guides include the following: orientation to the biodiversity in the farmland; recruitment of BD task force; id areas, habitats, and mapping; collection of biodiversity samples; identifying threats to biodiversity; ranking and selection of species; food chain and food web; planning for the HCP – were developed by the DANIDA-Thailand SAFE Project and the Thai Education Foundation. Additional guides were developed during the project implementation in Davao del Norte.
BD1
Orientation to Biodiversity in the Farmland

Learning Objective:

To enable students and farmers to explain what biodiversity on farmland is, why it is important and why it is necessary to plan for its conservation.

Materials

Photos of Biodiversity (Supplied with Guide)
Flip Chart Paper
Markers
Paper Tape

Time: 2 hours

Procedure

1. What is the Biodiversity in the Farmland?

To start the discussion with students, ask them “what is biodiversity?”. Students will have a number of answers.

Summarize their answers and see to it that it reveals this idea. “Biodiversity means all the different kinds of living things, both large and small. Some are so small that you cannot see them, like bacteria. Some are very large, like trees. It includes plants, animals, insects, fish, bacteria, algae and molds, everything that lives.”

2. Why is the biodiversity important to us?

Ask them “Why is biodiversity important to us?” Students will normally talk about things they can eat and things they can sell. Tell them to mention things they make from biodiversity. Tell them that biodiversity can have many important uses such as:

- Food
- Things which can be sold
- Medicine
- Things that farmers can make use of, like wood, certain kinds of leaves and straw
- Social and religious uses, such as certain flowers for wedding and funerals, or trees which are respected in the religion
• Making the area beautiful or pleasant, such as shade from trees, flowers, and green plants

It is better if you have photos of biodiversity to stimulate sharing or discussion among students.

3. Where could we find Biodiversity?

The teacher can ask the question, “Where can we find biodiversity?” Further, tell students that there are probably some areas in the farm where the biodiversity is more than others. Teacher can then show a picture (diagram) of a “farmscape” which has a number of “high biodiversity” areas on it. One by one, a teacher can show the pictures of these eight areas. The pictures should be given to students, one by one, as they are discussed. Then they could be posted on the wall in the room. The either areas are as follows:

- Trees and Forest
- Farm Ditches and Canals
- Fields
- Field borders/dikes
- Homestead Areas
- Roadsides
- Wetlands and Marshes
- Ponds

Ask students if each of these areas contain biodiversity which they earlier said as important: food; things which can be sold; medicine; things that farmers can make things from, like wood, certain kinds of leaves and straw; social and religious uses, such as certain flowers for wedding and funerals, or trees which are respected in the religion; and making the area beautiful or pleasant, such as shade from trees, flowers, and green plants.

Now, talk to students about how the amount of biodiversity has changed over the past 10 or 20 years. Which type is less than before? Why? Which is more than before? Why? What will happen in another 5 years? 10 years? 20 years?

Explain to students that the main reason why biodiversity disappears is because there is no plant to protect it. If they don’t have a plan biodiversity will totally disappear. They don’t know how much they want, how much they need, where they want it and how it will be monitored. Having no plan is the same as having a plan to kill it all!! Biodiversity should then be conserved. Let students discuss this.
E. Summary

Now is the time that teacher can ask the group if they are interested in working together to find out more about the farmland biodiversity in our community and make a plan for conservation. The plan should be for very specific types of biodiversity and not all of it. Making a plan requires time to meet many times. It requires a number of interested people in the community. If they are interested, they need to talk to other people in the community and agree on a time to begin working on the plan.

F. Suggestion for Student works:

Individual:

An essay with the following information:
- Are the differences in biodiversity in our farmland?
- What are the uses of biodiversity in a community?
- Where are biodiversity in a community?
- What do you think about farmland biodiversity?
BD2
ID Areas, Habitats and Mapping

A. Learning Objective:

The main objective of this activity is to become familiar with the main farm ecosystems in the area, where they are located and what they look like and use information for planning the survey.

