

Draft

ENVIRONMENTAL EDUCATION  
ACTIVITY MANUAL

(English Language)

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## INTRODUCTION

This manual was designed by environmental educators in Cambodia to assist school teachers and environmental officers to educate young people about the environment. As Cambodia emerges into a new stage of development, the questions and issues surrounding natural resources are taking on ever more significance. It is crucial that both the current and future generations are able to understand these issues and make sound decisions for sustainable development. As a starting point, this manual focuses on education of the younger generation, namely school-age students in upper primary and lower secondary level. It is a culmination of efforts by 4 organizations working in the Cambodian environment sector, combining several years of field experience and with the participation of professional educators.

The manual is designed as an extra-curricular teaching material, however, it is hoped that school teachers will be able to link the activities to other lessons within the national curriculum. It is also possible to use the manual with out-of-school children, however some adaptations will need to be made by the teacher. Some of the lessons may not be feasible with illiterate children.

### **Manual Strategies**

To make the manual most relevant to Cambodia, the authors divided the topics into 5 main sections, namely:

- General Environment
- Forests
- Wildlife
- Water
- Waste

In general, each section explores the fundamental concepts associated with a resource, raises issues and problems associated with this resource, and suggests activities and initiatives that students can take to improve the local environment. In all cases, the authors tried to relate the background materials and learning experience to the situation in Cambodia.

Activities have been designed as simply as possible in terms of structure, concepts, terminology, and preparation needs. Few materials are necessary and almost all of these should be readily accessible in all parts of the country.

Teaching about the environment is not an easy task. Many environmental issues are complicated and it may be difficult to convey abstract concepts to young students. However, experience in environmental education has taught us some techniques for making the experience not only effective but also enjoyable for both students and teachers.

## **Important concepts for implementation**

Student-centered learning – the activities are designed to encourage student-centered learning. This concept means that students are at the center of the learning process as compared to the traditional teacher-centered learning method in which students are focused on the teacher. In student-centered learning, students learn from each other (group learning) and through self-discovery, investigation, and participation. In this sense, the role of the teacher is one of facilitator of learning.

Participatory learning – It is far more effective for students to discover and learn things by themselves rather than to be lectured by a teacher. The idea behind participatory learning is that students will be actively involved in developing skills essential to learning.

Community outreach and student activism – It is important that the activities are given relevance for students by connecting them to “real life”. Many of the activities encourage students to make contact with community members, to learn from them, and to express and share their own ideas about the environment. Students are also encouraged to play an active role in improving the local environment by such activities as planting trees and cleaning up the village or school.

Care and responsibility for environment – The teacher should cultivate a feeling of caring and responsibility for the environment among his/her students. Changes in attitude and behavior are the ultimate goal of environmental education because they will influence an individual throughout their lifetime.

## **Practical Suggestions for Using the Manual**

Our experience has shown us that the following steps are very important and highly recommended for effective implementation of these teaching materials.

Training of teachers – It is important for teachers to receive practical training in the implementation of the activities. This training should provide time for teachers to practice implementing the activities and to give feedback on their performance.

Importance of teacher preparation – The lessons require the teacher to prepare some materials and to read the background materials and lesson procedure carefully. This extra effort on the part of the teacher is crucial for successful implementation of the activities, and it will be well-rewarded by the enjoyment and effective learning of the students.

Adapting the activities – The activities suggest an age group for which the concepts are appropriate. If you are working with children outside this range, you may need to adapt the lesson to fit the level of your students.

Student enjoyment – Many teachers may interpret noise and laughter in the classroom as a sign of lack of control over their class, but in fact it is usually only a sign of active learning. Allow your students to enjoy their experience in environmental education and they will come away with positive attitudes towards learning and the environment.

Improve your teaching through experimentation and experience – A great deal can be learned through trial and error. Prepare as much as possible for your activities, but don't be afraid to try new ideas. When you teach the lessons, pay attention to the reactions of your students. Are they stimulated and laughing, or do they look bored and confused? Try to read these signals and adapt your lessons accordingly.

Extension - The activities also contain an extension activity at the end of each lesson, which is aimed to deepen the understanding of the students. The extension provides some ideas for other activities that can compliment the original topic.

Making Connections and Reviewing – It is important for the teacher to make connections between different lessons (within the book and with the national curriculum) and to review concepts from time to time. Certain materials such as the Tonle Sap game and the Cambodia natural resources poster are aimed to facilitate this. They may be used throughout the various phases of learning.

## **LEARNING ABOUT THE GENERAL ENVIRONMENT IN CAMBODIA**

The following four activities should be used to introduce the concept of environment to students. In the first activity students will understand the definition of environment, which is a relatively new term in Cambodia. The second activity is a teaches the students about biodiversity and the importance of conservation. The third lesson on protected areas includes a map of Cambodia, which shows the country's natural resources. The fourth activity is a board game that combines environment facts and local knowledge on waste, water, wildlife and forests. These four activities use games to introduce students and teachers to environmental education which should be fun.

## Activity 1

### WHAT IS ENVIRONMENT?

#### Learning Objectives

Students will learn to:

- a) Investigate and describe their local environment

#### Method

Students walk around their local area to discover the environment around them.

#### Teachers Instructions

Setting: Outside

Group size: Up to 30 students

Age of group: Grade 4 and up

Materials needed: pencil and paper

Activity Length: 1-1.5 hours

#### Background Knowledge

The environment means "You and everything surrounding you" including living and non-living things. The living and the non-living things on earth are all interconnected and can affect each other directly and indirectly.

Although we know that many things are connected in the environment, we do not understand these connections clearly. So if humans change the environment quickly and use a lot of resources, we can not predict what the outcome will be for all the living and non-living things. For example we know that the productivity of fish in the Tonle Sap is connected to the flooded forest. However if all the flooded forest were destroyed, we do not understand how all the other living and non-living things would be affected such as birds, and the floating communities in the flooded forest area.

In order to understand more clearly about the environment, we can consider the following 3 sections of the environment:

#### The Natural Environment

The natural environment is everything on the earth that is not created by human beings, such as trees and plants, animals, soil, and water. It includes both living and non-living things. Many of the living things in the natural environment depend on the non-living things. For example, plants depend on soil and water.

#### Social and Cultural Environment

Culture and environment are very much linked. Natural resources, climate, and landscape affect the way humans live their lives and this influences their beliefs. When the environment is changed the cultures can be eroded or destroyed. For example, traditionally many Khmer people have collected non-timber forest products in the forests for centuries. In some communities, there are spirit forests which are specially protected. However, when forests that people depend on are logged by large companies, the community people may seek another source of income such as through day labor or factory work. This type of development can change the culture of a

community. The people in the community may no longer respect the environment as much because they no longer depend directly upon it.

### Human Made Environment

The human-made environment is made up of all the objects that human beings process or produce to satisfy their needs such as: food, shelter, and clothes. Besides that, there are other objects created by humans such as schools, hospitals, pagodas, bridges, and roads among others.

### Rural and Urban Environment

In the rural areas, Cambodian people live close to the natural environment because they primarily farm rice, fish, collect products from the forest, and raise livestock. Gradually, however, more and more people are moving to the cities to find other jobs. The urban environment in Cambodia is growing rapidly every day with the expansion of the population and the development of the country. The urban environment surrounds people with a human-made environment. When people live in towns and cities they tend to forget the quantity of resources they are using everyday. They also forget where all these resources are coming from and where their waste is going because it is not so easy to see. In addition, more affluent people in the cities may use more resources such as packaging and chemicals. If proper waste management systems are not in place, the waste can affect the local water supply.

### Environmental Problems of Cambodia

Problems and conflicts arise over natural resources when different people want to use the same resources for different purposes or when resources are harvested at unsustainable levels (i.e. people take too much of a resource without allowing it enough time to regenerate or reproduce). For example, fisherfolk communities and the Fisheries Department want to utilise the flooded forest for fish production, whereas, outside communities or people from the upland area, want to cut the forest to increase agricultural land and production. Some of the main problems in Cambodia are listed below:

- Illegal logging
- Fragmentation of wildlife habitats and wildlife trafficking
- Land encroachment on protected areas
- Insufficient management of irrigation water and watersheds
- Infiltration of pesticides and agrochemicals in ground and inland waters
- Excessive fishing of inland waters particularly in the Tonle Sap lake
- Destruction of flooded forests for fuel sources
- Destruction of coastal mangroves
- Increased energy demand
- Soil erosion on slopes
- Weakening of riverbank stability
- Land tenure insecurity

**Key-words:** environment, living, non-living,



### **Activity Procedure**

1. Explain to the students that they are going to learn about environment by walking around their local environment.
2. Ask the students if they can describe the environment. The teacher should draw pictures or list what the students are saying on the board. Encourage the students to think about the natural, man-made and cultural environment when answering this question. As the teacher writes the answers on the board, he/she should divide them into categories (natural, man-made, cultural).
3. Ask the students if they can see how each category is different and related.
4. Divide the students into pairs. Explain to the students that each group is going to walk around the area and each person should remember 2 things in the environment.
5. The students should then stand in one big circle and each tell everyone the 2 things they saw. Ask everyone to listen carefully. Then start at the beginning of the circle and ask the students to name something that one of the other students said which relates to one of their things. They should also explain how the two things are related/connected. When everyone has named the relationships in the environment they saw ask the students: Is everything in our environment connected? Reinforce that everything is part of the environment including humans and therefore we must look after our environment.
6. Encourage the students to talk to their families about what they learned today and congratulate them on their participation.

### **Evaluation**

1. To describe one thing in the environment and two things it is related to.

### **Extension**

1. Ask the students to draw a picture including all of their favourite things in the environment. Display their pictures in the classroom or at home.
2. Ask the students to write a story about the environment.
3. Ask the students to draw themselves and 5 things they need from the environment and 5 things they give to the environment. Display the pictures in the classroom or at home.

## Activity 2

### WHAT IS BIODIVERSITY?

#### Learning objectives

Student will learn to:

- a) investigate and describe biodiversity in their local area
- b) name one reason why biodiversity is important

#### Method

Students research a plot of land for any living things in the area and report their findings to the group.

#### Teachers instructions

Setting: Outside

Group size: Groups of five to six students each

Age of group: Grade 8 and up

Activity length: 1 hour

Materials required: For each group – 25 metres of string, measuring tape, four sticks and writing materials.

#### Background knowledge

Biodiversity means the variety of different species which live in different areas on the earth. Each species has an important role in the ecosystem. Scientists estimate that there are 10 million species living on the earth. So far, only 1.8 million species have been discovered. Cambodia is rich in biodiversity; there are 212 species of mammals, 536 species of birds, and 240 species of reptiles and 2300 plant species, so far recorded. In Tonle Sap there are as many as 850 species of fish. The marine waters around Kampot and Kompong Som also contain coral reefs, sea grass beds, 435 species of fish and marine mammals such as dugong and dolphins. The coastal wetlands of Cambodia also have a lot of biodiversity and are reported to contain at least 74 tree species.

Biodiversity is very important for the well being of people and for keeping the stability of ecosystem. A variety of different species live by interacting with one another in the ecosystem. For example, some species exist by depending on one, two or multiple other species. If any component is affected, it would affect the others.

Biodiversity is often threatened and is very fragile. Areas that have greater disturbance have less biodiversity than those with fewer disturbances. The richer the biodiversity the more stable is the ecosystem. Currently the biodiversity on earth is disappearing at an alarming rate. Estimates suggest that at least one species becomes extinct every twenty minutes and that it seems certain that more than twenty five percent of the earth's biodiversity will be lost during the next few decades.

The purpose of this activity is for students to learn about biodiversity and its importance for Cambodia and the world.

**Keywords** biodiversity, species, ecosystem.

#### Activity procedure

1. Explain to the student that today they are going to learn about biodiversity. Divide the students into groups with approximately four to six people in each group. Take participants to an area where plants are growing wild.

### Activity 3

#### CAMBODIAN PROTECTED AREAS

##### Learning Objectives:

Students will learn to:

- a) Describe the meaning of a protected area
- b) Tell why protected areas are established
- c) Identify the location of a protected area in Cambodia on the map

##### Method

Students play an equivalent to "pin the tail on the donkey" with the protected areas map

##### Teachers Instructions

Setting: In the classroom

Group size: Up to 30 students

Age of group: Grade 4 and up

Materials needed: Cambodia map with protected areas, blindfold, a pack of small Post-its (optional)

Activity Length: 1-1.5 hours

##### Background

The overall objective in establishing protected areas is to conserve Cambodia's natural resources and biodiversity. In 1993, King Norodom Sihanouk proclaimed a Royal decree which established the system of protected areas in Cambodia. The Government has selected the areas of the country which comprise the richest areas of biodiversity (diversity of animals and plants), and classified them as either national parks, wildlife sanctuaries, multiple-use areas or protected forest according to different priorities for protection.

A wildlife sanctuary is mainly designed to provide habitat for wildlife. Rare or threatened animals need wildlife sanctuaries in order for their species to survive. National parks serve a multiple role: they conserve biological resources, but also provide a place for nature recreation, and research. A protected landscape is designated to protect the environmental, aesthetic and historic qualities of a landscape. The Angkor area is the best known protected landscape. A multiple-use area is designated to control the use of resources in an area so that they may be used sustainably without jeopardizing the natural balance. The Tonle Sap is an example of a multiple use protected area. The first protected forest in the Cardamom mountains was established in June, 2002. With over 300,000 hectares, this is the largest contiguous area of protected forest in Southeast Asia.

There are currently 24 protected areas in Cambodia, including 7 national parks, 10 wildlife sanctuaries, 3 protected landscapes, 3 multiple use areas, and one protected forest.

National Parks	Protected Landscapes	Wildlife Sanctuaries	Multiple-Use Areas	Protected Forest
1. Kirirom NP	1. Prasat Preah Vihear	1. Boeung Per WS	1. Tonle Sap	1. Cardamom Mountaitns
2. Kep NP	2. Banteay Chhmar	2. Kulen Promtep WS	2. Sam Laut	

3. Bokor NP <i>Kom</i>	3. Angkor Wat	3. Lomphat WS	3. Dong Peng	
4. Ream NP		4. Phnom Namlyr WS		
5. Botum Sakor NP <i>Kom</i>		5. Phnom Somkos WS		
6. Virachay NP		6. Aural WS <i>Kom</i>		
7. Phnom Kulen NP		7. Snoul WS <i>Kom</i>		
		8. Peam Krasop WS		
		9. Roniem Daun Sam WS		
		10. Phnom Prich		

The system of protected areas makes it possible to conserve Cambodia's nature for future generations. There are many challenges to managing protected areas. There may be conflicts, for example, when there are people living inside or near a protected area or travelling to it to extract resources, such as logging and hunting. It is sometimes difficult to find an agreeable balance between using the resources and protecting them.

**Key Words:** protected area, national park, wildlife sanctuary, protected forest, multiple-use area, protected landscape

### Activity Preparation

1. Stick the Cambodia poster on the **classroom wall** at a low level, not higher than the height of the smaller students. If Post-its are available, cut them into small strips.

### Activity Procedure

1. Ask the students to look at the map of **Cambodia** and describe what they see.
2. Tell them that these are the natural resources of **Cambodia** and explain why they are very valuable to the country.
3. Ask the students what ideas they have about **protecting an area** of the country that has many important natural resources such as **forests, fisheries, wildlife, etc.**
4. Explain about the system of protected areas in **Cambodia**. Explain the different kinds of protected areas (national park, wildlife sanctuary, **multiple use** area, protected landscape, protected forest).
5. Ask the students what they think are the reasons to **set up parks, sanctuaries** and other protected areas.
6. Explain the importance of protected areas for **conservation of nature, research, recreation and tourism, watershed protection (only to students of higher grades), climate protection, habitat for animals, etc.** Show them **where the protected areas** are on the map.
7. Begin the game by asking about 10 students to form a **line standing about 5 meters** in front of the map. Explain that they are going to take **turns** to locate a protected area on the map with their eyes closed. Demonstrate **with a post-it**.
8. Give the first student a post-it., blindfold him/her, spin him/her **around 3 times** and then ask him/her to proceed to try to stick the post-it on a **protected area** on the map. If no post-its are available, they can simply point to the **place they think has a protected area**.

9. After the student has made a decision and stuck the post-it on the map, remove the blindfold, and let him/her see where they have landed. Congratulate the student if they have succeeded in landing on a protected area and ask them to name it. If not, name the nearest protected area.
10. Continue with the students one by one.
11. Conclude the lesson by reviewing the definition and purpose of protected areas. Keep the poster on display in the classroom and refer to it as you conduct other lessons in the manual.

### **Evaluation**

1. Ask the students to explain why protected areas are established
2. Ask the students to name one protected area in Cambodia

### **Extension**

1. Visit a nearby protected area
2. Establish a "mini-protected area" in the school compound.

## Activity 4

### THE TONLE SAP SNAKE GAME

#### Learning objectives

Student will learn to:

- c) describe information and facts about forest, water, water, wildlife of Cambodia

#### Method

Using a board game, students will learn about waste, water, wildlife, forests and the general environment.

#### Teachers instructions

Setting: Inside or outside

Group size: Maximum 8 teams of 1 to 3 students

Age of group: Grade 4 and up

Activity length: 1 hour

Materials required: Questions cards, actions cards, board, dice & tokens provided with manual

#### Background knowledge

The game will provide general knowledge and information about the general environment in Cambodia including forests, water, wildlife and waste. Read all the questions and answers before you start the game. You may add new questions to the game from your personal knowledge or from books. As more questions cards are added to the game, the more fun the students will have to play again and again and thus will be able to memorize the content.

The purpose of this game is for students to learn about the waste, water, wildlife and forests in Cambodia.

#### Activity procedure

1. Players throw a die, to move their tokens along a snake path. When they land on a question card square (blue), the player must draw a question card.
2. If the players are students from small grades, the teacher reads the information first and then asks the question. In upper grades, the student may read the card by themselves.
3. If the answer is correct, the player may move 2 spaces forward. If the answer is incorrect, the player must move 1 space backward.
4. Players who land on spaces marked "action card" (pink) must draw an action card and perform for the group the action prescribed on the card. If the action is performed well, the player may move two spaces forward.
5. The game ends when the first player reaches the head of the snake, after the final square (n°60).

#### Evaluation

1. The teacher should note the questions that the children had difficulty answering and ask and discuss these questions again at the end of the game.

#### Extension

1. Students create their own game on a different habitat focusing on environmental issues: tropical forest, coastal line, wetlands, urban habitat, etc.

2. Poster display. Ask the children to draw a poster with half the paper a dirty environment with a lot of rubbish and half the poster a clean environment with activities on how to keep the environment clean. Give each poster a title and display these posters in the classroom and around the school.
3. Ask the students to work in groups and present to the class different ways they could reduce and dispose of waste coming from their house.

## LEARNING ABOUT THE FOREST

In Cambodia the forest resources are extremely important and provide the basis of livelihood and economic development as well as a habitat for many plants and animals. Today, forests in Cambodia are under threat from over exploitation. The activities in this section provide students with an understanding of forest resources in Cambodia, their importance to people and nature, and the problems associated with forest loss. There are also activities to engage students in replanting and sharing their knowledge about forest conservation with the community.



## Activity 5

### BEAUTIFUL FORESTS IN CAMBODIA

#### Learning objectives

Students will be able to:

- a) Describe what a forest is
- b) Name three kinds of forest in Cambodia
- c) Communicate their ideas about the forest

#### Method

Students write and draw their ideas about the forest.

#### Teacher's instructions

Setting: Inside or outside

Group size: Up to 40 students

Age of group: Grades 4 to 8

Materials needed: Writing and drawing material, paper, the map of Cambodia included in this manual

Activity length: 2-3 hours

#### Background

A forest is a complex community of plants and animals in which trees are the most common members. Forests are vital for regulating the earth's climate and providing habitat for animals and plants. A forest habitat is a place where plants and animals can live and reproduce.

The forests in the tropical regions are home to more than half the world's animals and plant species.

Cambodia many types of forest which cover approximately 50 percent of the land area. Six examples of types of forest are:

1. Evergreen forest;
2. Deciduous forest;
3. Mangrove forest;
4. Flooded forest;
5. Bamboo forest; and
6. Pine forest.

1. Evergreen forests are found in many areas of Cambodia, especially, at altitudes of seven hundred meters or higher in the humid coastal ranges and the humid northeastern uplands. Evergreen forests stay green all year round.

2. There are also many deciduous forests in Cambodia. Deciduous means that the trees lose their leaves. In Cambodia, most deciduous trees lose their leaves in the dry season.

3. Mangrove forests are commonly found in coastal areas, such as in Koh Kong and Kompong Som provinces. Coastal mangroves have roots which are submerged or exposed, according to the rise and fall of the tides. Their roots provide a vital

breeding area for fish and crabs and their branches are important nesting sites for waterbirds.

4. Around the Tonle Sap, there are flooded forests, which are a type of mangrove forest. Every year during the rainy season, this forest is flooded as the water in the Tonle Sap rises. The trees in this forest are specially adapted to rising water, so they can survive annual flooding. The flooded forest is also an important habitat for animals. The fish and crabs provide food for many people who live on the Tonle Sap.

5. Bamboo forests are also common in Cambodia and are often found in places where the forest has been cut or cleared. Bamboo grows very quickly.

6. The pine forests are rare in Cambodia and are only found in areas which are high such as Kirirom and some areas of Mondulhiri and Kompong Thom. Instead of leaves, pine trees have needles. Their seeds are contained in cones. The pine forest provides a unique habitat for many species of forest birds and animals.

Many people and animals depend on the forests in Cambodia. The forest is also an important place for spiritual meditation. Many Buddhists believe that the forest is an important place because Buddha was born in the forest and spent much of his life there. He also found enlightenment and died under a tree.

The purpose of this activity is to encourage students to express their ideas about the importance and beauty of forests.