B. Materials

- Flip Chart Paper
- Markers
- Paper Tape

C. Time: 3 Hours

D. Procedure

1. Teacher explains that this activity is meant to help understand the various types of habitats on the farm where high levels of biodiversity exist. To do this, students and farmers should first review the 8 types of farm ecosystems they discussed in the first session. Teacher should ask them if they can see any of these same ecosystems in their area. Are there other ecosystems which are important?

2. Identify locations: Students and farmers should go out to an area and walk around it, taking notes so that they can draw a map of the area when they return.

3. Making BD Map: When the groups return from the field, they should be provided a piece of flip chart paper to make a map. To help them, the following instructions should be given:

   First, put on the map the major landmarks. These are usually roads, canals, ponds/lakes.

   Second, they can put on larger areas such as wetlands, forested areas and houses.

   Third, they can put in fields and indicate what crops are in them (or will be in them).

   Finally, any other details can be added which the farmers feel are important. The specific areas should be labeled so the farmers can remember which area is which. The facilitator can ask the farmers, “how has this area changed in the last 5-10-20 years?” “Which areas are most likely to change in the near future and how?”
E. Summary

Once the map is completed, students and farmers can discuss which of the areas will be most useful to analyze further for biodiversity. These areas should be recorded so they can plan for the survey in the next session.

Suggestion for Student’s Works:

Individuals:

An essay with the following information:
- What are the habitats in our farmland?
- How has the area changed during the past years?
- How has the farming practice affected these areas?

Group:
- A drawing of community farmland map with various types and names of habitats in native and English languages. Keep the drawing for use in various presentations.
A. Learning Objective:

The objectives of this activity are for students and farmers to tell that there is a very high amount of biodiversity on farms, and that some areas of the farm have richer biodiversity than others, and to document the information of the biodiversity in the areas.

B. Materials

- Plastic bags for collecting samples
- Flip Chart Paper
- Markers
- Paper Tape

C. Time: 4 hours

D. Procedure

1. Teacher explains that this activity will take a long time but is very important because it will help to understand how much biodiversity there is on the farm and why it is important.

2. Farmers and students are divided into small groups to survey important habitats identified in the previous session. They need to collect sample species of both plants and animals and write information like those species where they were found, their benefits and threats.

   **Plants:** Have the groups select some of the ecosystems identified on the map and collect samples of every plant species. Have the groups put each of the samples on a flip chart with a name and the use of the plant. Have the groups think about other seasons of the year and ask them if there are plants at that time which they did not see today. Have them draw the picture or write the name of these plants and add them to their collection.

   **Insects:** Have groups collect samples of insects from the same ecosystems using a sweepnet and water bowl. The insects should be killed by placing them in a plastic bag with a small amount of alcohol on a cotton swab (or tissue). Have the groups think about other seasons of the year and ask them if there are insects at that time which they did not see today. Have them draw the picture or write the name of these insects and add them to their collection.
Aquatic Species: It is difficult to collect aquatic species. By using a chart of fish and other aquatic species, have them identify which ones they normally have in the area. Draw the names of these on a sheet of paper and put it on the board.

Other Species: Ask the farmers if there are other species which they did not see today but which they know live in the area. These could be birds, reptiles or other species.

3. The group should put the sample species collected with their names on large newsprints for presentation to the large group. Have each group of farmers present their findings.

4. Have the groups record their findings on the large newsprint to be used for analysis. See the table below.

BD level:
“How many species are found in each habitat?”
“How many species are found in your farmland?”

Identify type of benefits in each habitat:
“Where are the sources of foods/ income/ medicines and etc.?”

Identify levels of benefit in each habitat:
“Which habitats provide highest source for foods?”
“Which habitats provide highest source for income?”

How is the condition of each habitat throughout the year?
What are the threats to each habitat?
E. Summary

Once they have made these groups, have them identify which species are beginning to disappear from the area. Mark these with a red circle or some other way. If possible, make a preserved specimen of each of the samples.

F. Suggestion for Students’ Works:

Individuals:
- Essay with following questions:
  - What do you think about the BD found in our farmland?
  - Which species are nearly gone or have disappeared?

Groups:
- Farmland BD Index Book:
  - Pictures of each species
  - Location
  - Benefits of each species
  - Threat to the species
- Reports:
  - What are sources of foods, income, medicine, etc.? Show the statistics and graph.
  - How many species are found in each habitat and in the farmland? Show the statistics and graph.
BD4
Identify Threats to Biodiversity

A. Learning Objective:

The objective of this activity is to identify species identified in the farmland survey which are threatened, meaning their population levels are low or are being adversely affected.

B. Materials

- The display from the farmland survey
- Paper cards (color is best, but pieces of paper cut from flipchart paper also works okay)
- Markers
- Paper Tape

C. Time: 1 Hour

D. Procedure

a. Teacher explains that many species that they have in their farmland have very healthy populations. There are a lot of them and they seem to be doing well in the farm environment. Teacher can ask the groups “Which of the plants, animals, insects and fish species we have seen or collected seem to be doing very well?” The farmers could talk about some weeds, grasses and insects which abound in the farm.

b. From each of the lists of organisms (plants, insects, animals, aquatic organisms, etc.) have the farmers pick 5 organisms which are having problems, i.e., meaning that their populations are low or are much lower than they used to be a few years ago. During the discussion, the farmers could be asked to think of an organism which is not on their display. They should add it during the discussion.

c. For each of these organisms, the name of the organism can be written in big letters on a red card and should be placed on the board.

d. Now next to each of these red cards, the farmers should list the reasons why this organism is being threatened. Example:

```
Frogs
Too many being caught
Too much pesticide used
Water in small ponds overused
No water for tadpoles
```
E. Summary:

After they have selected the species and identified the specific threats, the farmers can be told that they need to keep documenting these species so they can think about them again when they select specific species to develop their Habitat Conservation Plan (HCP) for the selected organism. This will be done in the next session.
BD5
Ranking and Selection of BD Species for Conservation

A. Learning Objective:

This session will result in the selection of one or more species for the farm community to develop a habitat conservation plan. The ranking activities should be done by farmers, not the students, so that the community will be responsible to improve the quality of the farmland biodiversity.

B. Materials

- The original display of the species collected
- The display of the species which are threatened
- Flip Chart Paper
- Markers
- Paper Tape

C. Time: 3 hours

D. Procedure

1. Teacher explains that this activity will result in the selection of species for which action plans will be developed. It is important to remember that only a few species (maybe even one!) can be selected to begin with as more than that becomes too complicated. More species can be added at a later time if the community wants to.
2. Now, also write the six reasons on six cards (colored) why biodiversity might be important;

Food
Sell for Money
Construction Materials

Medicine
Culture or Religion
Good Environment

3. Then, have the community look at the displays of organisms they have collected. Ask, “Are there any more species you want to add to the list?” Then, have each of the farmers select what they feel are the five most important organisms in each group based on these six factors and write each organism in big letters on one piece of
paper. One paper, one organism. They should put their own personal ideas down and not that of others.

4. Put all of these on the board. Take down duplications so that each species is written only one time. Now, for each group of organisms (plants, animals), start by putting one organism on the board. Take the next card and ask the farmers, “is this one more or less important than the one on the board?” Put it where the farmers say. Take the next card and do the same. The result will be a priority list of organisms which the farmers feel is the most important, from first to last. It will look like this:

|   |   |   |   |

5. After they have completed this exercise for each group of organisms, have them refer back to the list of organisms which are threatened. Ask, “Are there organisms which occur on both lists?” The ones that appear on both lists are organisms which are 1) Important and 2) threatened. From this, have the farmers give a priority again for which one or two species they want to begin developing a HCP for the selected organism.