**Key words:** habitat, evergreen forest, deciduous forest, mangrove forest, flooded forest, bamboo forest, pine forest

### **Activity procedure**

1. Explain to the students that today they are going to learn about forests.
2. Ask the students what they think a forest is. Write their responses on the board.
3. Ask the students to name the types of forest in their local area. Clarify what types of forest are found in the local region.
4. Explain about the different types of forest and where they are found (evergreen, deciduous, flooded forest, mangrove, bamboo, pine) using the forest cover map and photos of different types of forest.
5. Tell a story about the forest. If possible, go outside and sit under some trees. Ask the students to close their eyes and imagine they are in the forest. Ask them what they see and hear and smell.

### ***THE BEAUTIFUL FOREST OF UNCLE SORN'S VILLAGE***

*Faraway from Kompong Speu town, there was a remote village near mountain number 553. The majority of people living in this village earned their living by collecting firewood, selling charcoal and hunting animals. Uncle Sorn's family was one of a few families that relied on farming and raising livestock. Every day, after finishing the work on the rice field, the family went to a small farm near the mountain. Within the farm, there was a small plantation with banana, mango and coconut trees; These trees grew among wild trees and plants, which the family conserved as habitat for wildlife. Just outside of this area, the forest was cleared. Even the medicinal plants were cut, leaving the land bare. Animals that escaped from being caught or dying migrated to live in the small forest of Uncle Sorn.*

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Anytime they were free from school, Uncle Som's two children always went to the forest to play with the animals there. They were happy to look into a small stream that had many fishes swimming up and down; and there were some birds like cranes, egrets, and herons trying to catch those fish. On another bank of the stream, some rabbits, squirrels, and deer went down to drink or wash in the water. Those animals were eating and playing without being afraid of the children since they were used to each other. The children were very happy to see this scene and decided that they would try their very best to conserve this place for those animals.

Just then they heard a voice calling:

"Surround it, catch it, catch it; the hare is running to that side!"

The children ran to the place; but it was too late. The hare was already killed by a group of elder boys. The children were so shocked, and said to the group:

"Brothers, why did you kill the hare? Did it do anything wrong?"

"No, it didn't do anything wrong, but we killed it because we want to eat it," replied the group of boys.

"But don't you know how hard I try to protect this animal since the forest around here was cleared," the children told the group.

"We don't care how hard you tried, we only know that its meat is very delicious." the group answered to the children. Then they said to themselves:

"Let's not talk with these stupid children, we'll go to look for other animals."

The children were so angry with the group, thus they ran away from that place. After running for a while, they were so exhausted and sat under a tree. At that moment, they heard the sound of someone cutting a tree. They hurried to go that place. A group of people were cutting down a big tree.

"Uncles, please stop cutting the trees," the children told the group.

"It's none of your business, they are not your trees," one of the men said.

"We know we did not plant these trees, but if our parents and us did not conserve this place, it would have been cleared like the nearby forest," the children said. And they added:

"Don't you know that when the forest was destroyed, we will face so many big problems; for example, flood or drought?"

"I know that you go to school, but you don't need to teach us. We saw the sun before your parents were married," another man replied, while continuing to cut the tree.

The children were very disappointed and sad. They came back home crying and told their parents what had happened. However, all of them could not help.

One year later, the forest was cleared and there was a drought. There was no rain at all; the people's lives were so difficult. The villagers tried improve the situation by performing many religious ceremonies, but in vain. Then they remembered the children's speech.

On evening, several elders in the village went to Uncle Som's hut and asked what they could do to help the villagers. Uncle Som suggested that they should replant the trees. He also gave some seedlings that he had germinated in his farm with the help of his children. The villagers agreed to plant and protect the seedlings. Five years passed. The area in mountain number 553 became a little bit greener. Rain also came to the village. The lives of the villagers were better.

One day, Uncle Som's children (who were now teenagers) went to the place that they used to play with the animals. Each of them carried one deer that they had kept hidden on their farm for many years. Behind them, a group of children followed them to release the animals. When they came near the stream, they kissed the two animals and released them, but the deer did not seem to want to go. They made a signal to the animals, so that the deer ran into the forest with the claps of the boys who came to accompany them.

6. Ask the students to write a short story or draw a picture (for younger students) about "The Beauty of the Forest in Cambodia". This may be a homework assignment if time is limited.
7. Select two or three students to read their stories to the students or hold up and describe their drawings.
8. Congratulate the students on their ability to draw or write about the forest.

**Evaluation**

1. Describe what a forest is.
2. Name three different types of forest.
3. Review essays to see how students express their ideas about the forest.

**Extension**

1. Ask students to sing a song or write a poem about the forest.
2. Visit a forest and use the senses (sight, hearing, smell) to enjoy many aspects of the forest.



## Activity 6

### LEAVES, SUNLIGHT, AND OXYGEN

#### Learning objectives

Students will be able to:

- a) Describe how plants use the sun's energy to live.
- b) Describe the different shapes of the leaves and the size.
- c) Explain that plants and trees provide oxygen for people and animals to breathe.

#### Method

Students make artwork with leaves and play a game related to trees' ability to produce oxygen.

#### Teacher's instructions

Setting: Inside or outside for leaf activity and outside for the game

Group size: Up to 40 students

Age of group: Grades 4 to 8

Materials needed: leaves, plain paper, crayons

Activity length: 2 hours

#### Background

Trees basically need 4 things to survive:

sunlight

water

air

soil

But how does the tree use these things to grow? The most important process for the tree's growth occurs in its leaves. The process works like this:

First, the leaf receives water which comes up from the roots and into the leaf through its small veins.

Next, the leaf receives sunlight directly from the sun.

Finally, it absorbs some of the air through its pores.

Air has 2 very important parts: One is called carbon dioxide and the other is called oxygen. You can't see the difference, but air is made up of approximately 0.03% carbon dioxide and 21% oxygen. People need the oxygen in the air order to live.

Now continuing from above:

The leaf takes in all of these things (water, air, and sunlight) and it transforms them into 2 new things:

sugar and oxygen

The sugar is like energy that helps the tree to grow and the oxygen is given off into the air. Without plants to produce oxygen, people and animals would not be able to breathe! We are very lucky that trees have leaves that produce oxygen for us to breathe.

## The Diversity of Leaves

All leaves are not the same. There is a great variety of shapes and sizes. Also the color may vary quite a lot. Most leaves on tropical trees are dark green and leathery. The leathery leaves means the trees can survive in drought conditions which can occur even in tropical forests. Some leaves have elongated tips to easily shed water when it rains. Some trees are even able to adjust the position of their leaves to capture the energy from the sun. You may notice that leaves in shadier places may be thinner, while leaves in direct sunlight are often thicker.

The purpose of this activity is to encourage the students to think about the different shapes and sizes of leaves and to understand how plants and trees survive by capturing energy from the sun, and how plants provide oxygen.

**Key words:** carbon dioxide, oxygen,

### Activity procedure

1. Explain to the students that today they are going to learn about the different leaves on trees and how they capture energy from the sun and provide oxygen for us to breathe.
2. Each student should first collect one leaf each.
3. Give each student some paper and crayons.
4. Explain to the students that the leaves must be placed under the paper and that the students must lightly rub the crayon across the paper until an image of the leaf appears on the top.
5. When students are finished with their rubbings, ask them to hold them up for the class to see.
6. Pick out a few rubbings of different leaves and ask students to talk about the differences (i.e. pointed, large, round, etc.)
7. Explain to the students how the leaves work to nourish the tree or plant.
8. Next explain to the students that the leaves of plants and trees absorb carbon dioxide from the air and release oxygen into the air.
9. Explain to the students that people and animals need to breathe the oxygen produced by plants and trees to survive.
10. Explain to the students that they are going to play a game which will show why it is important not to cut down all the trees.
11. Go outside and ask six students to stand about three meters apart and spread their arms apart like a tree. Ask the other students to be a person or animal that lives on or near a tree. Ask the students who are people or animals to stand next to the students who are trees.
12. Explain to the students that when the teacher shouts 'Change!', all the students who are people or animals must run to another tree without breathing.
13. Explain to the students that only the students who are trees can breathe all the time.
14. Explain to the students that when the teacher touches one of the students who is a tree on the shoulder that person must sit down. The other students who are people or animals can not run to this student when the teacher shouts 'change'. The students must hold their breath for longer and longer.
15. Ask the students what happens if we cut down all the trees. (It means less oxygen that people and animals need to breathe.)

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16. Congratulate the students on their understanding of the importance of plants (namely trees) for producing oxygen.

### **Evaluation**

1. How do plants use the sun's energy to survive.
2. Describe three different shapes of leaves.
3. Name the gas that trees and plants provide which is essential for people and animals.

### **Extension**

1. Take the leaf rubbings and display them in the classroom or make a class book of all the rubbings of different kinds of leaves.
2. Do an experiment in the classroom with sunflower seeds. Start by cutting off the top of an old plastic water bottle to make a container. Punch some holes in the sides and bottom of the container and fill it with soil. Get some sunflower seeds, or other seed which is easy to grow.

Explain to the students that they will conduct an experiment to see how plants and trees survive using energy from the sun.

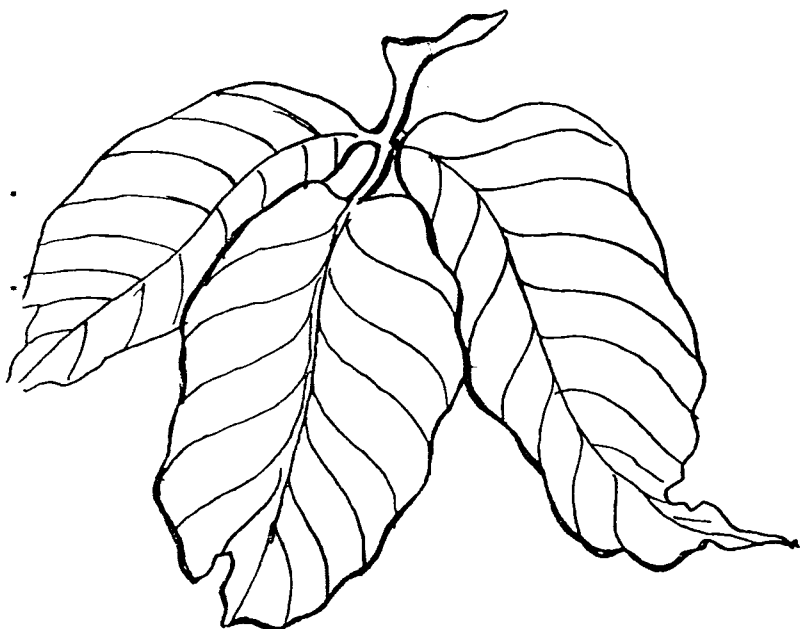
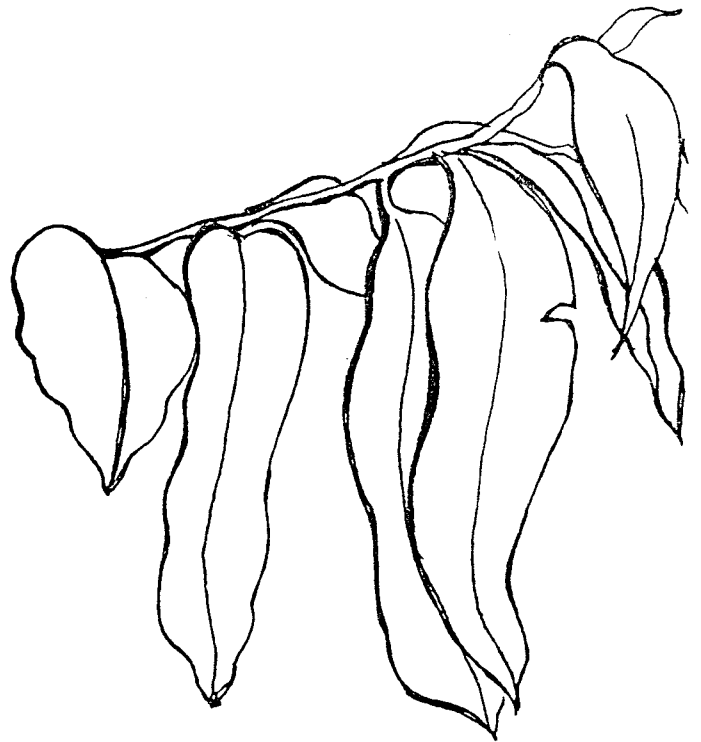
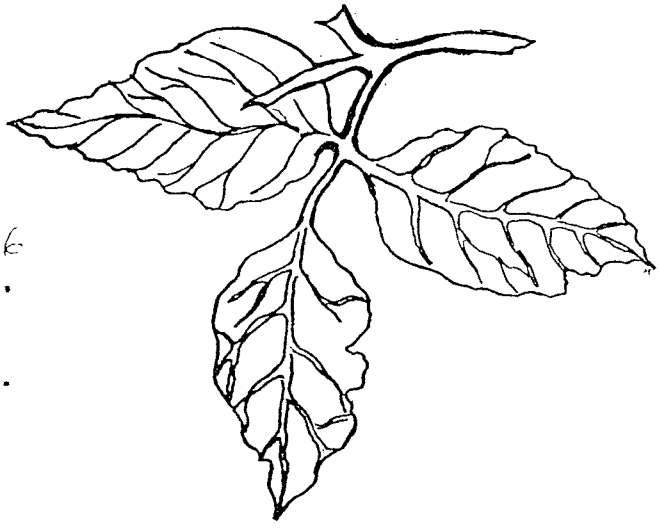
Together with the students, plant some sunflower seeds (or other suitable species) in the container with soil inside.

Place the container on a sunny windowsill and, over the course of several days, watch how the sunflower germinates and grows towards the light. Don't forget to water the seedling regularly. Explain to the students that the sunflower is bending to face the sun so that it can get as much sunlight as possible. (Option: Each student may have their own container and seeds and keep a diary on growth).

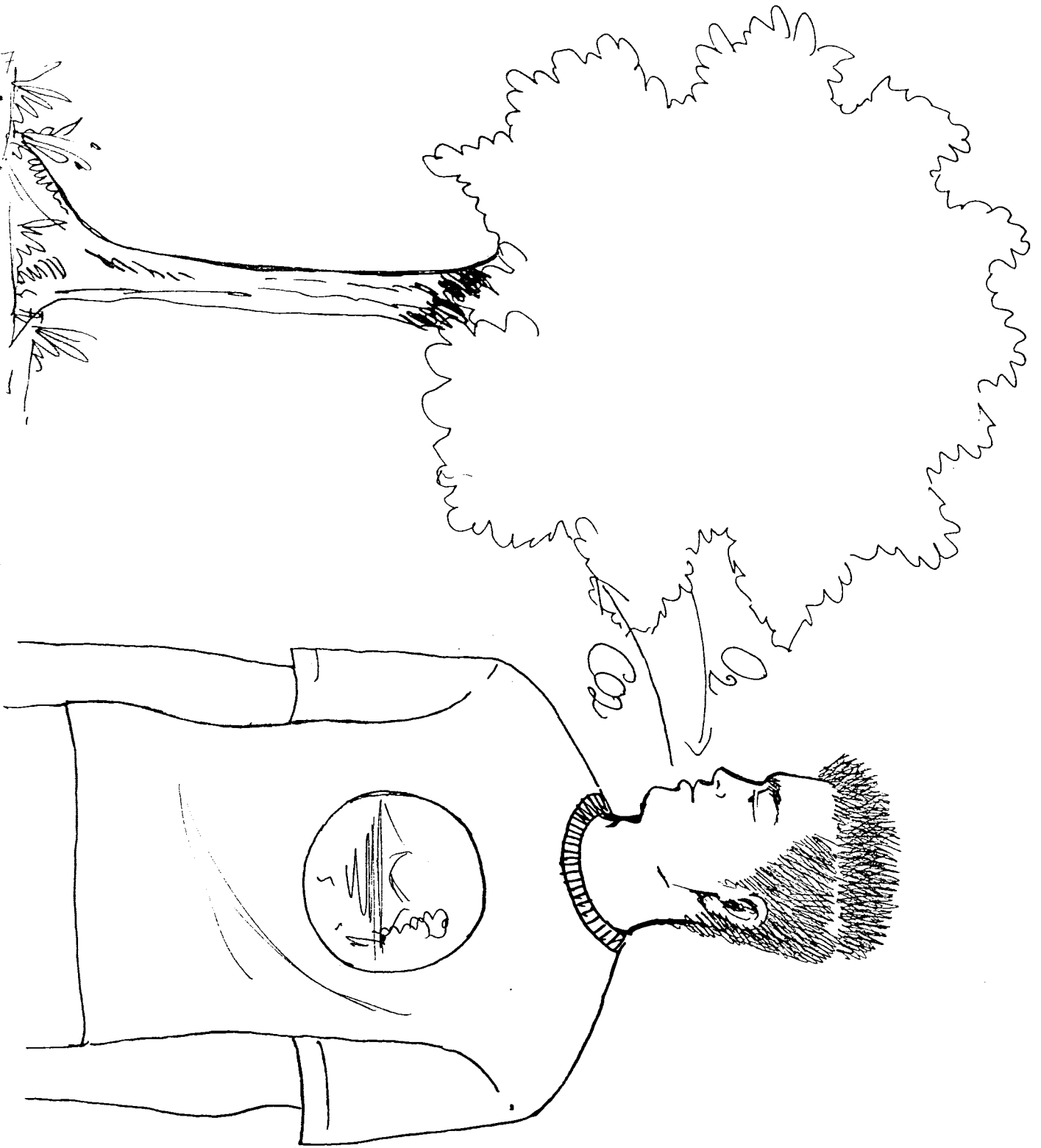
The students can also place the sunflower in a dark corner and observe what happens when the sunflower has no sunlight.



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## Activity 7

### STRUCTURE AND PARTS OF THE TREE

#### Learning objectives

Students will be able to:

- a) Name six different parts of the tree
- b) Explain the functions of different parts of the tree

#### Method

Students use their sense of touch to identify the parts of a tree.

#### Teacher's instructions

Setting: Inside and outside

Group size: Up to 30 students

Age of group: Grades 4 to 8

Materials needed: six small baskets with closed top or opaque bags, samples of each of the following: tree root, tree bark, tree seed, tree roots, tree leaves, tree branches

Activity length: 2 hours

#### Background

A tree has six important parts:

1. Root
2. Trunk
3. Bark
4. Branch
5. Leaves
6. Seeds

#### Roots

The roots keep the tree upright **and absorb** water from the soil. They also prevent the soil around the tree from **getting washed away** when it rains. When soil is washed away it is called soil erosion.

#### Trunk

Part of the tree connected from **the root to the branches** and has the duty to support the branches and leaves.

#### Bark

The bark protects the tree from **insects and other pests**, disease and drying out.

#### Branches

The branches are an important part of the tree structure and provide habitat for birds and insects.

#### Leaves and needles

The leaves absorb the sun's energy (photosynthesis) to nourish the tree.

## Seeds

The Seeds provide for the next generation of trees.

All the tree parts are connected to each other, and all the parts are essential to the survival of the tree. For example, when people take the bark for medicine or other purposes, they may injure the tree so severely that it will die. If people collect all the seeds (such as in the fruit), the tree may not be able to reproduce. If people cut too many branches or injure the roots, the tree may also die.

The purpose of this activity is to have students understand how trees function and to appreciate that each part of the tree is important for its survival.

**Key words:** photosynthesis, bark, leaves, seeds, roots, branches, soil erosion, pests, habitat, trunk

### Activity preparation

1. Collect a piece of bark and some leaves, seeds, roots and branches and put each tree part into a separate basket or bag.

### Activity procedure

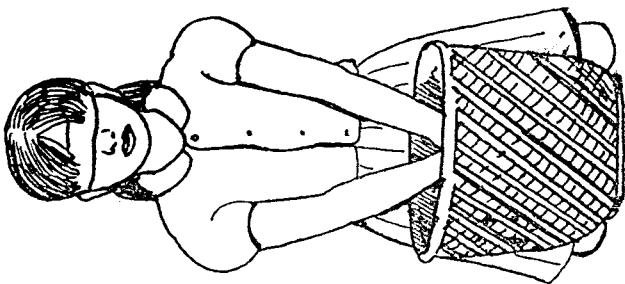
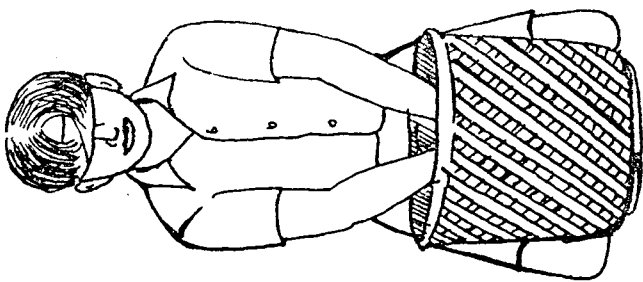
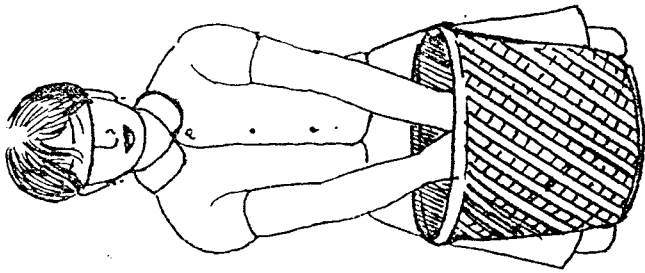
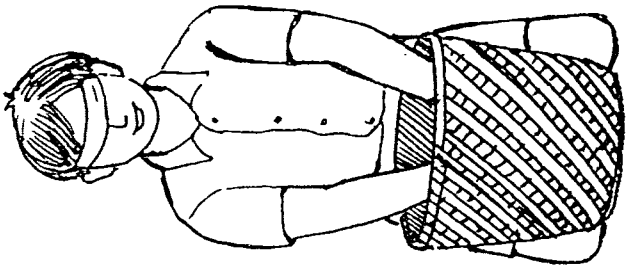
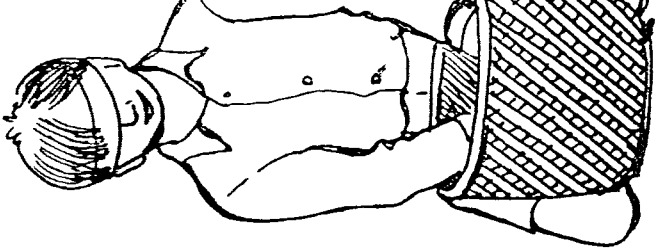
1. Take the students outside and sit in the shade of a tree. Explain to the students that today they are going to learn that trees have five different parts to them which they need to survive and reproduce.
2. Place the six baskets or bags in a line.
3. Ask the students to line up in front of the baskets containing the tree parts and to close their eyes. Ask the students and feel with their hand inside the basket or bag. They are not allowed to say what they feel until all students have felt inside all the bags or baskets.
4. Ask the students to guess what they have felt in each bag.
5. Confirm the students' guesses by revealing what is in each bag or basket.
6. Ask the students what all of these things have in common. (Answer: they are all parts of a tree).
7. Ask the students why each part of the tree is important and what its function is. As the students answer, ask them point to the relevant part of the tree. Alternatively, indoors, draw a picture of the tree on the blackboard and label each part.
8. Ask the students what happens when we take away or damage one part of the tree.
9. Ask the students to draw a picture of a tree in their notebooks and to label the five parts of the tree.
10. Explain that trees have an important structure and characteristics, which help them to survive and reproduce.
11. Congratulate the students on their drawings and encourage them to protect the trees in their schoolyard and village.

### **Evaluation**

1. Name six parts of the tree and each function.

### **Extension**

1. Encourage the students to get to know many trees in their village. Ask them to make a species list.
2. Visit the local forestry office or nursery.



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## Activity 8

### TREE OBSERVATION

#### Learning objectives

Students will be able to:

- a) Learn four benefits of trees
- b) Observe and describe two species of trees
- c) Practice observation skills in nature

#### Method

Students observe trees.

#### Teacher's instructions

Setting: Inside a room and/or around a tree

Group size: Up to 30 students

Age of group: Grades 4 to 8

Materials needed: Pencils and paper for students

Activity length: 1 – 2 hours

#### Background

There are many species of trees which can be used for many different things. Trees can be of benefit to animals and people.

Some of the benefits that trees can provide are listed here:

- they remove dust from the air. Particles of dust and dirt in the air settle on leaves and are washed to the ground when it rains..
- they act as a wind break by reducing the speed and force of the wind.
- they moisten the air. Trees lose water from their leaves through a process called transpiration which keeps the air in the forest moist..
- they help to produce the oxygen that people and animals need to survive. Plants and trees use the sun's energy to take carbon dioxide from the air and release oxygen into the air. This process is called Photosynthesis.
- the shade that the trees produce cools the air.
- the shade that trees provide also protects people and plants from the sun.
- they prevent soil erosion. The soil on sloping ground like river banks and hills is held in place by the trees roots so it does not wash away during heavy rainfall.
- they provide a home for animals to live and for other plants to grow in.
- they provide wood for construction and fire wood for cooking.
- they also provide food for people and animals.
- they can also provide medicine for people when they are sick.

In Cambodia many trees have been cut since the 1980's and now we need to help plant them again.

The purpose of this activity is to make students aware of the many benefits of trees by observing them directly.

**Key words:** species, windbreak, transpiration, soil erosion, photosynthesis, shade, habitat.

### Activity procedure

1. Explain to the students that today they are going to learn about the many benefits of trees.
2. Ask the students if they know what types of trees grow in the area they live in. Ask them to name them and write their answers on the board. Ask why they think trees are important and write the answers on the board/paper.
3. Divide the students into groups of three or four. Ask each group of students to copy the following questions in their notebooks

What is the name of the tree:	What animals do you see living on or near this tree?
Describe the trunk (How thick is it? How tall?):	Select one animal and describe how the animal uses this tree?
Describe the branches (Are they thick or thin? Are there many?):	How do people use this tree?
Describe the bark (Is it rough or smooth, what color(s) is it?):	Name 4 benefits of trees:
Describe the leaves (What shape? What color? What size?):	1.
When does the tree have flowers?	2.
Describe the flowers (What color? What smell? What use if any?):	3.
	4.

Ask the students to go outside in their groups (not too far away) and choose a tree to observe. The students should be given approximately thirty minutes to fill out the questions in their notebooks. The teacher should circulate among the groups to check the students understand the activity and are completing the questions appropriately.

4. When the students have answered the questions ask them to draw a picture of the tree in their notebooks. Write the name of the tree at the top of the page.
5. Ask each group of students to tell the others all about the tree they were observing.
6. Congratulates the students and asks them to practice observing trees and the animals that live on them.

### Evaluation

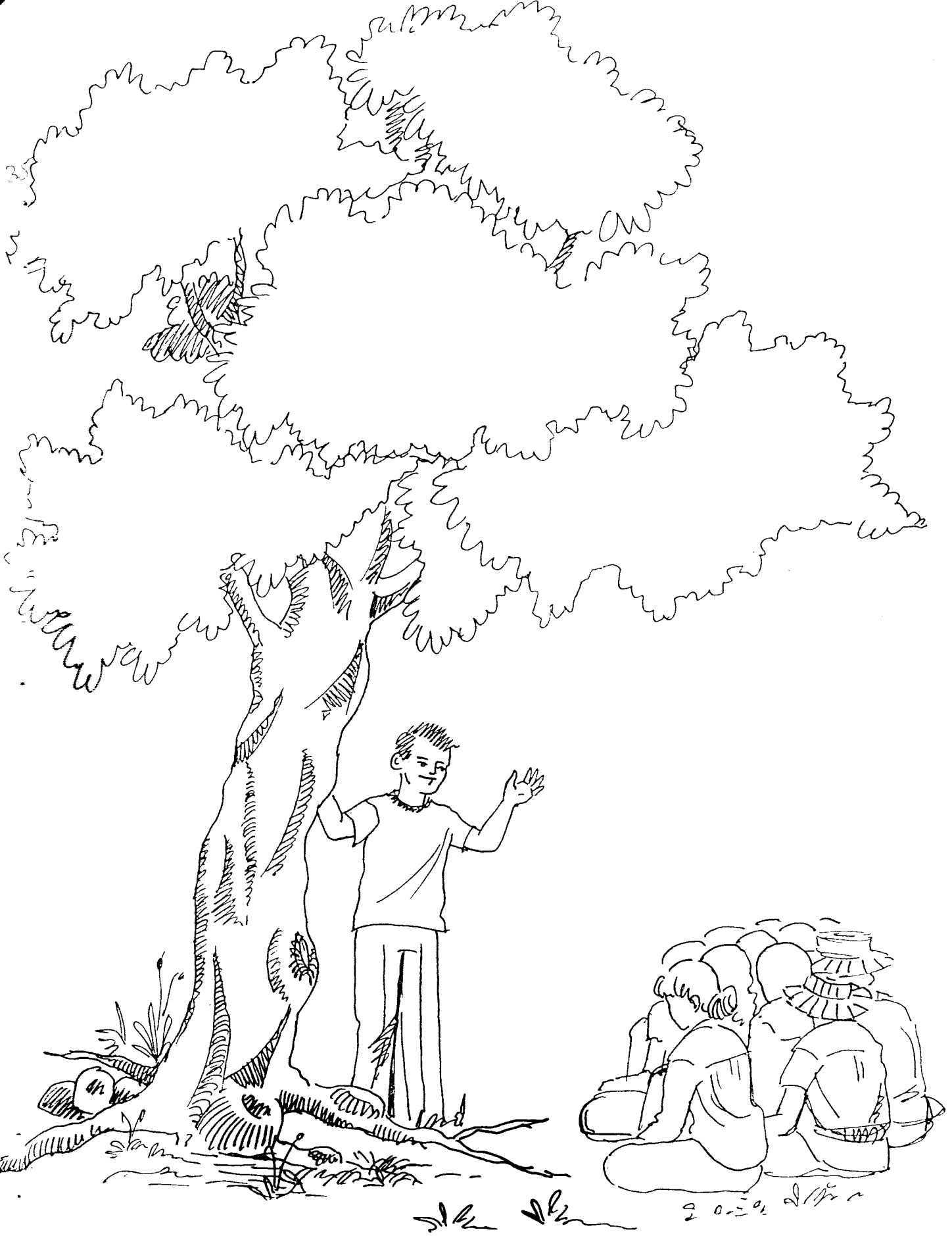
1. Name **three species** of trees found in Cambodia.
2. Name **six different** benefits which trees provide to people and animals.

### Extension

1. Observe **another plant** to find out if there are different uses or benefits



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2. Ask the students to write their own questions to investigate about something in nature
  3. Keep a class diary of the chosen tree and make observations during each season to see the differences.



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## Activity 9

### DISCOVERING NON-TIMBER FOREST PRODUCTS (NTFP)

#### Learning objectives

Students will be able to:

#### Define the meaning of NTFP

- a. Name two reasons why NTFP are important.

#### Method

Students play a memory game to try to recall many different types of Non-Timber Forest Products.

#### Teacher's instructions

Setting: inside or outside

Group size: up to 40 students.

Age of group: grades 4 to 8

Materials needed: Ten pictures or examples of Non-Timber Forest Products, sheet or cover

Activity length: 2 hours

#### Background

The forest provides many benefits to people. One of the obvious benefits is timber for houses, furniture, etc—but there are also many other products which people depend on from the forest. These are called non-timber forest products (NTFP). Examples of Non Timber Forest Products are:

- Food such as fruit, mushrooms, honey, leaves and bamboo shoots
- Traditional medicine from bark and roots, etc; and
- Plant products such as rattan, vines, resin and flowers.

When the forest is cut for timber, many people cannot collect Non-Timber Forest Products which they depend on. We need to **protect the forest** so that people can continue to benefit from these products in the future.

The purpose of this activity is to encourage students to understand that there are many non-timber benefits of the forest.

**Key words:** Non-Timber Forest Products, technologies, medicine, food.

#### Activity procedure

1. Explain to the students that today they are going to learn that the forest provides benefits other than timber.
2. Place examples of Non-Timber Forest Products and in the front of the students. Ask the students to observe these items carefully for two minutes. (Optional: if no NTFP are available, use pictures)
3. After the students have observed the Non-Timber Forest Products put a cover over them or turn over the pictures so that the students can't see them.
4. Ask the students to try to write down the names of all the things they can remember seeing.

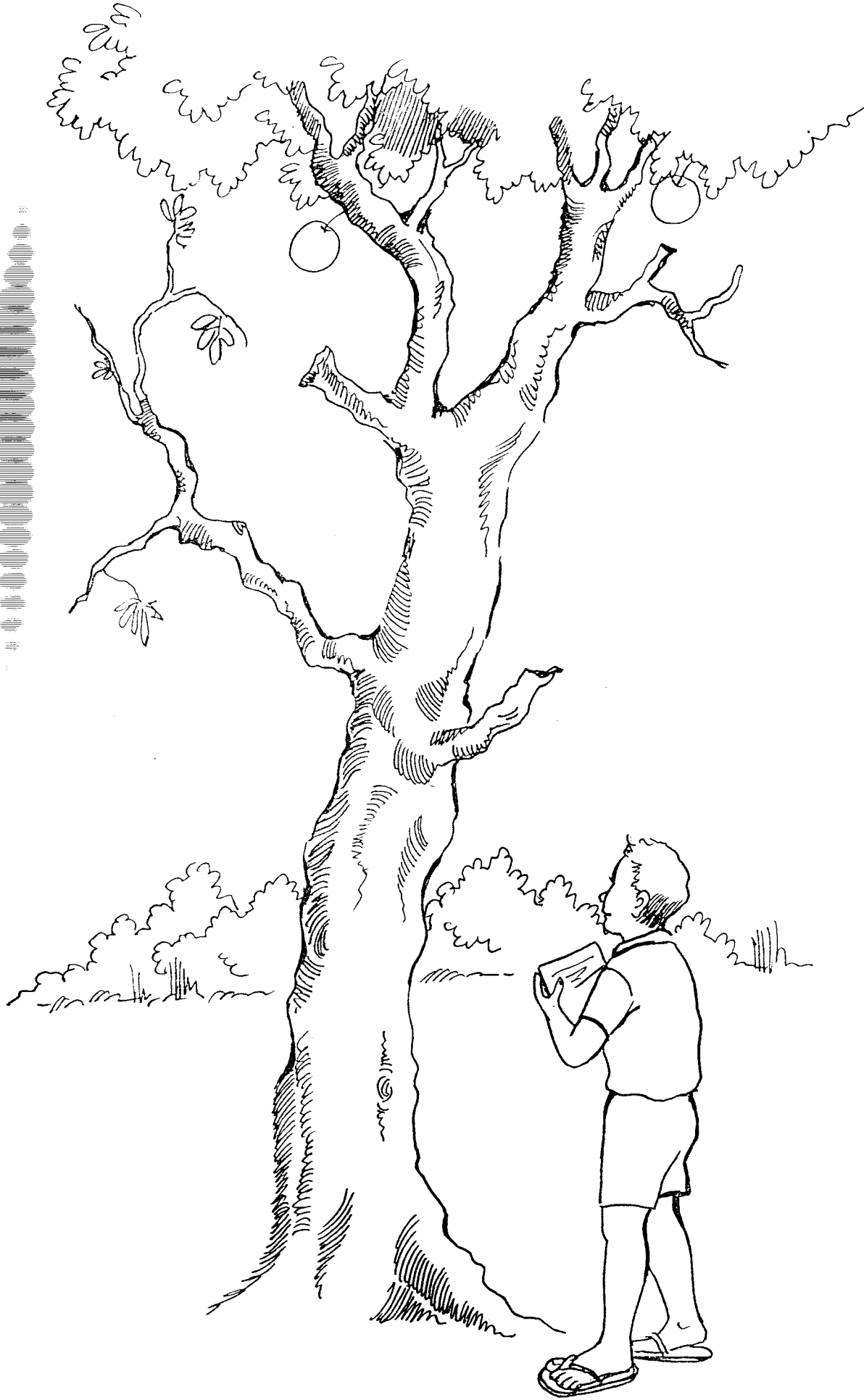
5. Ask the students to name the things on their list. Confirm or correct the list by removing the cover from the Non-Timber Forest Products or pictures.
6. Ask the students what all of these things have in common (they are Non-Timber Forest Products)
7. Explain the importance of Non-Timber Forest Products to the students (provide food and medicine etc.)
8. Congratulate the students on their good memory and encourage them to think about the benefits of Non-Timber Forest Products.

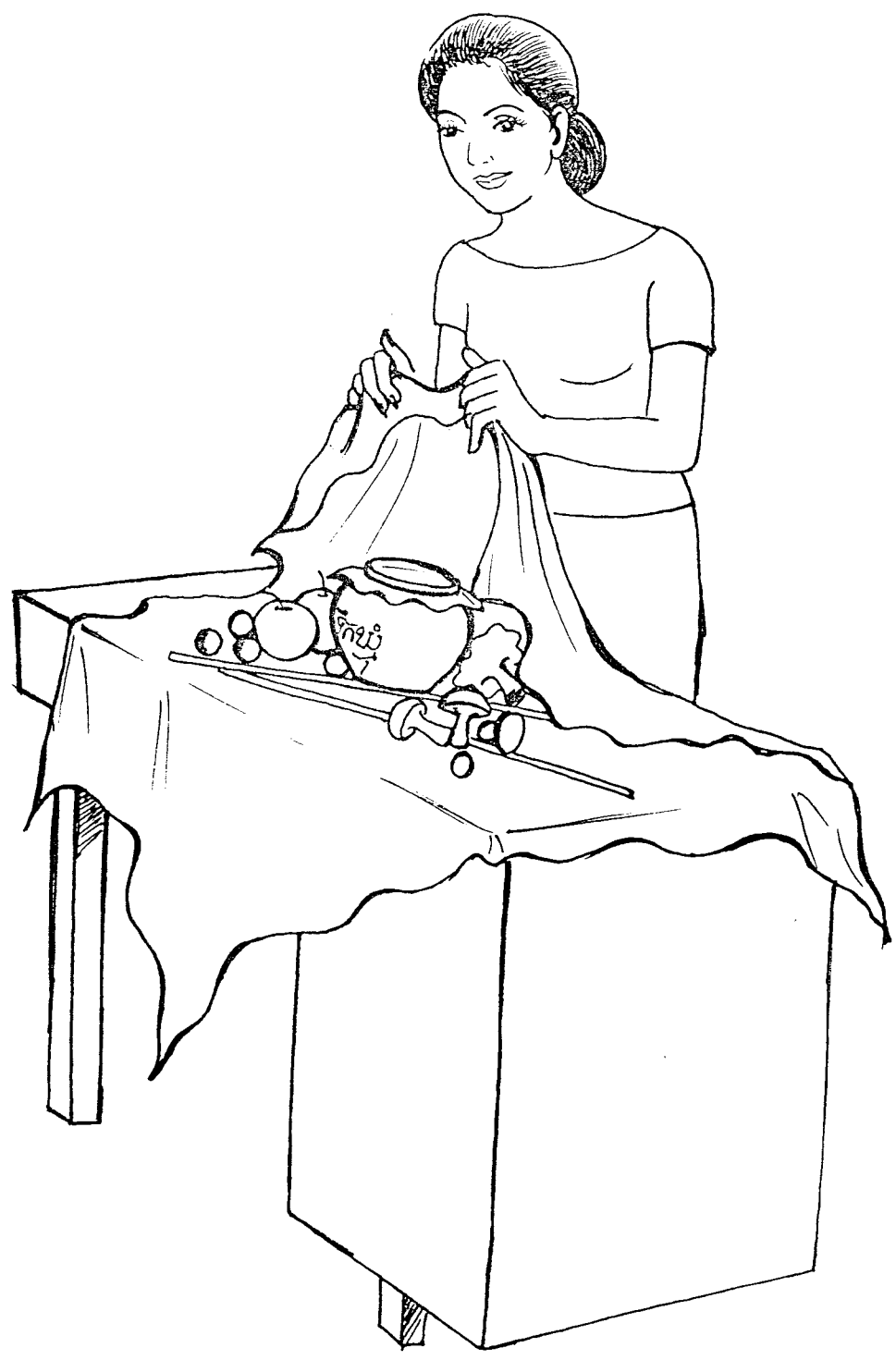
### **Evaluation**

1. Name three examples of Non-Timber Forest Products.
2. Give three reasons why Non-Timber Forest Products are important.

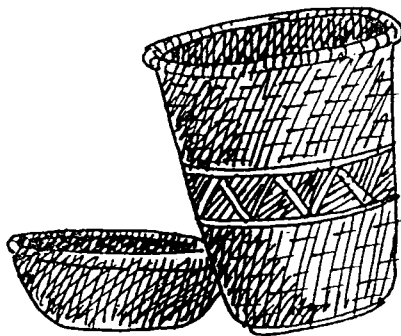
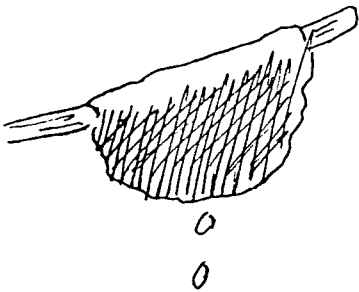
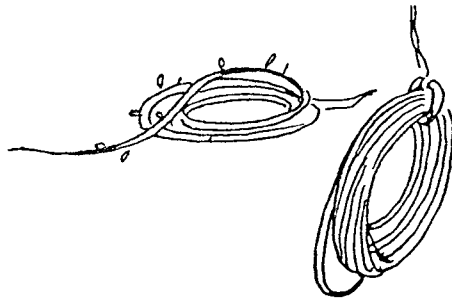
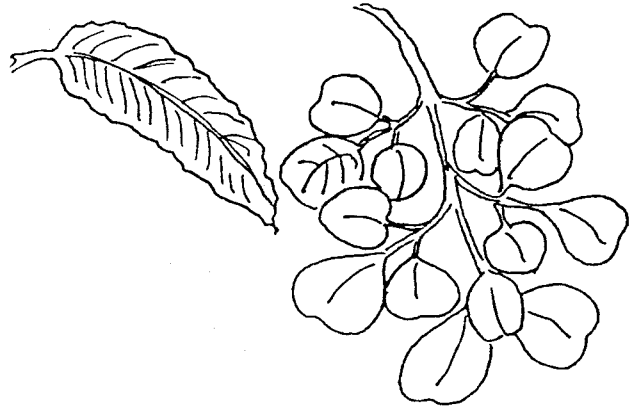
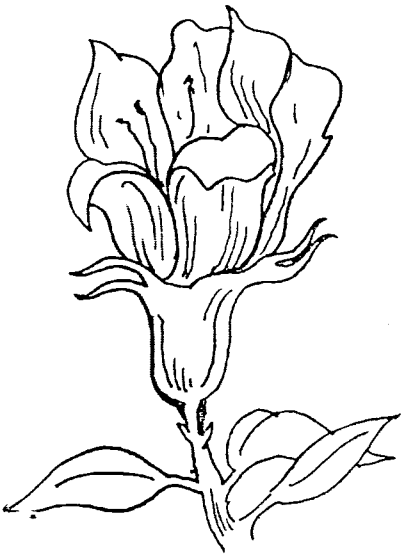
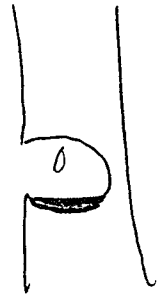
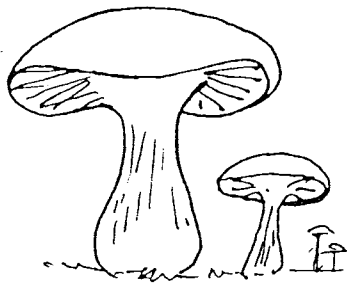
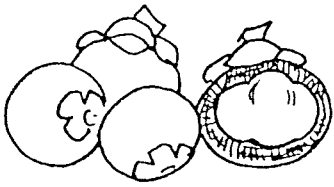
### **Extension**

1. Take the students to the forest with a local villager and ask him/her to show examples of Non-Timber Forest Products.
2. Invite a villager with knowledge of traditional medicine to speak to the students.