E. Summary

The organisms that are selected in this process will be the organisms that the community will begin developing an HCP for. Be sure to record the process and the specific organisms selected. Later, the farmers may want to go back and select additional organisms to protect. Have one of the farmers summarize what happened in the session. Tell them the next step is to develop the HCP plan.
BD6
Recruit the Biodiversity Task Force

A. Learning Objective:

The main objective of this activity is to ensure that students and farmers understand very clearly what is involved in making a biodiversity action plan, or a “habitat action plan” (HCP). The reason for that making a HCP takes a considerable period of time and it is important that farmers are involved and committed to completing it. School children can learn through the process but the conservation efforts will require community involvement in the process.

B. Materials

- A set of photos illustrating the steps to complete a HCP
- Flip Chart Paper
- Markers
- Paper Tape

C. Time:

1 hour

D. Procedure

1. Set up a meeting with interested farmers: Teachers and students can talk to farmers in the community and invite them to a meeting at the school to discuss about school project on the farmland biodiversity conservation.
2. Introduce the farmland biodiversity to farmers. Teacher needs to repeat activity BD1 to give orientation on the farmland biodiversity to farmers in the meeting.
3. Present the Habit Conservation Planning Process. For the farmers to understand the process, they can be shown photos of the following activities which occur in the development of the HCP:
   - Survey of local farmland
   - Survey and collection of organisms on the farmland
   - Preparing displays and ranking of the organisms
   - Selecting organisms which are important to the farmers and which they will use as basis for developing a conservation/ action plan
   - Develop the plan
   - Document the entire process to present to the community and potential funders
   - Implement the plan

When teacher shows a photo of each of the processes for the farmers to understand what the activity looks like, s/he can talk about each activity and why it is done. Then,
all the photos should be posted on the wall so the farmers can see all the processes from beginning to end.

Teacher explains that this activity will help the farmers to decide whether or not they want to develop an HCP. Teacher should tell the farmers that they will need to meet at least six times to develop a plan, and that after it is developed they will need to implement their plan. This will require a commitment on the part of the farmers.

E. Summary

After the farmers understand the processes and time commitments, teacher asks the farmers “How many people would like to work with students to find out more about the farmland biodiversity in our community and to make a habitat action plan together?”
BD7
Feeding Preference of Paddy Frogs

Introduction

Frogs are of great importance to humans. Most frogs live on a diet of insects, and in many areas they help control populations of mosquitoes and crop-damaging insects. In turn, they may be a food source for humans—the legs of one type of frog are considered a delicacy in many parts of Europe. Frogs are also important in teaching and scientific research. Adult frogs are often used to teach students about the anatomy and physiology of vertebrates, or animals that have a backbone. Frog eggs, meanwhile, help scientists learn about embryonic development. Ecologists, scientists who study the Earth’s living ecosystems, are interested in frogs and other amphibians because these animals are considered bio-indicators. This means that the health of frog populations is thought to reflect the health of the ecosystem as a whole.

Frogs have sharp eyes that help them capture insect prey and identify predators or other dangers in their environment. The eyes of many frog species bulge out from the sides of the head, enabling them to see in nearly all directions and providing them with good depth perception, which helps them when capturing prey. Frogs also have a well-developed sense of hearing, which plays a role in locating mates and sensing predators. Behind each eye is a large disk called the tympanic membrane, an external eardrum that picks up sound waves and transmits them to the inner ear and then to the brain (Microsoft Encarta, 2007).

Objectives

1. Determine the common insects/other organisms that serves as food for the paddy frogs.
2. Explain the importance of knowing food preference of common frogs.

Time Required

120 minutes

Materials

marker pens, paper, tape, AESA paper, plastic bags, pins, dissecting board, dissecting set, catching net

Procedure

1. Ask each group to collect frogs from the rice field.
2. Return to the session hall. Immobilize the frogs and mount them on a dissecting board.
3. With the scalpel, open the gut of the frog. Slowly collect the insects/organisms inside the stomach of the frog.
4. List the names and the number of each organism found inside the stomach
5. Ask each group to present their findings to the big group.