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4. Explain to the students that sixteen actors are needed to perform the play and ask for volunteers play. The other students may be the audience.
  5. Give each of the actors a part in the play. Practice the play by asking the actors to read through their part. If the group is larger than sixteen, practice the play with the actors after school, so that the other students are not bored.
  6. When the students have finished practicing their parts ask them to put on the masks and come to the front of the classroom and perform the play for the other students. The teacher is the narrator.
  7. When the students have performed the play ask the students in the audience what happens to the animals when the forest is destroyed (they lose their basic needs).
  8. Give a big applause for the performers and ask the students to think about the importance of the forest to animals.

### **Evaluation**

1. Name five basic needs of animals which the forest provides.

### **Extension**

1. Perform the play with music and costumes for other students in the school and/or parents.



## Activity 10

### FORESTS ARE HABITATS

#### Learning objectives

Students will be able to:

- a) Explain that forests provide habitat for animals
- b) Identify some benefits of the forest

#### Method

Students act in a play about deforestation and the impacts on wildlife.

#### Teacher's instructions

Setting: Inside

Group size: 16 students and audience

Age of group: grade 4 and up, students must be literate

Materials needed: Copies of the play, cardboard, elastic, and crayons to make simple masks

Activity length: 2-3 hours

#### Background

The forest provides an important habitat for wild animals. A habitat is a place or an environment in which an animal can find all its basic needs. These basic needs include:

- Food
- Water
- Shelter
- Space (territory)
- Other animals so they can reproduce

When deforestation occurs animals lose all of these basic needs and since it may be difficult for them to find new habitat, they may die. Deforestation occurs when the trees are cut down and the forest is destroyed. In Cambodia, animals are quickly losing their most important habitat, the forest.

The purpose of this activity is to make students aware of what happens to animals in the forest when deforestation occurs.

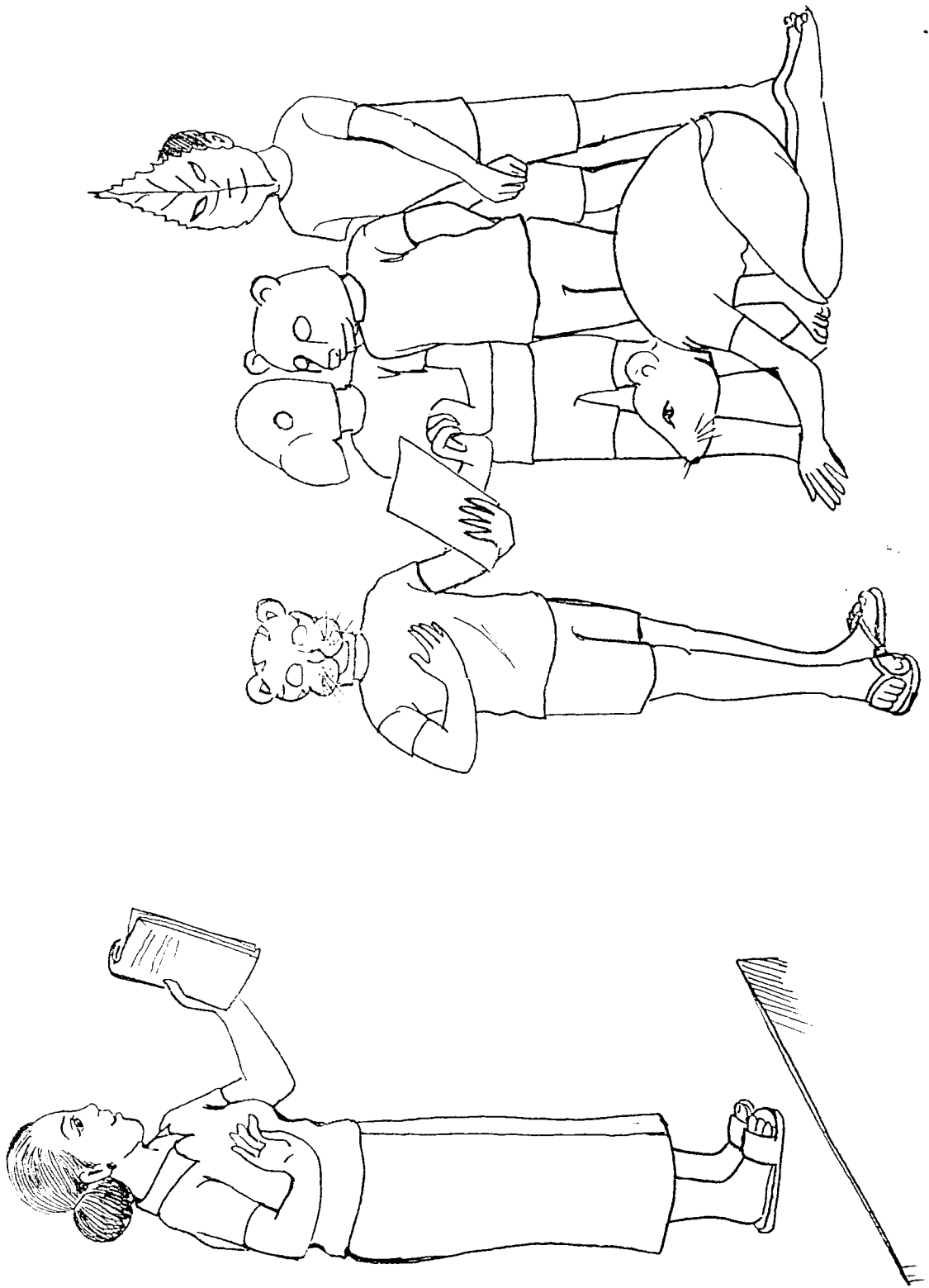
**Key words:** habitat, deforestation, basic needs.

#### Activity preparation

1. Use the cardboard, elastic, and crayons to make simple masks for each on the animals in the play.

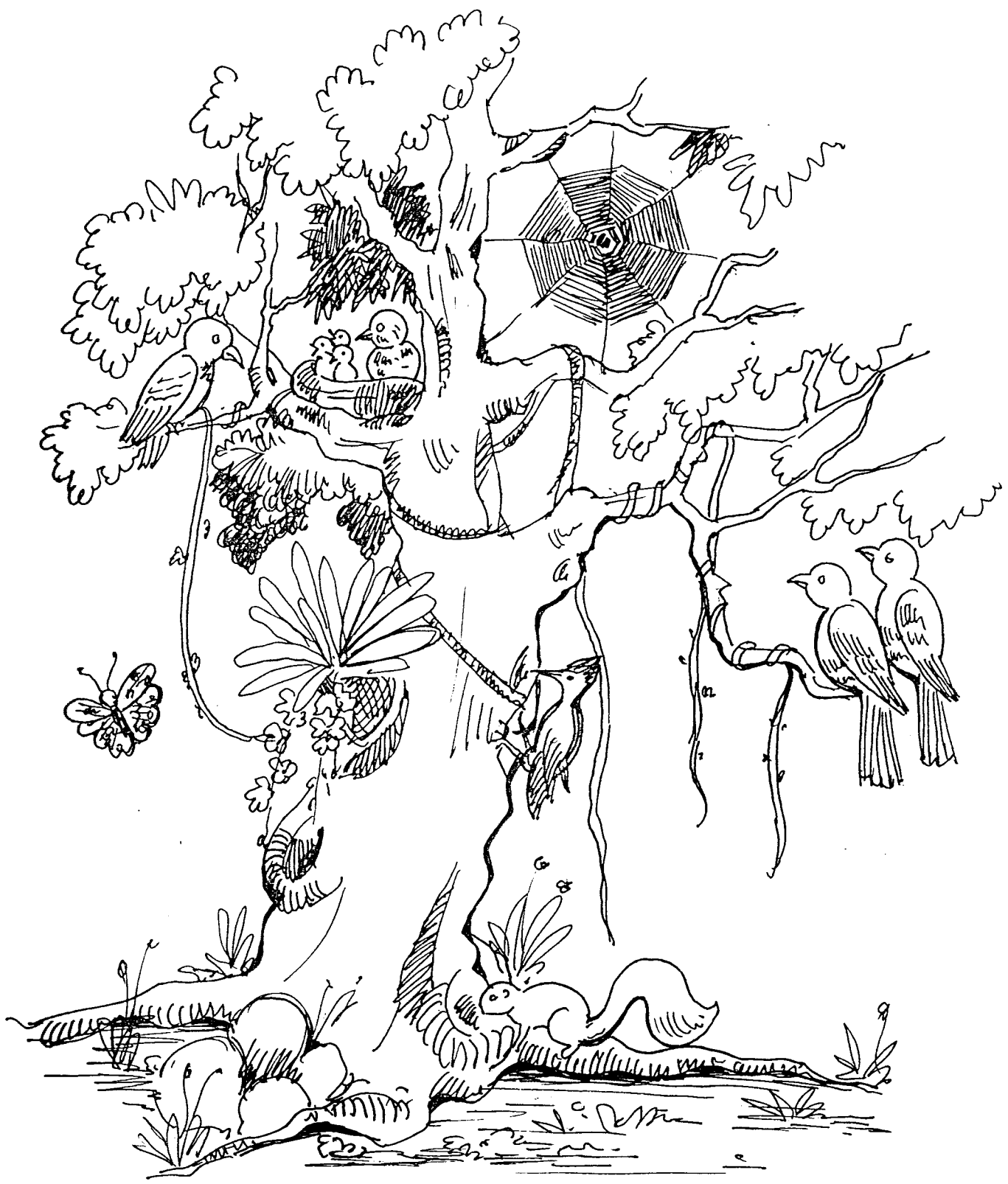
#### Activity procedure

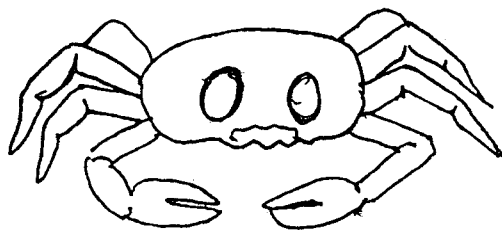
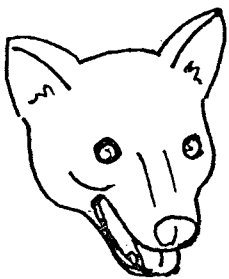
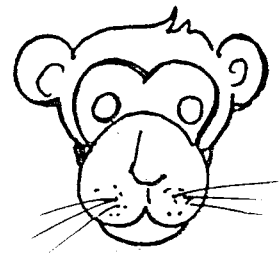
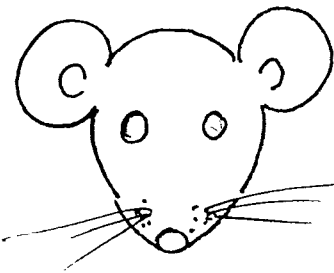
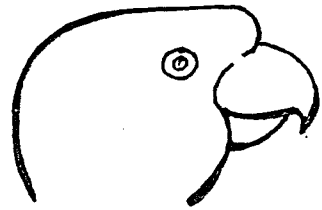
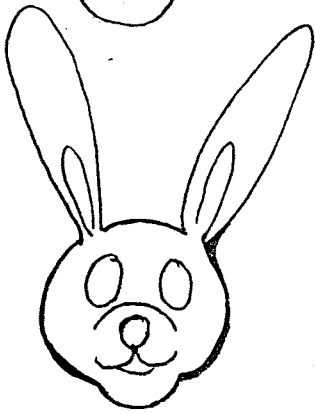
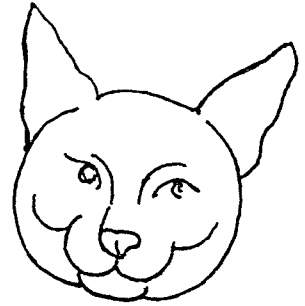
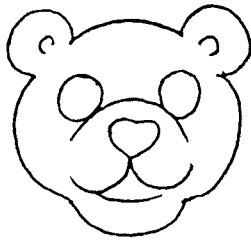
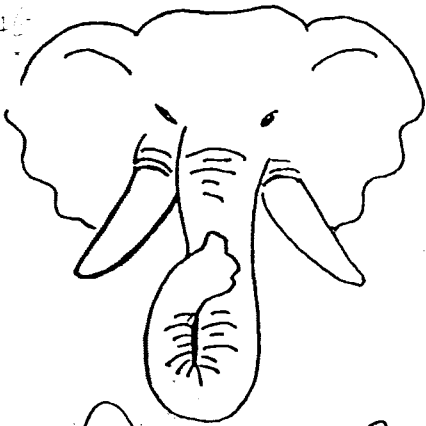
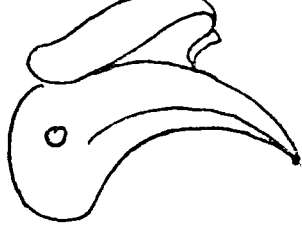
1. Explain to the students that today they are going to learn about the benefits the forests provides to animals and the problems deforestation cause to the wildlife which live in the forest.
2. Ask the students to discuss the basic needs of animals which the forest provides.
3. Give the scripts to the students and read through them with the students.





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## Play: Forest Is Our Life

This play shows the difficulties and problems of people and wild animals when forests are destroyed. They find out the solution to this problem is planting trees. Sixteen actors are needed to perform the play.

1 narrator (teacher)	1 farmer (or a couple farmers)
1 wolf	1 tree
2 hornbills	1 parrot
1 tiger	1 mouse
1 bear	1 monkey
1 elephant	1 wildcat
1 crab	1 frog
2 rabbit	

**1. Narrator:** "The sun is shining and it is a very hot day. This area used to have a dense and shady forest. It was the home for many wild animals. Now it has changed, there are no trees, grass or plants. Every year villagers here are suffering from hot weather, storms and flooding. There is a farmer coming from the village. He carries a spade.

**2. Farmer:** (The farmer is digging the soil. After a while he uses his hand to wipe away the sweat) "Hew! My farm has not been productive for several years because of hot weather. My chickens, cows, and buffalos are all miserable because they don't have enough food and water. If the situation continues, we will surely die. I wonder who could solve this problem. Oh! I know. Maybe the Rabbit can help me. I'll go to talk to him."

**3. Narrator:** "The farmer leaves to meet the rabbit. Here comes a Wolf, he is looking for habitat. He walks slowly and tiredly under the hot sun. He sits down next to a tree whose leaves are dried up because there is no water or rain."

**4. Wolf:** "Hello! My friend the tree. May I stay under your shade for a while? I'm so hot."

**5. Tree:** "Yes of course"

**6. Wolf:** "Thank you very much."

**7. Tree:** "Mr. Wolf! You can see almost all my leaves have dried out. I feel very hot too. My life is so terrible. I don't have enough water to drink and all my relatives have been cut down."

**8. Narrator:** "Suddenly there is a pair of hornbills and one wounded parrot flying by."

**9. Hornbills:** (Moving their wings slowly). "What a hot day it is! We used to live together happily and peacefully. But now nearly all of the trees have been cut down".

**10. Parrot:** (Flies around the tree then speaks) "Yes that is true. They have cut down many trees. We can hardly find any habitat to live in."

**11. Narrator:** "After a while there are three more animals: Mouse, Tiger and Bear who walk tiredly to the tree."

**12. Tiger:** (Limps and walks slowly because his one leg was injured). "Oh! What a miserable life! Every day people cut our trees and destroy our homes."

**13. Mouse:** (One hand scratches his nose.) "I live in a village and see people cut down trees to make their houses, tools such as ploughs, ox carts, tables."

- 14. Tree:** "Oh! They not only cut us for that kind of thing but also dig our roots to made medicines. You see my roots are cut and other parts are damaged."
- 15. Bear:** (Walking unsteadily)"I am very sorrowful, because my young children have been captured and sold. Now they are probably looking for me too!"
- 16. Parrot:** (Flapping his wings and saying angrily). "Oh! My relatives were also caught and kept as pets. People not only cut down our homes but also kill us."
- 17. Wolf:** "People can be very cruel."
- 18. Mouse:** "I think we must find a solution to this problem so that we can all live together peacefully."
- 19. Tiger:** "I think we should go to meet the Rabbit and ask him for help."
- 20. Wolf:** "Let's go."
- 21. Narrator:** "As soon as all the animals agree, they leave for the Rabbit's house. As for Monkey, Elephant and Wildcat, they are looking for new habitat as well. Their habitats were already destroyed and now they are trying to escape from being killed. They all go to drink water at a lake. Then they talk. "
- 22. Monkey:** (Jumping up and down with both hands scratching his body. He looks right and left and right) "We are animals living in the forest. We used to live happily with plenty of food for eating. But now..."
- 23. Elephant:** (Swinging her trunk). "Now the weather is so hot and the lakes and rivers have little water— some are dried up. It is getting more and more difficult to find food from day to day."
- 24. Wildcat:** (He limps because of a leg broken by trap). "Yes, it is because people keep destroying more and more forest, that our lives are hard now."
- 25. Narrative:** "After that Crab and Frog living next to bank of the lake come out and say:"
- 26. Crab:** (Walking slowly.) "Humans only think about themselves."
- 27. Frog:** (Jumps from his hole) "Right, I 'm scared of going out for my food because I would be caught to be eaten by them."
- 28. Monkey:** (Jumps up and down his both hands scratching his body. He looks right, left and right.) "If the situation continues, then their will be no animals left at all". We all have to solve this problem so that we can live."
- 29. Elephant:** "We should go to see Rabbit to ask if he can help us."
- 30. Narrator:** "Agreeing, they all go to meet the Rabbit. The pair of Rabbits live happily in their beautiful house surrounded by greenish plants and vegetable which they planted. As they are planting more trees, the farmers approach them."
- 31. Farmer:** (Raises his hand to his forehead and looks at the Rabbit). "Bomg Rabbit! What are you doing?"
- 32. Rabbit:** "Oh! Bomg Farmer! Please come in. Now, we are planting trees. Where are you going?"
- 33. Narrator:** "While the Farmer talks to the rabbits, all the animals arrived. Suddenly, Tiger attacks the Farmers angrily."
- 34. Tiger:** (Jumps and cling one farmer's neck and roars loudly). "I will eat you because you destroyed our splendid habitat."
- 35. Rabbit:** (Rush to separate them apart.) "Stop! Stop! Tiger, don't be so violent. Please talk with us first. All of you come here. What can I do for you?"
- 36. Farmer:** "Well, I came to visit you to ask for your help. I want to know why the weather has changed and it doesn't rain like it used to?"

37. **Tiger:** "We also have serious problems. Our lives are terrible, there is no habitat, our relatives have died because humans have destroyed the forests which are our homes."

38. **Frog:** (Jumps up to Rabbit.) "Not only that but also they catch me for their food."

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39. **Rabbit:** "Oh! I see. These problems have occurred because of deforestation. Therefore, we all have to replant trees and protect the ones that remain because trees are very important for all of us. They help to produce rain, prevent flooding and storms, and provide habitat for all creatures. Our lives are miserable now that the trees have been cut down."

40. **Farmers:** Oh! I know and I am sorry. I promise that I will plant trees and protect the forests."

41. **All animals and Farmers:** (Raising their arms in a cheer) "We all promise that we will look after the forest."

42. **Rabbit:** "You must all return home and do what you have promised in order to improve our lives".

43. **Narrator:** "After getting advice from Rabbit, all the animals and farmers became aware of the importance of trees. They start planting trees. Since then there is a change surrounding their houses as well as other places. Everywhere looks green and has become a lovely place to live. All animals live with their relatives and others happily and peacefully. "



## Activity 11

### ROLE OF THE FORESTS IN BUDDHISM

#### Learning objectives

Students will be able to:

- a) Explain why the forest is important for Buddhism
- b) Describe two links between the life of the Buddha and the forest

#### Method

The students visit a pagoda to learn about the role of the forest in Buddhism.

#### Teacher's instructions

Setting: In the local pagoda

Group size: Under 30 students

Age of group: Grades 4 to 8

Materials needed: Notebooks and pens to take notes, some pictures of the Buddha in the forest, the monk and tree spirit story.

Activity length: 3 hours

#### Background

There is a close connection between Buddhist teachings and the natural environment. The Buddha was born in the forest, lived a good part of his life in the forest, and died in the forest. For Buddhists, large or old trees are particularly respected, such as the Bodhi and Sala trees. They are very well known in Buddhism because Buddha attained enlightenment under the Bodhi tree and was born under the Sala tree in Lumbini Park. When Buddha gave advice to his disciples and others, he usually did this in natural places and forests. Forests represent quiet and peaceful places for Buddhists to meditate.

Pagodas are an ideal place to learn about the connection between Buddhism and the environment. Many pagodas have paintings of the Buddha's life, which show the importance of the forest and nature. Students may also learn about the "wataram" which is the pagoda and the grounds around it. It is important for the wataram to have a beautiful environment with trees and shade because wataram literally means "Park which has shady forests, flowers, and fresh air". It was also a place for the Buddha and is still a place for Buddhist monks to learn and relax. In addition, wataram have been a center for conserving Khmer culture and tradition. Some pagodas also have their own forest adjoining. This may be an important place for monks to do meditation.

**Key words:** natural environment, Buddhist, meditation, forest, nature, wataram, shade, conserving

The purpose of this activity is to make students aware that the natural environment is closely connected to the Buddhist religion.

#### Activity Preparation

1. Make contact with the monks in the pagoda before the field visit and explain the purpose of the activity.

2. Explain to the monk that the students would like to learn about the Buddha's life and the strong connection to forests and nature, as well as the importance of the wataram. Give him a copy of the story The Monk and Tree Spirit and ask if a monk could read the story to the students.
3. If the pagoda is a long way from the school, the students should get permission from their parents.