Discussion Questions

1. What were the common insects found inside the stomach of frogs?
2. Are frogs important organisms in the rice ecosystem? Why?
3. What conclusions can you draw from this exercise?

Follow-up Activity: With farmers, design and conduct study on effect of frogs on management of common pests/herbivores such as stemborers and others.
Introduction

Snail is considered as any of the many as 50,000 kinds of marine, freshwater, and terrestrial species of mollusks. Gastropods, where the mollusks like snails belong, (literally, belly-footed animals) have been able to adapt their singular means of locomotion to a wide range of water and land habitats, from the depths and shorelines of oceans to all bodies of fresh water, and from tropical areas to mountains and deserts.

Snails move by means of wavelike series of muscular contractions along the bottom of the foot. This motion is often aided by cilia or by a track of laid-down slime for land snails. Snails feed mainly on algae and decaying matter and are important members of the food web, being a source of food to fish and waterfowl.

The spiral shell into which the snail withdraws serves mainly as protection against predators and desiccation. Land snails are particularly well adapted to changes in moisture; some desert species are able to remain sealed within their thick shells for two or more years. Land snail species of more moist habitats usually have thinner shells; slugs, which live in very moist places and are often considered snails, have only vestigial shells (Microsoft Encarta, 2007).

Objective

Collect species of snails in different ecosystem in the farmland.

Time Required

120 minutes

Materials

marker pens, paper, tape, AESA paper, plastic bags, small plastic bowl,

Procedure

1. Assign each group to collect snails in an approximately 1 m² area in the rice field. Let them collect samples of different snail species.
2. Return to the session hall. Sort the specimens.
3. Ask each group to present their findings to the big group.
4. Summarize the activity by using the discussion questions as your guide.

Discussion Questions

1. Are indigenous paddy snail species important organisms in the rice ecosystem? Why?
2. What are the factors/reasons in the decline of local species of paddy snails?
3. What conclusions can you draw from this exercise?

Follow-up Activity:

With students, set-up a simple experiment to study the life cycle of snails.
Appendices
Glossary

Abundance. The total number of individuals, or biomass, of a species present in a specified area.

Adaptation. An evolutionary process that changes anatomy, physiology, or behavior, resulting in an increased ability of a population to live in a particular environment. The term is also applied to the anatomical, physiological, or behavioral characteristics produced by this process.

Aestivation. Adormant state that some animals enter during the summer, involves a reduction of metabolic rate.

Agriculture. It is the science of farming, including growing plants and raising animals.

Biodiversity. It is the abundance of different plant and animal species found in an environment.

Biological Control. It is the action of parasites, predators, or pathogens in maintaining another organism’s population density at a lower average level than would occur in their absence. Biological control may occur naturally in the field or result from manipulation or introduction of biological control agents by people.

Biomes. They are distinguished primarily by their predominant plants and are associated with particular climates. They consist of distinctive plant formations such as the tropical rainforest biome and the desert biome.

Biosphere. The portions of the earth that support life; also refers to the total global ecosystem.

Carnivore. An organism that consumes flesh; approximately synonymous with predator.

Community. An association of interacting species living in a particular area; also often defined as all the organisms living in a particular area.

Conservation. A human activity to manage the resources of the Earth which includes preservation of habitats or species, management of ecosystems, reclamation of damaged habitats and even the creation of new ones.

Decomposition. The breakdown of organic matter accompanied by the release of a carbon dioxide and other inorganic compounds; a key process in nutrient cycling.

Ecology. The study of the relationships between organisms and the environment.

Endemic. A term applied to populations or species that are found in a particular locality, for instance an island, and nowhere else.
Ecological Services. The conditions and processes through which natural ecosystems, and the species that make them up, sustain and fulfill human life.

Estuary. The lowermost part of a river, which is under the influence of the tides and is a mixture of seawater and freshwater.

Eutrophication. An increase in the nitrates, phosphates or organic content of aquatic systems. Pollution is the usual cause of eutrophication in lakes and rivers and is sometimes called anthropogenic or cultural eutrophication.

Evaporation. The process by which a liquid changes from liquid phase to gas, as in the change from water to water vapor.

Evolution. The process that changes populations of organisms over time. Since evolution ultimately involves changes in the frequency of heritable traits in a population, we can define evolution more precisely as a change in gene frequencies in a population.

Food Web. A summary of the feeding relationships within an ecological community.

Greenhouse Effect. The warming of the earth’s atmosphere and surface as a result of heat trapped near the earth’s surface by gases in the atmosphere, especially water vapor, carbon dioxide, methane, ozone, nitrous oxide, and chlorofluorocarbons.

Guild. A group of organisms that make their living in a similar way; for example, the seed-eating animals in a desert, the fruit-eating birds in a tropical rain forest, or the filter-feeding invertebrates in a stream.

Habitat. It is a space (which includes food, water and shelter) suitable for the survival and reproduction of an organism.

Hibernation. It is a dormant state, involving reduced metabolic rate, that occurs in some animals during the winter.

Indigenous Organism. An organism that lives naturally in a particular region and not introduced there by man.

Interspecific Competition. A competition between individuals of different species.

Intraspecific Competition. A competition between individuals of the same species.

Limnetic Zone. The open lake beyond the littoral zone.

Lithosol. Soils that are very low in organic matter and composed on rock fragments.

Littoral Zone. The shallowest waters along a lake or ocean shore; where rooted aquatic plants may grow.
Mangrove Forest. A forest of subtropical and tropical marine shores dominated by salt-tolerant woody plants.

Mineralization. The breakdown of organic matter from organic to inorganic from during decomposition.

Natural Capital. It is the stock of goods derived directly from nature that have the potential to contribute to the long-term economic productivity and welfare of societies.

Natural Enemies. These are predators, parasites, or pathogens that are considered beneficial because they attack and kill organisms that we normally consider to be pests.

Niche. The environmental factors that influence the growth, survival, and reproduction of species.

Nutrient Cycling. It is the use, transformation, movement, and reuse of nutrients in ecosystems.

Omnivore. A heterotrophic organism that eats a wide range of food items, usually including both animal and plant matter.

Parasite. It is an organism that lives in or on another organism, call the host, deriving benefits from it; parasites typically reduce the fitness of the host, but do not generally kill it.

Parasitoid. An insect whose larva consumes its host and kills it in the process; parasitoids are functionally equivalent to predators.

Phytoplankton. Microscopic photosynthetic organisms that drift with the currents in the open sea or in lakes.

Producer (aerotroph). An organism that makes its own food from light energy (using photosynthesis), or chemical energy (using chemosynthesis). Most green plants many protists (one-celled organisms like slime molds) and most bacteria are producers. Producers are the base of the food chain.

Species Diversity. A measure of diversity that increases with species evenness and species richness

Symbiosis. It is a situation in which two dissimilar organisms live together. There are many types of symbiosis, including mutualism (in which both organisms benefit), commensalisms (in which one organism benefits and the other is not affected), or parasitism (in which one organism benefits at the other organism’s expense). Symbiosis is usually defined as a situation in which two dissimilar organisms live together to the benefit of both - which is called mutualism. The word symbiosis means "living together" in Greek.

Trophic Level. The trophic position in an ecosystem, for instance primary producer, primary consumer, secondary consumer, tertiary consumer, and so forth.
**Tropical Rain Forest.** A broadleaf evergreen forest growing in tropical regions where conditions are warm and wet year-round.

**Zooplankton.** Animals that drift in the surface waters of the ocean or lakes; most zooplankton are microscopic.
References