### **Activity procedure**

1. Explain to the students that today they are going to learn about the importance of the natural environment to the Buddhist religion.
2. Ask the students to write two questions that they would like to ask the monk about the Buddhist religion and the forest.
3. Take the students to the pagoda to meet the monk and introduce the monk to the students.
4. Allow the monk to give a short presentation and tell the story of The Monk and the Tree Spirit.

### ***The Monk and the Tree Spirit***

*Once upon a time, a monk of Alavi decided to build himself a hut (Kuti) and so set about to cut down a tree. The tree spirit that resided in the tree begged him to stop but he refused. The spirit, thinking that the sight of her child would touch the monk, placed her child on a branch of the tree. However, the monk, unable to check the force of his upraised axe, cut off the arm of the child. The tree-spirit managed to retain her anger and impulse to kill the monk, and reported the matter to the Buddha. The Buddha commended her for her self-restraint and assigned her another tree in which to live.*

*The Buddha took this occasion to lay down upon monks the observance of the precept regarding the injuring of plants and trees. It is an interesting story because it informs us how people, even monks, often learn environmental lessons through experience. The full implications of acts which are destructive to the environment are frequently only realized after damage has been done. The image of the tree spirit has often been used in environmental campaigns in Buddhist countries to encourage people to respect the forests and abandon destructive practices. Old forest areas surrounding villages are frequently believed to be inhabited by powerful forest spirits, and it is forbidden for these areas to be cut. Because these community-based sacred sites and spirit forests are taboo to human interference, they provide an important contribution to the conservation of the environment.*

5. Ask the monk to explain any illustrations or paintings in the pagoda, which depict the **Buddha's life** and connections to nature.
6. **When the monk has finished reading the story**, ask him if the students can ask him **some questions** about the Buddhist religion and the environment.
7. **Ask the monk to give** the students a tour of the wataram in which he identifies and **talks about the various trees, shrubs, and flowers.**
8. **Thank the monk for talking to the students** and ask the students to think about the **importance of the natural environment to the Buddhist religion.**

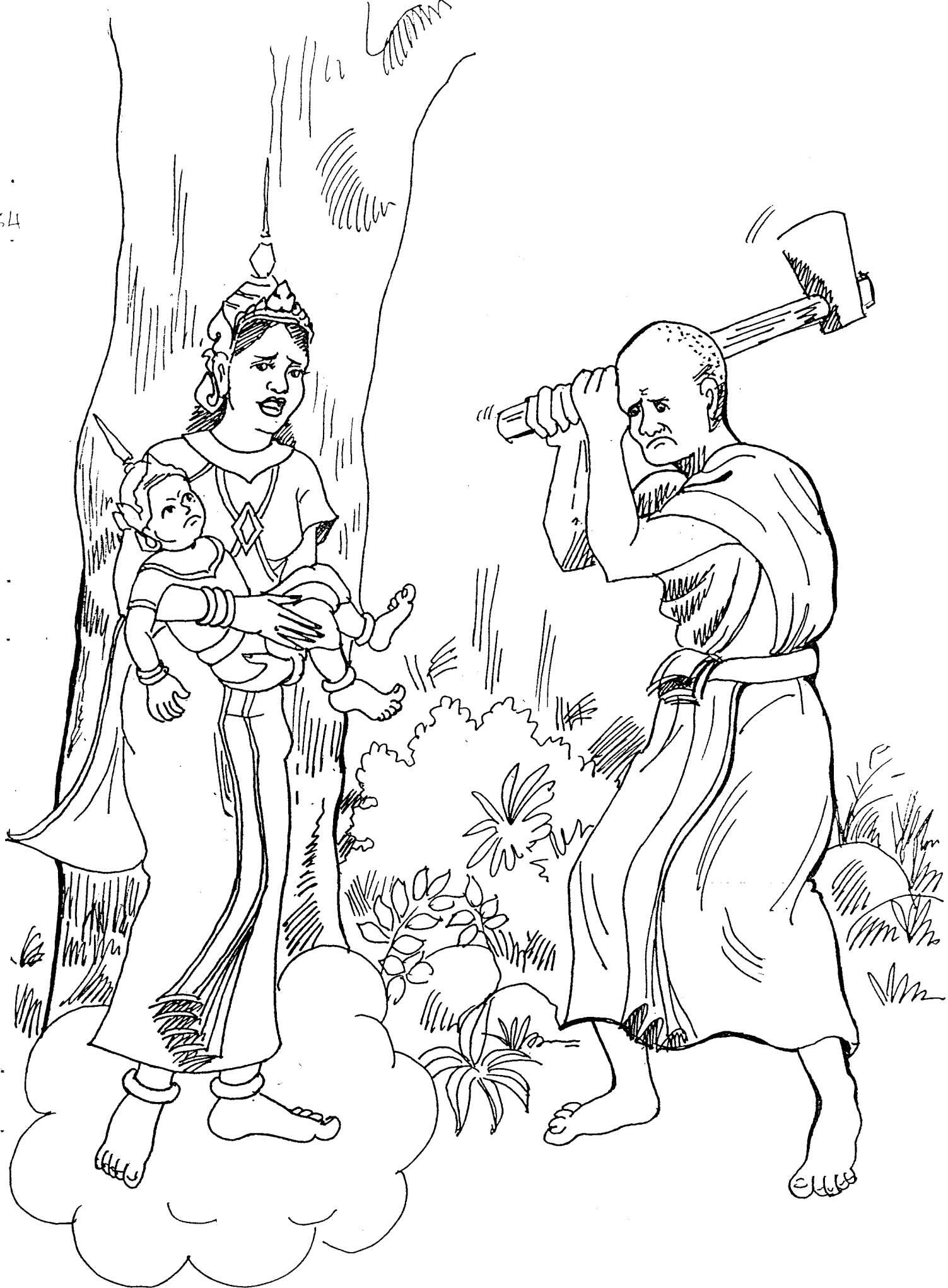
**Evaluation**

1. Name two links between the forest and Buddhism.

**Extension**

1. Ask the monk to lead a meditation exercise outdoors in nature.
2. Ask the monk to come to the school to do the presentation using pictures.





## Activity 12

### LEARNING ABOUT THREATS TO THE FOREST THROUGH LOCAL HISTORY

#### Learning objectives

Students will be able to:

- a) Name three threats to the forest
- b) Describe the local forestry situation

#### Method

Students conduct a survey with elders to learn about the threats to the forest

#### Teacher's instructions

Setting: Inside or outside with activity in the village

Group size: Up to 40 students

Age of group: Grades 4 to 8

Materials needed: Survey sheets, map showing deforestation over time, picture of deforestation.

Activity length: 2 hours

#### Background

Forests cover approximately one-third of the earth's total area. During the last forty years, at least one third of the world's forest have been cut down. In Cambodia, prior to the 1970's, approximately seventy percent of land was covered in forests. Because of rapid deforestation, however, now only about thirty five percent of Cambodia remains forested. Deforestation is when people cut the forest so much that it can not grow back. Usually, the land may be used for something else, such as farming. There are many reasons for deforestation, including:

- Poor management of logging concessions. Large areas forests have been sold private companies who cut down the trees and sell the timber. These areas are call logging concessions. Most of these companies do not care what happens to the land after they have cut down the trees. For instance, one company has cleared the forest and replanted with acacia trees, which destroys the soil.
- The increase in population and need for timber and firewood for energy. Most people in Cambodia use firewood from the forest to provide a source of energy cooking. Firewood and charcoal are also used to provide energy for industry
- Clearing of land for agriculture. As the population of Cambodia grows the need for land to build house and agricultural land is also grows bigger. Generally, in rural area of Cambodia, a family has at least five children. When these five children get married and have children they may need to cut down the forest to build a house and grow food to support their family.
- Short-term thinking and lack of understanding of the benefits of the forest. Most people do not understand the importance of forest and the long-term benefits the forest provides.

The purpose of this activity is to encourage students to communicate and learn from elders about the problems of deforestation.

**Key words:** threatened, deforestation, logging concessions, energy, benefits.

### **Activity procedure**

1. Explain to the students that today they are going to learn about the history of the forests in their area and why forests are threatened.
2. Show a picture of a deforested area and ask the students what they think has happened.
3. Ask the students if they know how much forest there was around their village or in their district ten years ago.
4. Explain to the students that the older people in the village probably know a lot about the history of the forest because they can remember how much forest there was when they were young.
5. Ask the students to think of one older person they know in the village that they could interview.
6. Give the students the interview sheets and read through them with the students.

### **Survey Questions**

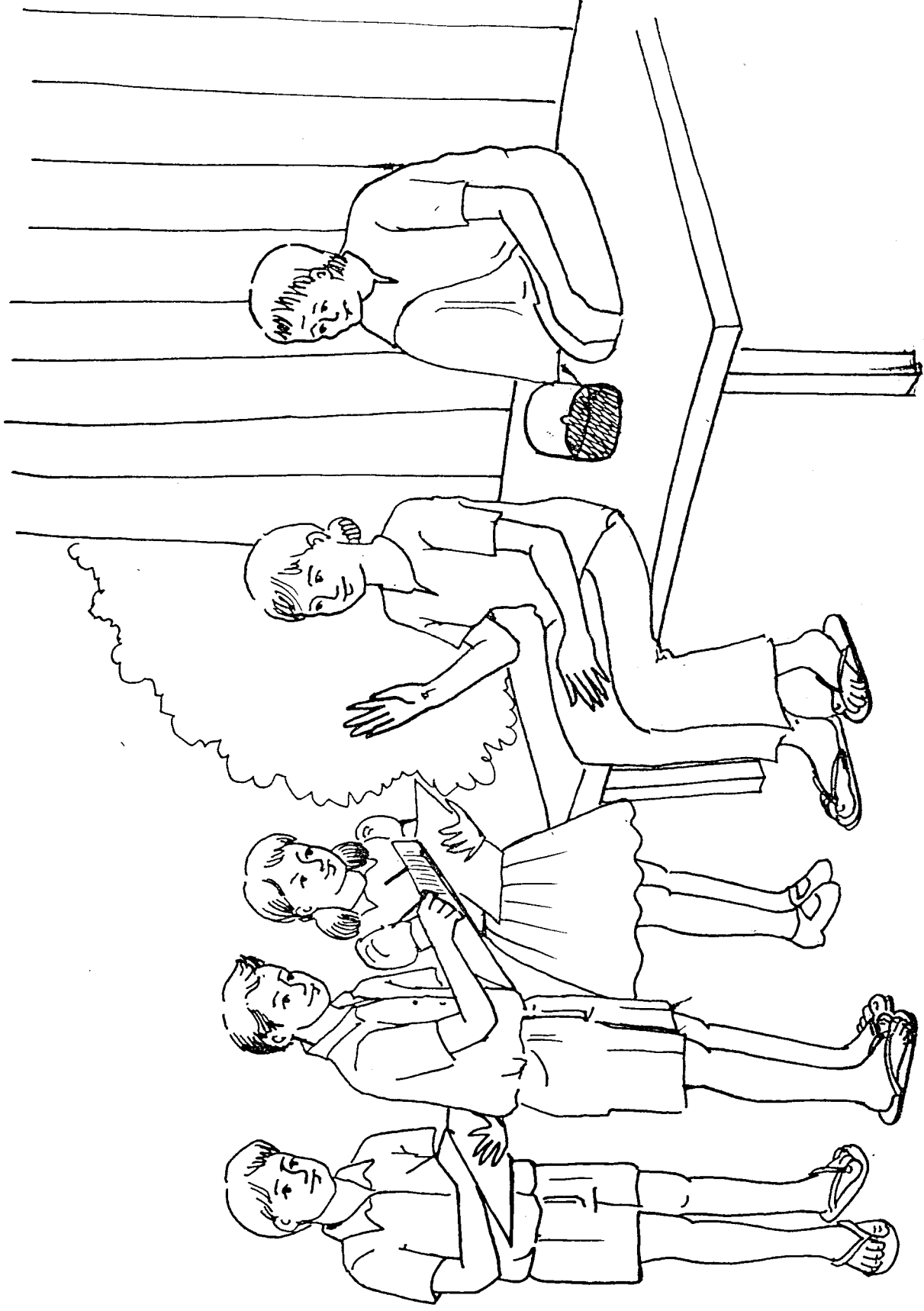
1. How long have you lived in this area?
  2. How has the forest changed?
  3. What is your opinion about the loss of the forest?
  4. What is the land that was forest used for today?
  5. What can we do to save the remaining forest?
7. Ask several students to volunteer to demonstrate how to ask the questions.
  8. Ask the students to complete the survey as homework or walk to the village and conduct survey together. Make sure they introduce themselves and their activity first.
  9. When the students have finished ask them to read out the results of the interview to the rest of the class.
  10. Explain to the students why the forests are threatened.
  11. Congratulate the students for their new understanding of the local forest history.

### **Evaluation**

1. Name three threats to the forest.
2. Interviews completed.

### **Extension**

1. Ask one of the older villagers to give a guest presentation on the history of the forest in the village or district.
2. Encourage the students to plant trees in the area where forest has been destroyed and look after them until they can survive by themselves.



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## Activity 13

### FOREST REGENERATION

#### Learning objectives

Students will be able to:

- a) Name three ways people use timber products
- b) Explain how we can use the forest without destroying it

#### Method

Students role play forests and users to understand about demand for forest products.

#### Teacher's instructions

Setting: Inside or outside

Group size: Up to 40 students

Age of group: Grades 4 to 8

Materials needed: Cards for each student with pictures of either trees or timber products.

Activity length: 2 hours

#### Background

The timber industry is one of the major industries in Cambodia. People get many benefits from the timber the forest provides because wood is used to produce many useful products including:

- furniture (beds, tables, chairs, chests, shelves)
- houses
- bridges
- ox carts
- paper (books, newspapers, notebooks)

The problem is that sometimes people take too much timber from the forest and don't think about what will happen when the forest is destroyed. When too many trees are cut down soil will get washed away and the forest cannot grow back.

If people only take some of the large trees from the forest and are careful not to destroy many of the smaller trees then the forest will stay healthy. If small trees are allowed to grow into large trees then they will produce the seeds for the next generation of trees. When small trees grow into large trees and produce seeds for the next generation of trees it is called regeneration.

The Government of Cambodia has also decided to protect some areas of forests such as national parks and wildlife sanctuaries because they want to keep these areas for the benefit of wildlife and nature.

The purpose of this activity is to make students aware that forests provide timber for many valuable wood products but must be allowed to regenerate.

**Key words:** regeneration, healthy, timber, timber products

### Activity preparation

1. Draw trees and timber products on the pieces of card. There should be the same number of tree cards and product cards.

### Activity procedure

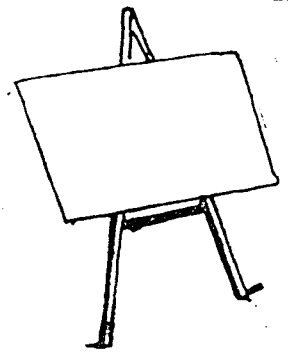
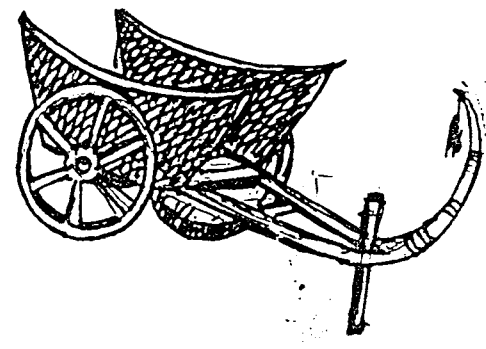
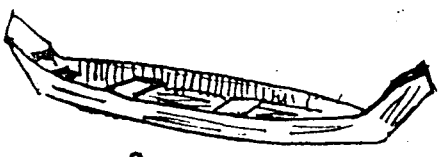
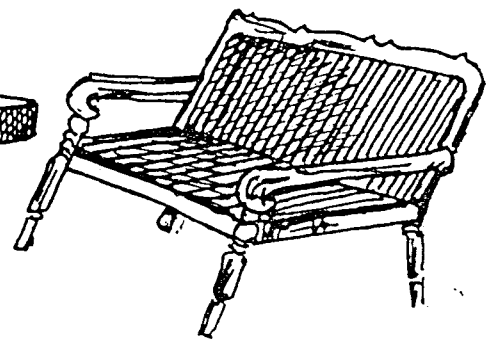
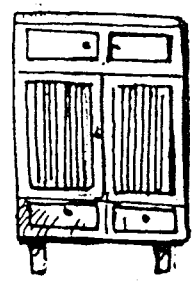
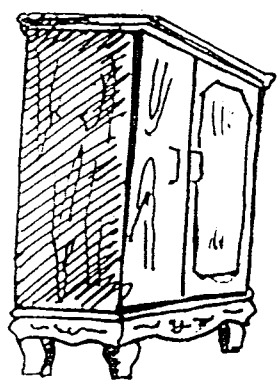
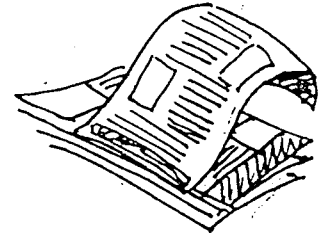
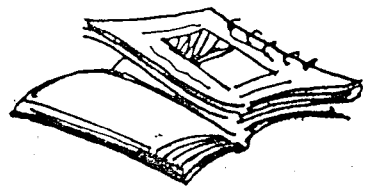
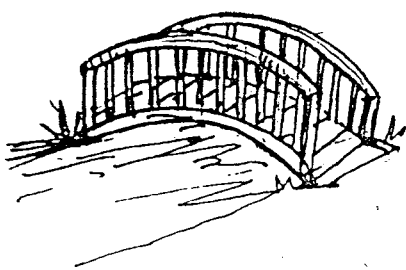
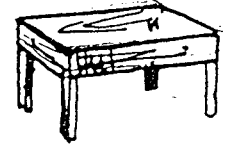
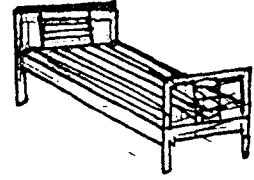
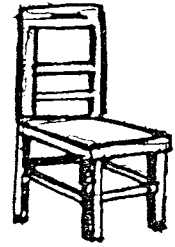
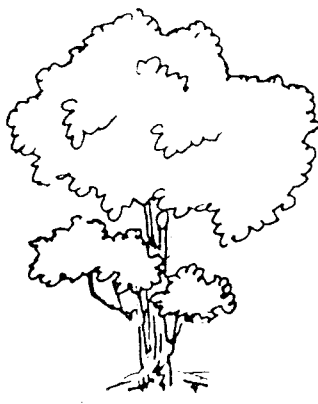
1. Explain to the students that they are going to learn about what happens when forests are not allowed to regenerate.
2. Ask the students what wood products they get from the timber taken from the forest and write their answers on the board. Don't forget to tell them that paper also comes from trees!
3. Explain that people are lucky to get so many different and useful products from the forest.
4. Give the students one card each. Each student will be a tree in the forest or a person who needs a certain timber product.
5. Ask all the students with a picture of a tree to stand together at one side of the room and be the forest.
6. Ask each of the students with the cards with a picture of a product made of wood on how many trees they need to make their product? When they have answered they must go to the other side of the room and pretend to cut down the same number of trees from the forest. The students with tree cards must sit on the floor after they have been cut down.
7. When all the students with tree cards are sitting on the floor ask the students with timber product cards where they are going to get the wood from now that all the trees in the forest have been cut down. Ask them why the forest disappeared and what could they do to prevent this. If students don't know, suggest keeping a few trees so that the forest can regenerate or replanting new trees. Explain that the forest is a valuable resource for people, but we need to be careful not to take too many trees.
8. Congratulate the students on their ideas and encouraging them to remember that forests must be allowed regenerate.

### Evaluation

1. Name three uses of timber from the forest.
2. Explain what regeneration means.

### Extension

1. Collect newspaper clippings on forestry and other **environmental** issues and paste them into a notebook to keep in the classroom **or put them on** a bulletin board.



## Activity 14

### PLANTING TREES

#### Learning objectives

Students will be able to:

- a) Name two reasons why we need to plant trees
- b) Name four things the plant needs to be healthy
- c) Learn how to plant trees successfully
- d) Develop responsibility and caring for nature

#### Method

Students plant trees in the school grounds.

#### Teacher's instructions

Setting: Outside

Group size: Up to 30 students

Age of group: Grades 4 to 8

Materials needed: Tree seedlings, fence materials including hammer and nails or wire, spade, scissors or knife to cut plastic bags, natural fertilizer, planting area in the school, home or community area, water and bucket

Optional –name plates

Activity length: Half day with follow - up

#### Background knowledge

Trees are all around us and include a variety of species that have many uses. Trees give many benefits to plants, animals and people. Trees are also closely related to the Khmer Buddhist beliefs.

In the school playground trees help to provide shade for students and make the school look more beautiful. In Cambodia many trees have been cut since the 1980's. The increasing population requires firewood for cooking and timber to build houses. There is also an increasing demand to clear forest for agriculture. One of the greatest causes of deforestation is large scale logging to export the timber to foreign countries. Foreign countries have cut down most of their own forest and timber is very expensive there now. It is cheaper to buy timber cut from forests in Cambodia. Now we need to help plant trees in areas that cannot regenerate naturally as well as around the community and our homes.

The purpose of this activity is to provide students with an opportunity to improve their environment by planting trees. It also gives them experience in managing and caring for seedlings.

**Key words:** regenerate, deforestation, timber.

#### Activity Preparation

1. Inform the local community and commune authorities on the tree planting project to get their support for the project. It is good to involve as many people as possible in the project because this will help educate the whole community about the importance of planting and caring for trees.

2. Ask them if they can provide materials such as seedlings and natural fertilizer.
3. Make sure that all the materials are available before the tree planting starts. As many materials as possible should be provided by the students themselves. Usually they can find bamboo and brambles for fences and natural fertilizer.

### Activity procedure

This activity has three phases: planning, planting and care.

#### Phase I: Planning

1. Take the students outside and sit under a tree. Ask the students why they think trees are important and why we need to plant trees (Write the answers on the board or on flipchart paper. Draw a picture of a tree on the flipchart or board. Ask the students what a tree needs to survive and what materials are needed for tree planting. Explain to the students that they must care for the trees after they have been planted.
2. Ask the students where they would like to plant the seedlings. Explain to the students that it is better to plant the seedlings near water.
3. Discuss with students what kind of seedlings they would like to plant. If they want to plant trees in a school playground the school principal can provide a guide of the best trees for the children's safety in the school area. Encourage the students to choose native trees and more than one species. **\*\*Note:** Schools do not allow the planting of fruit trees because of possible accidents from students climbing trees to pick the fruit. If possible get an expert from the Forestry Department or NGO to identify the kind of seedling that is suitable with the type of soil in the region and also select season to plant the seedling.

#### Phase II: Planting

1. If possible have two-three students planting and caring for **one seedling** but if this is not possible divide the students according to how many **seedlings** there are.
2. Organise the materials so that the students can collect **the things they need** to plant the seedlings. Demonstration how to plant a **seedling and construct** the tree guard. The tree guard should be large and strong **enough to keep** cows and pigs out. It should be secured in the ground by **digging holes for the main posts** (if this is difficult for smaller children organize for some **adults to assist** with the tree guard construction).
3. Dig the holes for planting and put the natural fertilizer in **the hole**. The hole should be much larger than the seedling. If the area is likely to **flood, it is better** to make a small hill/mound first and then dig the hole in the top of **the mound**.
4. Show students how to handle the **seedlings properly**. They **are fragile**. Carry the seedling by supporting one hand under the seedling and **one hand on the side** of the bag. **DO NOT** carry the seedling by the stem or leaves.
5. Cut the seedling bags for small students with the **scissors or a small knife** and remove the seedlings from the plastic bags. Always support **the base** of the seedling so the soil does not fall away from the roots.
6. Place the seedling in the hole, always supporting the base of **the seedling** and cover with soil. Press the soil firmly around the seedling.
7. Water the seedlings
8. (Optional) Put painted nameplates on the tree guards to **identify the tree species** and the people who planted and are maintaining the tree.
9. Congratulate all the students on their hard work and **encourage them to take care** of the seedling they have planted today.

### Phase III: Care

1. Explain the importance of regular weeding, watering, adding more natural fertilizer and checking the tree guard is secure. The students should monitor the trees carefully.
2. If there are problems with insects, use only natural pesticides such as urine or neem leaves (especially for *chat* seedlings)
3. Some seedlings will naturally die. Be prepared to provide some replacement seedlings.

### Evaluation

1. Name the tree species planted.
2. Give two reasons why we need to plant trees.
3. Have the students:
  - cleared the grass from around the base of the seedling;
  - pressed the soil around the base of the seedling;
  - planted the seedling straight;
  - watered the seedling; and
  - constructed the tree guard properly

### Extension

1. Ask each student to keep a diary of the tree they planted and record observations:
  - Height
  - Diameter
  - Insects and animals on the tree
  - Natural pesticide used if it is a harmful insect
  - Color of the leaves
2. Start a compost pile at the school to supply natural fertilizer for the trees planted
3. Start a seedling nursery at the school.



## Activity 15

### SPREADING THE MESSAGE OF FOREST CONSERVATION

#### Learning Objectives

Students will be able to:

- a) Communicate ideas about the importance of the forest.
- b) Express ideas about the forest through art.

#### Method

Students draw and make artwork about the forest to share their ideas with the families and local community.

#### Teacher's instructions

Setting: In the classroom

Group size: Up to 40 students

Age of group: Grades 4 to 8

Materials needed: paper and crayons or paints

Activity length: 3 hours

#### Background

One reason for the problem of deforestation in Cambodia is that people don't understand that the forests can provide long term benefits. Most people only see the short term benefit of taking timber, woodland animals from the forestland don't think about the future of the forest. For example, some people burn the forest so they can catch the small animals. People also cut young trees for firewood. Unfortunately, many people do not know the long term benefits of the forests like providing oxygen, cleaning the air, preventing floods and preventing soil erosion. It is important that students who have learnt about the long term benefits the forest provides can share their knowledge of the forest with others so that all people would be more likely to protect the forest. One of the best ways to spread the knowledge is through art.

The purpose of this activity is to provide students with the opportunities to share their awareness about forest with their communities.

**Key words:** deforestation, timber, animals, short term benefits, long term benefits, soil erosion, oxygen, floods

#### Activity procedure

1. Explain to the students that today they are **going to draw** a picture and write about benefits of the forest.
2. Ask the students what the long term **benefits of the forest** are. Write the answers on the board.
3. Give the students some paper and crayons and ask them to draw a picture which shows the long term benefits of the forest.
4. When the students have finished the picture ask them to write what the long term benefit of the forest is at the top of the page.
5. Put the finished pictures on the wall of the class room so that other students can learn from the drawings.
6. Students should also explain their drawings to the other students.



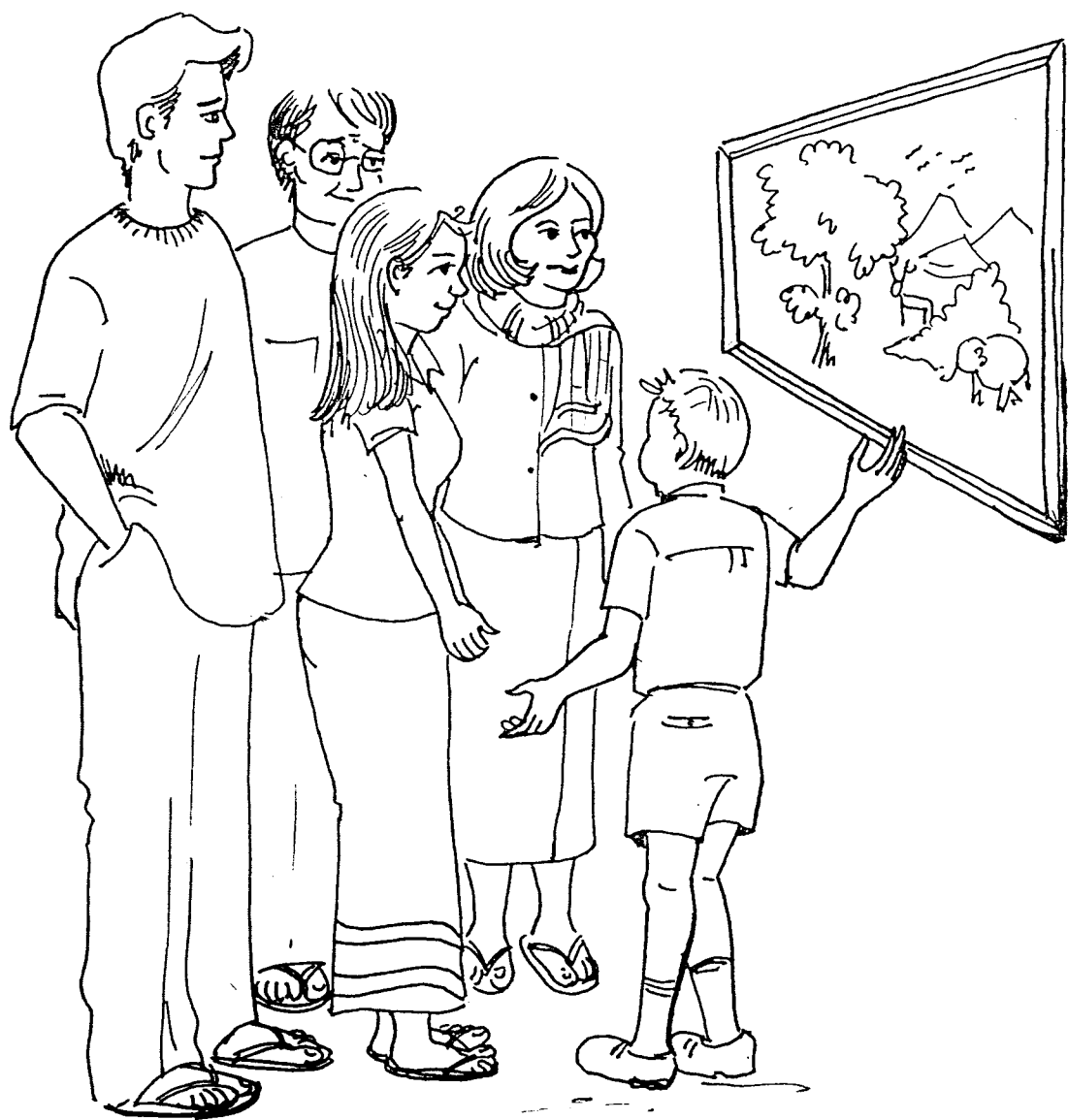
7. Give a small prize to the student with the best drawing, based on artistic skill and clarity of message about the forest.
8. Congratulate all the students on their drawing skills and encourage them to think about the long term benefits of the forest.

### **Evaluation**

1. Name one long term benefit of the forest.

### **Extension**

1. Invite parents and other students to visit for an exhibition of the students' art.
2. Display the drawings (or copies of the drawings) in other places where they will be more likely to be seen, such as market, local restaurant, etc.
3. Send some of the best drawings to local newspaper or children magazines.
4. Provide flipchart paper and ask students to work in-groups to make posters.



## LEARNING ABOUT WILDLIFE

Cambodia is lucky to have a broad diversity of animal species including large mammals, reptiles, birds, amphibians and insects. These animals are part of a variety of ecosystems including the upland and lowland forests, lakes, rivers and the sea. Increasingly, wildlife is under threat from habitat destruction and hunting. The activities in this section teach students about investigating all around them for evidence of wildlife. Students will also understand that animals and humans are part of a web of life and depend on each other. More advanced students will be able to undertake a project to improve the situation for wildlife in their local area.

## Activity 16

### WILDLIFE IS EVERYWHERE

#### Learning objectives

Students will be able to:

- a) Explain the difference between wild and domestic animals
- b) Observe and identify different wild and domestic animals in the local area
- c) Describe how people and wildlife share the environment

#### Method

Students investigate their environment for evidence of wild and domestic animals.

#### Teacher's instructions:

Setting: inside and outside

Group size: Up to 40 students

Age of group: Grade 4 and up

Materials needed: No materials required

Activity Length: 30 to 45 minutes

#### Background

People often think of wildlife only as large animals like tigers and elephants that they see on television, pictures, or at the zoo. However wildlife includes all animals that have not been domesticated by people.

Domesticated animals are those that have been tamed, made captive and bred for special purposes. Farm animals (cows, ducks, chickens) and pets (cats, dogs) are considered domesticated animals.

So wildlife is all the rest of the animals found on planet earth. These include fish, birds, insects, reptiles (such as snakes, lizards, and crocodiles), amphibians (such as frogs and toads) and mammals (monkeys, elephants and tigers). What may be surprising is that wildlife includes the smallest animal organisms, even those that can be seen only through a microscope. Wildlife occurs in a tremendous variety of forms and colours. Wildlife lives in a variety of places - in the soil, on the ground, in water, in trees and in the air.

Wildlife can be found all around us-in the deserts, the oceans, tropical jungles, and in cities. Wildlife can also be found in rice fields, around schools or temples, and in many other places. Even when people think they cannot see or hear wildlife, it is always somewhere nearby, maybe even under our feet! There are even tens of thousands of life forms on our skin, in our hair, and inside our bodies! In fact, each of us would die if all the organisms that inhabit our bodies were to disappear. People are never truly alone in the environment.

The purpose of this activity is for students to be able to distinguish between domestic and wildlife, describe wildlife around them and observe that people and wildlife share the same environment.

**Key Words:** wildlife, amphibians, mammals, reptiles, birds, insects, domesticated,, environment, organisms.

### Activity Procedure

1. Explain to the students that today they are going to learn about wildlife.
2. Ask the students to name all the different animals they know. List the answers on the board. Explain that there are two categories of animals in the world; wild animals and domesticated animals. Ask the students the difference between wild animals and domesticated animals. Clarify the explanation if they are unsure. Explain to the students that the left side of the room represents domesticated animals and the right side represents wild animals. One at a time each student should say one animal name and mime the characteristics of this animal, then move to the correct side of the room. No student should be allowed to repeat the name of an animal which has already been said. If the student is unsure whether he/she is a wild or domesticated animal, he/she should discuss and ask the help of a friend. Then ask the students which category an ant and a fish fit into (wild animals). These are animals young students will often get confused.
3. Explain to the students that everyone is now going to explore inside the room for evidence of wild and domesticated animals for about 15 minutes. Explain to the students that they should not touch any wildlife they see.
4. Explain that even in the most cleanly swept rooms, some evidence of wildlife can usually be found such as spider webs, dead insects or insect holes along wooden door or window frames or in books.
5. Ask the students about what they have found. Explain that sometimes people don't even notice that they are sharing the environment with other living things but in most places people must live in harmony with lots of different wildlife and share the resources available such as water, food and air.
6. Next ask the students to look for evidence of other animals outside of the room. Take the students outside and give them five minutes to look around. Look for indirect evidence, such as tracks, webs, droppings, feathers, and nests. Explain to the students that they must not harm or disturb anything.
7. When the students have finished looking for evidence ask them to sit down and discuss what they observed. Each student should name one domestic and one wild animal they found. Emphasize that people and wild animals share the environment, even when you can't easily see wildlife.
8. Ask the students to talk about the types of wildlife that they have in their village. Ask the students if they know about other types of wildlife in Cambodia. Ask them what is the difference in protecting wildlife vs. domesticated animals.
9. Congratulate the students on their work and encourage them to think about how they share their environment with animals.

### Evaluation

1. Name one type of wild and domestic animal observed in the local environment
2. Separate animals correctly into the wild and domestic category.

### Extensions

1. Search your garden, kitchen, neighborhood, or village, looking for wildlife.

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2. When you find a picture of an animal, draw and write a description of it (for example describe it's size, colour and shape)
  3. Continue to collect information on different types of wildlife throughout the year to see how many types of wildlife you have in your village
  4. Create a wildlife trail for your students to follow. Place a long piece of string around an area of the school yard, either along the ground or tie the string between several trees. Make sure there is evidence of animals (bones, feathers, etc) along the trail or place items along it. Ask the students to follow the string.



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**Activity 17**

**WHAT DO ANIMALS NEED TO SURVIVE?**

**Learning objectives**

Students will be able to:

- a) Name three survival needs of the wildlife
- b) Describe how people and wildlife have similar basic survival needs.

**Method**

Students observe wildlife meeting their basic survival needs.

**Teacher's instructions**

Setting: Outside  
Group size: Groups of 3-6; approximately 40 students in total  
Age of group: Grade 6 and up  
Materials needed: Writing materials  
Activity length: 1 hour

**Background**

People, domesticated animals and wildlife have similar basic survival needs. To survive they all need food, water, shelter and space. Sometimes people forget that all living things share the same environment and have the same basic survival needs.

The purpose of this activity is to make students aware that people are not the only species with basic survival needs. Even ants have the same needs for food, water, shelter and space.

**Key Words:** survival needs, water, shelter, habitat, predator.

**Activity procedure**

1. Explain to the students that today they are going to learn that people and wildlife share the same basic survival needs. Clarify that the students know the difference between domestic and wild animals, because today everyone is only going to observe wildlife.
2. Explain to the students that they should not touch any wildlife they find.
3. Divide the students into groups of three – six students. Explain that at least one student in each group must write down the observations of the other students in the group.
4. Ask the students to search outside to find a wild animal. Look on trees, under plants, in grass or in the water.
5. Explain to each group that they must observe the animal and write a description of:

What is the name of the animal:

Where does the animal live:

What is the animal doing:

(Write down everything you see including - eating, flying, swimming, drinking water, nesting, sleeping)



6. When the students have finished ask them to sit in a circle and each group tell everyone about what they observed and recorded on their question sheet.
7. Having investigated the basic survival needs for food, water, shelter, and space, ask the students to describe similarities and differences between the basic needs of the animal and humans. Assist the students in generalizing that humans and other animals, both wild and domesticated, have similar basic survival needs.
8. Explain to the students that, although humans and animals are very different, they both share the same basic needs, i.e. food, water, shelter and space.
9. Congratulate the students on their work and remind them to look around everyday to see who and what is in the environment and to care for everything in the environment.

### **Evaluation**

1. Write and name three basic survival needs of wild animals.
2. Explain the similarities between people's needs and wildlife needs.

### **Extension**

1. Observe the wildlife in your home garden, near a pond or river, or near a pagoda. How many different types of wildlife can you see? How are they different (eg size, colors, do they occur on their own or in flocks?) Continue to observe these birds and record what they eat.
2. See if you can learn more about an animal living around your home or school that you can observe and recognise everyday. Note your daily observation by drawing your animal.

## Activity 18

### THE ANIMAL KINGDOMS

#### Learning objectives

Students will be able to:

- Name the five different animal family kingdoms
- Classify Cambodian animals into their family kingdom

#### Method

Students play a card game to classify animals into the kingdoms.

#### Teacher's instructions

Setting: inside or outside

Group size: up to 10 students

Age of group: grades 4 to 8 . . . provided with this "kit" =

Materials needed: 40 Animal pictures and five extra cards to show the five animal kingdoms (fish, amphibians, reptiles, birds, and mammals)

Activity length: 1 hour

#### Background

- Insects

Insects make up over four-fifths of all the animal species on Earth. About 1 million species are known and many thousands more are discovered each year. Insects live in almost every habitat on land, from rainforest to desert. Many live in fresh water, but hardly any live in the sea. Most insects can fly, and many change shape as they mature.

- Fish

With more than 20,000 species, fish are more numerous than all other vertebrates (animals with backbones). Fish are very well suited to life in the water. They have streamlined bodies, and most have slippery scales and a special organ that helps them float.

- Amphibians

Amphibians were the first group of animals to move from water to live on land. Most amphibians spend the early part of their lives in water. Later, they grow legs, lose their gills, and can live both on land and water. (For example: Frog, newt, salamander)

- Reptiles

Million of years ago, reptiles dominated Earth. Some of these reptiles – including dinosaurs- died out, but other kinds are still alive today. Unlike amphibians, reptiles may live entirely on dry land, but they are also cold-blooded, and so need warmth to become active. Most reptiles lay eggs. (For example: Crocodile, snake, turtle)

- Birds

Birds are the largest animal capable of powered flight. Their streamlined bodies are covered with feathers, and many bones are hollow to save weight. Birds live in

different habitats, and reproduce by laying hard-shelled eggs. Some species have lost the ability to fly. (For example: kiwi, chicken)

- **Mammals**

Mammals are a very diverse group of animals. They range from huge rhinos to whales that spend their lives in the oceans to bats that spend time in the air. Mammals can live in nearly all habitats. Humans belong to this group of animals. All mammals are warm-blooded. Most mammals have hair of some sort on their bodies. Female mammals suckle their young with their own supply of milk. A mammal has well-developed senses.

The following species are included in the card game: (each card is double)

Animal Kingdoms	Wildlife Species
<b>Mammals</b>	1. Tiger 2. Asian elephant 3. Pileated gibbon 4. Muntjac 5. Small bat
<b>Reptiles</b>	1. Siamese crocodile 2. Batagur baska 3. Tockay 4. Rainbow watersnake
<b>Amphibians</b>	1. Buffo toad 2. Rana frog
<b>Fish</b>	1. Giant catfish 2. Giant barb 3. Snakehead 4. Gourami
<b>Birds</b>	1. Sarus crane 2. Green peafowl 3. Spot billed pelican 4. Yellow vented bulbul 5. Common myna

### Activity Procedure

1. Explain to the students that today we are going to learn about different types of wildlife. Some wildlife have wings and can fly, some animals live in water and swim and these different types of animals come from different family kingdoms.. Ask the children to name different types of animals they know. Write the animals on the board.
2. Ask the students to sit in a circle. Show the animal class cards to the students and introduce the 5 different classes by giving an example for each class. Explain that the children will be given animal cards and have to put them on the family kingdom card. *representative.* *ASK five students to represent each a family King. down*
3. Organise two groups and give one set of identical animal cards to each group. Ask the students to divide the cards amongst the members of their group. When all the groups are ready, the facilitator says go and the students must place all

their cards in the correct family category . The group who gets the highest number of correctly-placed animal cards will be the winner.

4. Repeat this activity if there is time, until the students put all the animals in the correct family kingdom. Explain to students that by understanding the family kingdoms, they will have a deeper understanding about animals in general.
5. Congratulate the students and encourage them to keep practicing by categorising animals around their home.

### **Evaluation**

1. Name the five different animal kingdoms
2. Students classify Cambodian animals correctly into their family kingdom

### **Extension**

1. In groups ask the children to discuss and write down the similarities and differences of the animals in each family kingdom.

## Activity 19

### THE FOOD CHAIN

#### Learning objective

Students will be able to:

- a) Explain that all animals, including people, depend on plants and each other as a food source.
- b) Draw the food chain

#### Method

Students draw, list and analyze the links between food sources.

#### Teacher's Instructions

Setting: Inside  
Group size: Any  
Age of group: Grade 4 and up  
Materials needed: tape, string

Drawings of links in 6 food chains as follows:

- 1) Person > big fish > small fish > smaller fish > marine plant
  - 2) Person > chicken > cricket > grass
  - 3) Tiger > wild pig > plants and roots
  - 4) Person > cow > grass
  - 5) Leopard > monkey > frog > insect > grass
  - 6) Bat > insect > plant
- Cut each group into a set, but mix up the order within each set.

Activity length: 30 minutes

#### Background

On planet earth there are millions of different types of animals and plants. All of these animals and plants, including people, depend on other plants and other animals for survival. Ultimately it is plants that support all forms of animal life. It may not be as easy for people to see that even when they are eating animal products, they are indirectly relying on plant sources. For example, people drink the milk and eat the meat from cows, which eat grass to survive. People also eat the eggs and meat from chickens, which eat insects that eat grass to survive. Every animal, including people, either eat plants or eat animals which eat plants. This is called the food chain.

The purpose of this activity is to make students aware that all animals and plants depend on other animals and plants to survive.

**Key Words:** food chain, plant, animals, predators, survival.

#### Activity procedure

1. Explain to the students that today they are going to learn that animals and plants depend on each other for survival.
2. First brainstorm with the students by asking them what they ate for dinner last night. Ask them where this food came from. Next divide the students into groups of 4-6 students and then. Give each group a set of picture cards. Ask them to

look at the cards and try to put them in order according to who eats what and who eats who first. (You may need to give an example). Get the students to make the chain by using the tape and string to connect the drawings. Assist the students if they are having difficulties with which animals are predators and which are prey.

3. Draw a spider web on the board. Ask one representative of each group to stick their two food chains on the web. Help the students to connect their food chains to each other. Explain that all the plants and animals are connected. They rely on each other for food and many other things. We are all part of this food web.
4. Ask the students what happens if one animal or plant is taken out of the food web? For example remove one plant picture from the food web diagram. As the students name the animals that are affected remove the animal from the web. Ask the students how many animals does it affect? (All the animals). When the activity is finished read the story "The Cambodian Flood".

*This story takes place towns near the Mekong River and Tonle Sap Lake. In Cambodia the Mekong River and Tonle Sap River rise every year in the wet season. However in some years a lot of the land near Mekong River and Tonle Sap Lake floods very high. When this flood happened swarms of mosquitoes came, maybe 10 times more than the normal amount of mosquitos. Then people were very annoyed because of all the bites. They did not want to go outside. After a day many dragonflies appeared and started to eat the mosquitoes. Then the sky turned black with dragonflies. The people wondered what would happen. Some time later, frogs appeared from the wetlands and started eating the dragonflies. Their long tongues caught the mosquitoes as they were flying past. After a while the frogs were so full they could hardly jump. There were so many frogs on the ground that people had to be careful where they stepped (the reader should demonstrate how the people are walking). Then other animals came and started eating the frogs. Can you guess what they were? Snakes. That's right. Who likes snakes? But there are very important because they at the frogs. But then people became frightened. Snakes were everywhere on the ground and the people had to stand on chairs (demonstrate to the class) and on the beds. they didn't know what to do. After a short while something appeared in the sky....eagles. They were hungry and flew down and caught the snakes in their big claws and took them away to eat. Can you guess what happened after this? What did the eagles do when all the snakes were eaten? They flew away to another place and the town became quiet again. the sun had dried the floodwater and only a few ponds were left. The town was peaceful and the people were happy again.*

5. Ask the students if they know what this story is about? Nature has a way of fixing problems and the food chain helps keep everything balanced, because if there is too many of one species it can cause problems for other species.
6. Congratulate the student's on their work and encourage them to remember that people, plants and animals are all part of the web of life and depend on each other.

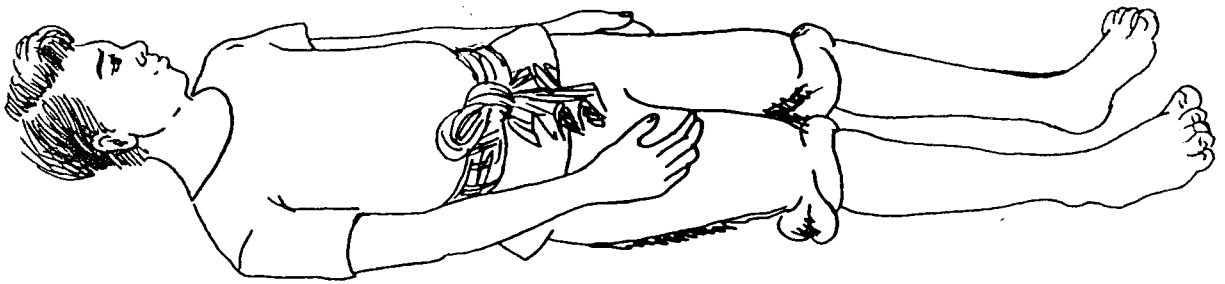
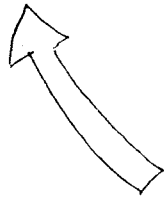
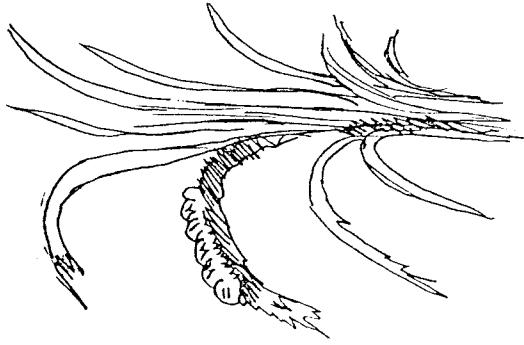
### **Evaluation**

1. Draw a food chain using three organisms.
2. Draw a food web with three food chains.

3. Name two food sources that all animals including people depend on either directly or indirectly.

### Extensions

1. Using the organisms listed below, construct at least three food chains using more than three organisms: people, rabbits, grass, lettuce, tigers, ducks, earthworms, hawks, mice, insects, wheat, cows, corn, pigs, deer, rice.
2. Make a poster showing all the food chains drawn by the student. Add soil, water, sun, and air - since these are necessary to plants, people, and all animals too!





## Activity 20

### BATS ARE BENEFICIAL

#### Learning objectives

Students will be able to:

- a) Describe 2 benefits of bats
- b) Describe how bats locate their prey

#### Method

Students play an active game to understand how bats capture and control insect pests.

#### Teacher's instructions

Setting: outside

Group size: Up to 40 students

Age of group: Grades 4 to 8

Materials needed:

Activity length: 2 hours

#### Background

Bats are mammal species (they nurse their young as people do) which are nocturnal, meaning they are most active at night. Bats move faster than insects and use sound to find their way around, so that they don't fly into trees or buildings and also can find their food. As they fly, they send out a sound that bounces back to them when it hits something, like an echo. If the sound comes back quickly, they know they are close to something. Depending on how much of the signal bounces back, it lets them know if the object is big or small. This way bats can determine where objects are while flying and searching for food.

Bats are an important part of the ecosystem because they control insects. In fact, bats can consume up to half of their body weight each night in insects! Bats also provide a very rich and valuable fertilizer in their droppings. This fertilizer is a good source of organic nutrients which can help farmers to produce better crops.

**Key words:** mammal, nocturnal, echolocation, ecosystem, natural selection

#### Activity procedure

1. Select one volunteer student to be the bat and 3-5 other students to play the insects. The other players stand around in a large circle holding hands. The bat and the insects stand within the circle and the bat is blindfolded.
2. The bat calls out "bat" and the insects must answer back "insect". The bat may then try to catch the insect, while the insects try to escape from the bat. This is repeated over and over until the bat catches an insect. If it's necessary to help the bat out, you can make the circle smaller, by asking the students to take a step forward.
3. The game starts again as another bat and more insect volunteers take their place within the circle.
4. Ask the students if anyone noticed any characteristic that any of the moths had that helped them to survive longer. Examples could be that the insect was fast,

stopped low to the ground, or had a quiet voice. Remind the players that these successful traits help the individual moth to live longer, and this process is called natural selection. Clarify the bats' special technique for capturing its prey (echolocation).

5. Next ask the students what benefits people get from bats. Remind them of the many insects that sometimes eat farmers' crops and see if they can guess. Also, explain to them that bat guano is a very useful fertilizer for farmers.
6. Emphasize the important role of bats in the ecosystem and praise the students for their new appreciation of bats.

#### Evaluation

1. Describe how bats capture their prey
2. Name one advantage of bats

#### Extension

1. Take students for bat-watching in the evening at a place where bats are known to roost. If possible, keep a diary on the times when bats leave their roost each day.
2. Create a bat roost in a palm tree so that bats will be attracted to a farmer's field. The bats will help to control insects and also provide some fertilizer from their droppings at the base of the tree.

## Activity 21

### WILDLIFE IS CAMBODIA'S HERITAGE

#### Learning objective

Students will be able to:

- a) Explain that wildlife is part of Cambodia's heritage and that it should be protected.

#### Method

Story-telling and drawings about wildlife throughout Cambodia's history.

#### Teacher's instructions

Setting: In the Pagoda and inside

Group size: Up to 30 students

Age of group: Grades 4 and up

Materials needed: Writing and drawing materials, a pagoda with paintings

Activity length: 2 hours

#### Background

The Angkor temples were built by the ancient Khmers hundreds of years ago. Wildlife was present everywhere at that time. Animals from legends or real wildlife are shown on the walls and columns of the monuments and are represented by statues, or along bridges and causeways (snakes/*nagas*) along the terraces (elephants with lotus flowers at the bottom of their trunk). The Bayon temple is famous for its bas-reliefs depicting thousands of animals including reptiles, amphibians, fish, mammals and birds in their natural environment. Many scenes show aquatic life with fish, turtles, crocodiles, crabs and water snakes. In other scenes trees and forests, even the flooded forests, are carved on the sandstone walls. These forests host many types of birds, such as peafowl, flying parrots, dancing sarus cranes, some round-faced owls and one of the rarest storks in the world, the Greater Adjutant. The temples also show scenes of mammals, such as gibbons, muntjacs, and tigers. The Angkor temples show the rich biodiversity of the past.

Some mythical animals are also widely represented everywhere in and around the Angkor temples:

- the *nagas* with multiple heads;
- the bird Hamsa, the mythical goose-like mount of **Brahma**;
- the cow Ninda, the mount of the god Shiva;
- the half man, half bird or prey Garuda, the mount of the god Vishnu the Protector;
- the King of the white monkeys, Hanuman from the **Reamker** legend; and
- the turtle in the center of the Churning of the Ocean of Milk.

The bas-reliefs and legends tell of the strong relationship that the ancient Khmers had with wildlife. Seven hundred years later, it is sad to see how many animals have now disappeared or are critically endangered. In just the last few decades: the rhinoceros, the giant catfish, the green peafowl, the giant ibis, the tiger and the elephant have almost disappeared from Cambodia. Before they all disappear completely people need to look at ways of protecting these animals and preserving the important link between the cultural and natural heritage of Cambodia.

Today the elephant is popular with Buddhist people because of its cleverness, strength and patience and for its services in agriculture and transportation. However, the number of elephants in Cambodia has declined due to habitat loss and hunting. Perhaps the protection of elephants and their habitats could be used to promote animal conservation and habitat preservation in general.

The purpose of this activity is to make students appreciate how important Cambodia's wildlife has been throughout Cambodian history and make the current generation aware of Cambodia's rich natural heritage.

**Key words:** biodiversity, natural heritage, endangered, extinct, wildlife, protection

### Activity preparation

1. Arrange a visit to your local Pagoda.
2. Make contact with the monks in the pagoda before the field visit and explain the purpose of the activity.
3. If the pagoda is a long way from the school, the students should get permission from their parents.

### Activity procedure

1. Take the students to the Pagoda. Enter the Vihear and ask students to observe the paintings of animals.
2. Ask the students to sit with you and tell them the following story:  
*"The elephant plays a significant role throughout the life of Buddha. In Buddhism, the elephant is a symbol of endurance, strength, and restraint. In Cambodia the walls of the temples are often illustrated with pictures of elephants serving the Buddha."*
3. Ask the students to show you where they see elephants with Buddha.  
*"The elephant, particularly the white elephant, has been closely linked with Buddhism and the Cambodian monarchy, thus making it an important unifying symbol in Khmer culture. The Buddha himself came to his mother after she had a dream with a white elephant."*
4. Can you find this painting around you?  
*Another well-known elephant story involves Devadatta, the Buddha's evil disciple, who made many attempts to eliminate the Buddha. He sent a savage elephant to a place where the Buddha was expected to pass by, so that the animal could gore him with his tusks and trample him underfoot. But on the contrary, at the sight of the Master, the elephant became quite gentle and in going up to him, brushed the dust from the sacred robes with his trunk. The Buddha thanked Devadatta for sending the elephant to pay homage to him."*
5. Ask the students if they see a painting representing this story? If not, tell them to look for other wildlife representation that they know already? Ask them to describe and tell the story.
6. Explain to the students why the elephant is popular with Buddhist people and ask them to draw a white elephant or other wildlife they have seen on the Pagoda.
7. When the students have completed their drawings, congratulate them for their artistic and creative work.
8. Ask the students which animals still live in their province today? Ask the students if there are any of the animals that have disappeared. Explain to the students that

animals that can no longer be found anywhere are called extinct and animals that there are only a few left are called endangered. Explain that everyone should work together to preserve Cambodia's heritage so that no more animals disappear from our environment in Cambodia.

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9. Congratulate the students and encourage them to talk to their family about wildlife and the heritage of Cambodia.

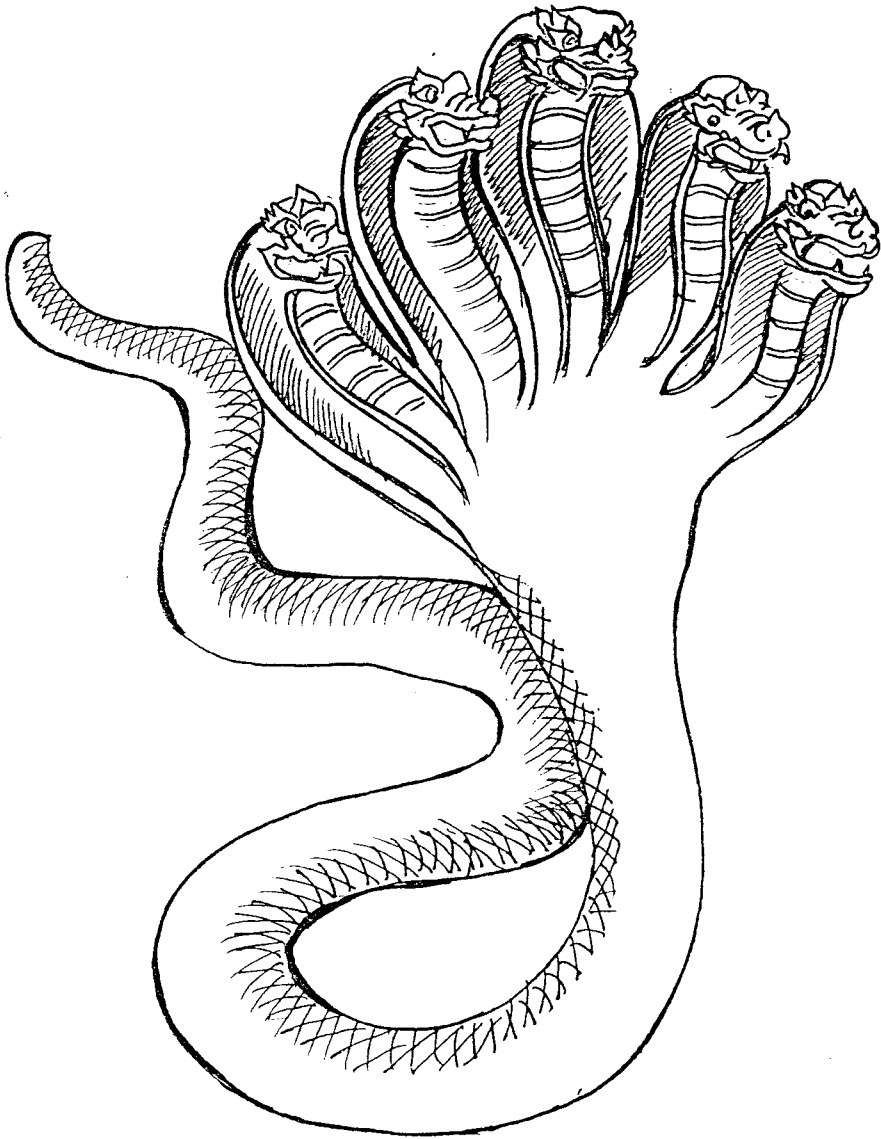
### **Evaluation**

1. Give two reasons why the elephant is important in Buddhism.
2. Name two types of wildlife that are shown in the pagoda that are still alive in Cambodia today.

### **Extension**

1. Students collect information about a specific ancient legend with wildlife or about a mythical animal and report to their class.
2. If students are able to visit Angkor, walk around the Bayon temple to find the animal representations on the bas-reliefs corresponding with the drawings of this activity. If not, visit a temple near you and see if you can find wildlife represented in the bas-reliefs of the temple. Then ask the children to classify their drawings either into different groups (reptiles, amphibians, fish, mammals, birds) or into common or endangered species.

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## Activity 22

### COMMON AND ENDANGERED WILDLIFE SPECIES

#### Learning objectives:

Students will be able to:

- a) Describe the difference between a common and endangered species.
- b) Name five endangered wildlife in Cambodia; and
- c) Explain two reasons why some wildlife is being threatened or becoming endangered.

#### Prerequisite:

Completing Activity "Wildlife is Everywhere" before this activity will help students understand clearly the definition of wildlife.

Activity "Forests are Habitats" is also another activity that can teach students about the threats to wildlife.

#### Method

Students play a card game learning different endangered and common wildlife species.

#### Teacher's instructions:

Setting: inside or outside

Group size: up to 10 students

Age of group: grades 4 to 8

Materials needed: Map of Cambodia and 20 endangered (red cards) and 20 common (green cards) wildlife cards both provided in this manual, with

Activity length: 1 to 2 hours

#### Background

Cambodia has many wild animals, including mammals (tigers, elephants), birds and reptiles (turtles and crocodiles). However the numbers of these wild animals are decreasing due to loss of habitat and hunting. When the number of animals in the wild decreases dramatically they are called threatened species and when there is a chance that they may become extinct, they are called endangered species. Species means a group of animals that all share the same characteristics or qualities and that can reproduce together. For example, animals with wings, feathers and two feet are considered to be bird species.

#### Endangered Mammal species

Approximately one hundred species of mammals have been recorded in Cambodia. Of these one hundred species a total of forty nine mammals are currently threatened or endangered. There are still some large mammals (such as elephants) surviving in Cambodia.

The most immediate threat to these mammal species is hunting. Most of the large-bodied mammals have both a commercial and a subsistence value to local communities and hunters. The near or total loss of populations in neighboring

countries (Thailand, Laos and Vietnam) has only increased the pressure on some species, especially the tiger, Asian Elephant, Kouprey, and Javan Rhinoceros. In addition to hunting, deforestation throughout the country continues to destroy the habitat of many of these endangered mammal species.

### **Endangered Bird species:**

Over five hundred species of birds have been recorded in Cambodia. Of these five hundred species at least thirty nine species of birds are threatened or endangered, the majority being large waterbirds.

The major threats are:

- hunting;
- egg/chick/bird collection (for food, international trade, traditional medicine, prayer release, pets and private zoos);
- habitat loss; and
- human disturbance.

The endangered bird species include:

- The Giant Ibis: this is so rare that it is believed to be a near-mythical species. It is surviving in very small population only in northern Cambodia (Preah Vihear) in a habitat of dry forest with pools. It is extinct in Thailand and Vietnam and almost extinct in southern Laos.
- Bengal Florican: Tonle Sap eastern grasslands support the most significant population in the world.
- Sarus Crane: this Crane survives in the wetlands of the northern dry forest (breeding) and to Tropeang Thmor reservoir (Banteay Meanchey) in the dry season.
- Green Peafowl: the world's largest remaining population survives in the lowland forest of southern Monduliri and across the Vietnamese border.
- Spot-billed Pelican: Southeast Asia's last breeding colony survives in Prek Toal, Tonle Sap.
- Greater Adjutant: this is the most endangered stork. One hundred to one hundred and fifty birds survive in Cambodia (twenty percent of world population). It is an important colony in Prek Toal, Tonle Sap.

### **Endangered Reptile species:**

All large reptile species in Cambodia are under threat of extinction. Some of the significant reptile species in Cambodia include:

- Siamese Crocodile: this crocodile grows up to four meters in length. It feeds on birds, frogs and small mammals. It lives in wetland areas but lays eggs on land.
- Asian Box Turtle: this turtle lives in canals, streams and marshes. It survives on the land and in the water. It eats aquatic plants, molluscs and shrimps in the water and plants, fungi and worms on the land.
- Tockay: the Tockay is the largest Gecko in Asia and can reach thirty five centimeters in length. The Khmer name for this lizard is based on the distinctive call it makes, however it is only the males that call. They hunt on houses or trees and eat large insects such as beetles, locusts and large winged termites.
- Reticulated Python: this snake is the world's largest snake and can reach nine meters in length. It likes the water and is excellent swimmer. Pythons kill their



prey be crushing it until it stops breathing and then they eat it whole. They typically hunt at night and eat small mammals and birds.

**Key words:** endangered, extinct, threatened, habitat loss, deforestation, species, reptile, mammal, bird, hunting

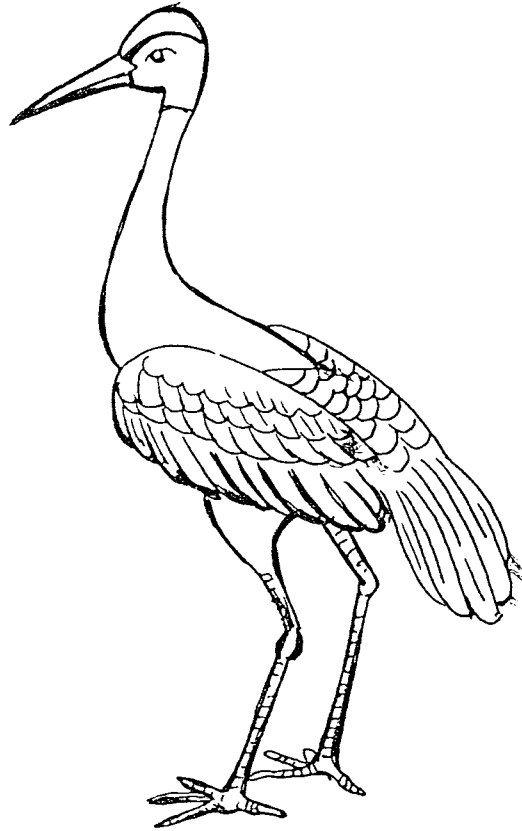
**Activity procedure:**

1. Explain to the students that today everyone is going to learn about different common and endangered wildlife species in Cambodia. Ask the students to name some wildlife that they see everyday around their homes. List these animals on the board. Ask the students to name some wildlife they have heard of in Cambodia, but do not see. For example elephants, tigers, gibbons, Giant Mekong catfish. Explain to the students that these two categories can be called; common species – wildlife that have a high population, and endangered species – wildlife that have a low population and may disappear if not protected.
2. Explain to the students that everyone is going to play a memory game to learn the names of some wildlife species that are endangered and common in Cambodia. Explain that the wildlife with red names on the cards are endangered and the wildlife with green names on the cards are common species in Cambodia. Check there are 40 cards with 20 different species, 10 common, 10 endangered species 2 copies of each species in the following categories:

Animal Kingdoms	Endangered	Common
<b>Mammals</b>	1. Tiger 2. Asian elephant 3. Pilated gibbon	1. Muntjac 2. Small bat
<b>Reptiles</b>	1. Siamese crocodile 2. Batagur baska	1. Tockay 2. Rainbow watersnake
<b>Amphibians</b>	UNKNOWN	1. Buffo toad 2. Rana frog
<b>Fish</b>	1. Giant catfish 2. Giant barb	1. Snakehead 2. Gourami
<b>Birds</b>	1. Sarus crane 2. Green peafowl	1. Yellow vented bulbul 2. Common myna

\* Sppt-billed pelican

3. Divide the students into two groups and select the first 2 or 4 people to play the game. Shuffle the cards and place all the cards on the floor with the animals facing down. One at a time each student turns over two cards and read the names of the animals on the cards. If the wildlife species is the same, the student keeps the cards until the end of the game. If the wildlife cards are different, the student must turn the cards face down again. The students should try to make couples by remembering the position of each card. The winner will be the one who collects the biggest number of couples. Repeat the game until all students have participated in the game.
4. At the end of the game ask the children to split the cards in two groups: endangered and common species. Ask all the students to look at the map of Cambodia and name the wildlife they can see on the poster. Ask the students to



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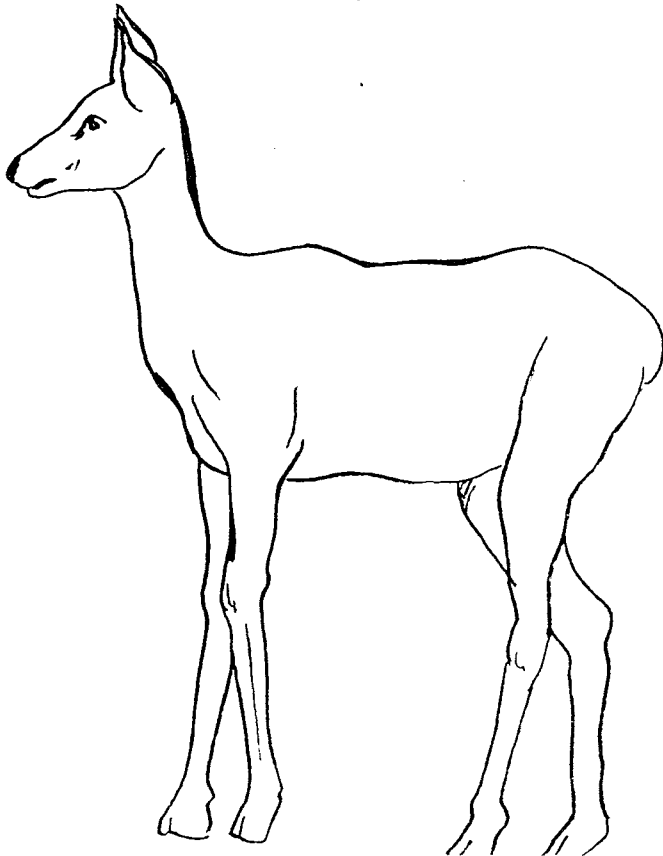
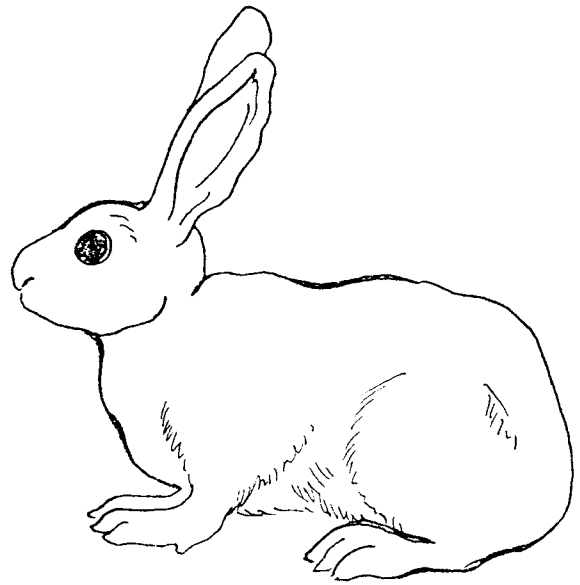
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## Activity 23

### HABITAT LOSS

#### Learning objectives

Students will be able to:

- a) Explain how the destruction of habitat results in the loss of wildlife
- b) Name one main cause of habitat destruction
- c) Identify the location of one of Cambodia's protected areas on a map.

#### Pre-requisite

The activity "Common and endangered wildlife species" is a pre-requisite for this activity.

The activity "Protected Areas of Cambodia" is a suggested pre-requisite for this activity.

#### Methods

Students play a habitat game and listen to a story

#### Teacher's instructions

Setting: inside or outside

Group size: up to 30 students

Age of group: grades 4 to 8

Materials needed: Three hoops (diameters = 1 meter, 0.5 meter and 0.2 meter) or circles drawn on the ground

Music: tape or song or clapping

The Map of Cambodia provided with this manual and paper,

Time frame: 1 hour

#### Background:

The greatest threat to most wild species of plants and animals is destruction of their habitats. Habitat is a place where plants and animals can live and reproduce. Destruction of habitat threatens wildlife species by removing whole or part of tree communities and destroying migration routes, breeding areas, and food sources. Deforestation is the greatest cause of habitat loss around the world, followed by destruction of coral reefs and wetlands and conversion of grasslands for agricultural production. Forest fires and pollution also threaten habitats of animals and plants.

A Royal decree signed in November 1993 designates twenty-three protected areas in Cambodia. Protected areas are areas especially dedicated to the protection and maintenance of biological diversity, habitat and wildlife. There are five categories of protected areas in Cambodia: National Parks, Wildlife Sanctuaries, Protected landscapes, Multi-use Management Areas, and protected forests.

The purpose of this activity is to make the students aware that wildlife needs habitat to survive.

**Key words:** habitat, habitat loss, biodiversity, endangered species, and protected areas

### Activity procedure:

1. Explain to the students that today they are going to learn that wildlife needs its habitat to survive.
2. Place the 1-meter hoop or draw a circle on the ground. Ask one student to turn the music on and off every two minutes. Ask the other students to walk or dance around the hoop/circle until the music stops. When the music stops the students must run and try to stand inside the hoop/circle. Students who don't have both feet inside the hoop must sit down and watch. Count how many students are inside the hoop.
3. Replace the 1 meter hoop/circle with the 0.5 meter hoop/circle and when the music starts again ask the students still in the game to dance or walk around it. When the music stops the students must run and try to stand inside the hoop. Count how many students are inside the hoop. Students who don't have both feet inside the hoop must sit down and watch.
4. Replace the 0.5 meter hoop/circle with the 0.2 meter hoop/circle and when the music starts again ask the students still in the game to dance or walk around it. When the music stops the students are must again run and try to stand in the hoop. -The last hoop is so small than perhaps only one person can stand with both feet inside.
5. Ask the all the students to come and sit down together. Ask them how many students can fit into the 1-meter, 0.5 meter and 0.2 meter hoops/circles?
6. Ask the students to guess what these "hoops/circles" represent. If they can not guess, explain that they represent forest habitat and each student was an animal, struggling to survive. Explain to the students that the forest only has enough food and homes for a certain number of animals. Ask them what they think will happen to the animals when the forests are cut down? Explain to the students that as the "forest habitat" gets smaller animals have to move to another habitat to survive or they will die.
7. Ask the students who could not get into a hoop what it felt like to be left out? Explain to the students that animals must compete and fight for the area left in the forest and some get left out.
8. Then ask the students to sit down and listen carefully to the following true story:

*"Some years ago at a tribal village of Ratanakiri province located on a plateau, a troop of aggressive wild elephants suddenly appeared and attacked the local people. They chased people, pulled all their houses down, damaged crops, and destroyed fruit trees. Some people were even killed during the attack. Everyone was very afraid of these elephants and ran away leaving all their belongings behind. Some villagers located nearby also worried about the elephants, and so they moved to other places too.*

*Local villagers say that a long time ago, there was forest everywhere, but people gradually cut all the trees and converted any land that could be used to agriculture, and used the cool, streams, and rivers that crossed the plateau for their own use. People took over almost all of the favorite places that the elephants had once lived in. The elephants were forced into a smaller and smaller area, and soon had almost no place to live.*

*However, the elephant is a very smart animal. Although they were frightened by people, the elephants realized that humans would destroy the last remaining forest, on which they depended to survive. Perhaps the elephants tried to protect their forest by attacking and scaring the humans away."*

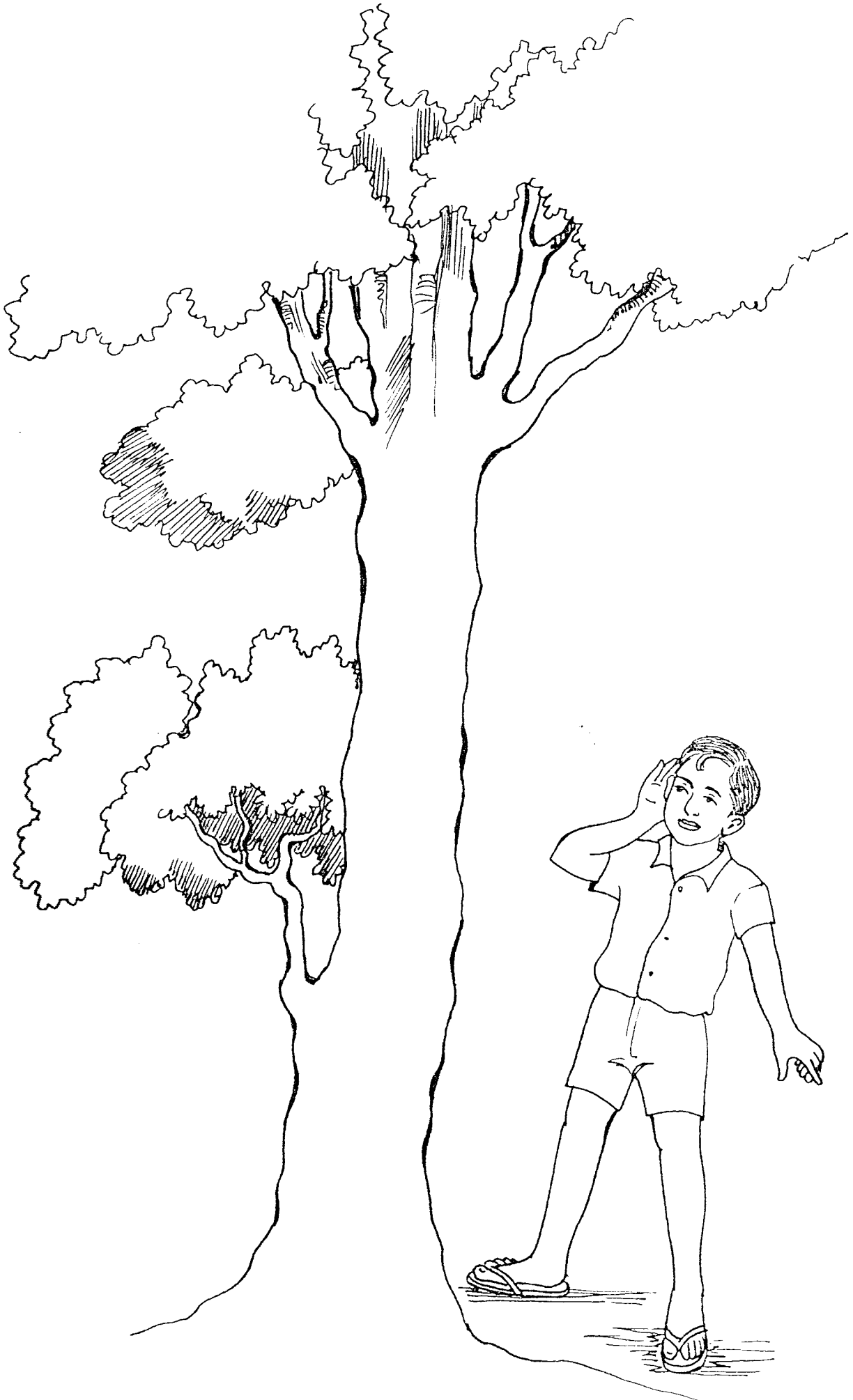
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9. Ask the students:
    - What do you think of the story?
    - What would you do if you were one of the people in the village?
    - What would you do if you were one of the elephants?
  10. Ask the students if they can think of other animals affected by forest cutting or burning in Cambodia? What can these animals do when their habitat is destroyed? (birds fly away, small animals (wild dogs and monkeys) comes to the village for food and cause other problems).
  11. Ask the students what they think are the main reasons for habitat loss? (Deforestation, destruction of coral reef and wetlands, conversion of grasslands for agriculture, forest fires and pollution).
  12. Show the students the map of Cambodia and point to the different national protected areas closest to their village. Ask some students to name the protected areas nearby. Ask them to describe the habitat (dense forest, dry forest, freshwater and coastal wetlands, grassland, floodplain) and to give some names of endangered species that may be living in this habitat. Explain to the students that one of the ways to save endangered species is by protecting their habitat. If people respect the national protected areas, they can save the lives of hundreds of animals, which are rare and endangered. If people follow the wildlife laws and support the rangers in their work, they are helping to save this special place for our children and us in the future.
  13. Congratulate the students on their work and remind them to respect wildlife and natural habitats for themselves and the future generations.

#### **Evaluation:**

1. Give two reasons why habitat loss results in wildlife loss.
2. Give the main reason of habitat loss in Cambodia.
3. Name one natural protected area in Cambodia.

#### **Extension**

1. Choose one protected area located near your village. Study its habitat and draw a list of common and endangered species you think are living there (you can collect information from the local Wildlife Protection Office). Draw a map of the protected area in your class with significant plants and animals. Interview old people living around the protected area to and ask how much habitat and wildlife has been lost in twenty years.

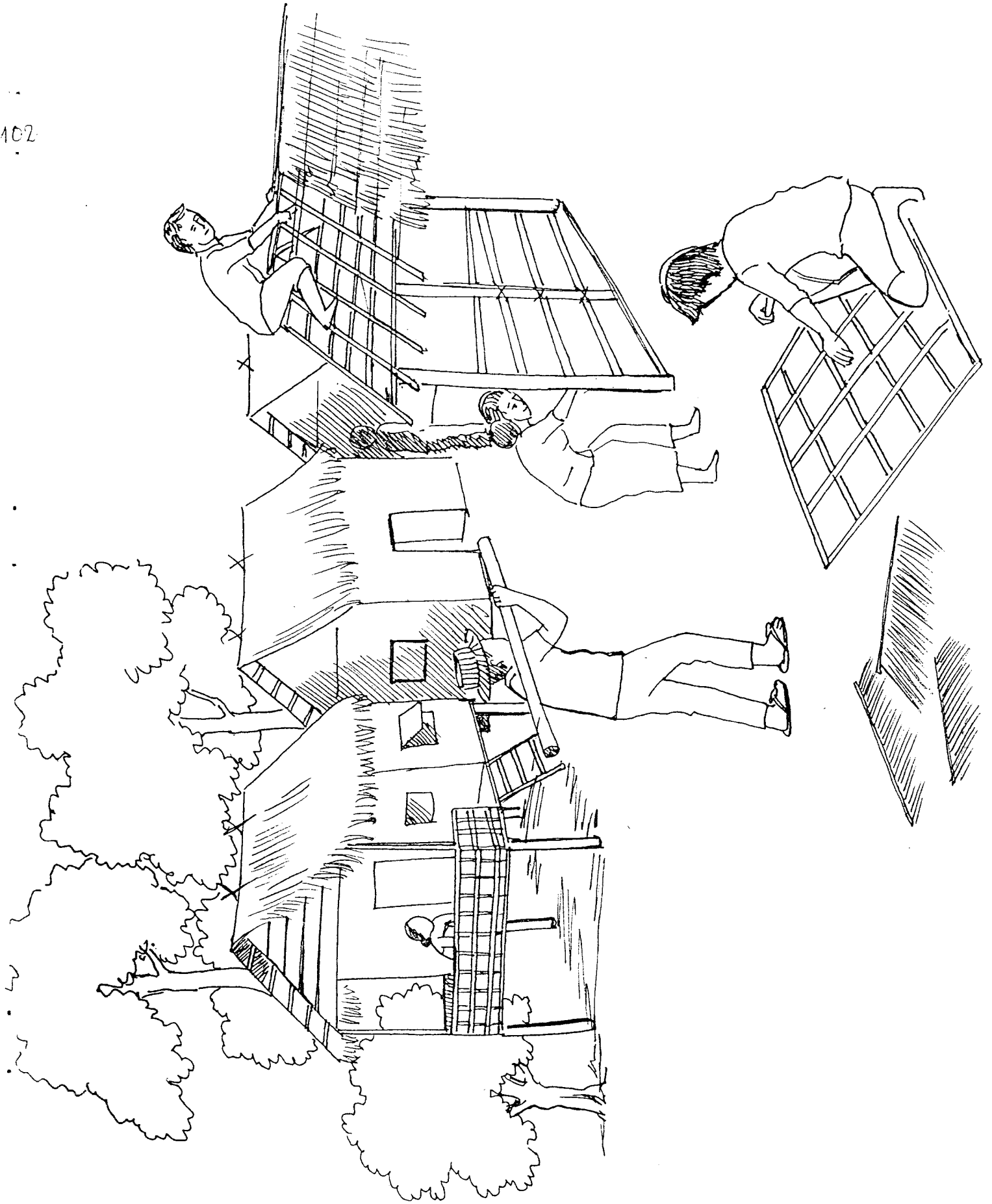














## Activity 41

### REDUCE, REUSE, RECYCLE

#### Learning objectives

Students will be able to:

- a) Explain how the waste produced can be reduced; and
- b) Name waste that can be reused and recycled.

#### Method

Students separate recyclable and reusable wastes.

#### Teacher's instructions

Setting:	Outside or inside
Group size:	Up to 30 students
Age of group:	Grade 4 and up
Materials needed:	paper, fruit skins, lotus leaves, banana leaves, coconut shell, plastic bags, aluminum cans, steel cans, styro-foam, plastic water bottle,
Activity length:	1 hour

#### Background

##### Reducing Waste

Pollution is caused when the waste that people produce is not disposed of correctly. The activities of people cause waste to be produced and the waste people produce causes pollution. The best way to protect the environment from pollution is to reduce the amount of waste produced.

People can easily reduce the amount of waste they produce by shopping more carefully. For example, when we buy something from a shop which is already packaged in a cardboard box or wrapped in paper we do not need to put it in another plastic bag.

A product that is designed to be used once is called a disposable product. People can also reduce the amount of waste they produce by not using disposable products. For example when we go on a picnic we can take our food in a chan srak (Khmer lunch box) instead of a disposable styro-foam lunch box which is thrown away after it has been used once.

##### Recycling and Reusing Waste

Wastes which are unwanted by one person may be useful to another. When wastes are useful to another person these wastes are called recyclable or re-useable wastes.

It is often very expensive for factories to import materials from other countries to make new products. Some factories recycle or reuse the waste people produce to make new products instead of importing expensive materials from other countries.

The following is a list of some of the waste which can be re-used or recycled by other people:

- metal including steel, iron, copper and aluminum;
- paper and cardboard;
- oil;
- glass bottles; and
- some plastic bottles.

We can often re-use the wastes we produce ourselves, for example we can wash out plastic bottles and refill them many times before they are disposed of. Cardboard boxes and some plastic bags can also be used several times before they are thrown away.

Some wastes such as plastic used to keep food fresh and syringes from health clinics can not be recycled or reused. If these wastes were re-used they may spread disease and make people sick. Non recyclable wastes must be carefully disposed of so they do not cause pollution.

The following techniques can be used by everybody to protect the environment from pollution:

1. Reduce the amount of waste we produce.
2. Reuse products which are still usable.
3. Recycle wastes which are no longer useful to ourselves.
4. Only dispose of waste which can not be recycled or reused
5. Never throw waste into the river or the street or anywhere else except a disposal site.

The purpose of this activity is to make students aware that some wastes can be recycled and reused many times before they are thrown away.

**Key words:** waste, disposable product, pollution, reduce, recycle, reuse, non-recyclable waste.

#### **Activity procedure**

1. Explain to the students that today they are going to learn more about different types of waste.

2. Ask the students to give some examples of waste they throw away everyday? Write the answers on the board. Ask the students what were these products used for before they became waste? Write the answers on the board. Explain that if we reduce the amount of waste we produce there will be less pollution in our environment.
3. Write a list of questions on the board for the students to answer:

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What type of material was used to create this packaging? (ie glass, paper)
Is the packaging recyclable? Yes, No, Not sure
Is the packaging made from recyclable material? Yes, No, Not sure
Can the package be recycled where you live? Yes, No, Not sure
What is the package used for?
What else could you use instead of this package that is better for the environment?
Could you reuse this package? burn or dump.
Name one reason why we should reduce, reuse, recycle in our community?

4. Divide the students into groups of four students and give each group one piece of packaging. Ask them to answer all the questions about this piece of packaging in fifteen minutes.
5. Ask each group to tell the class about their piece of packaging. When they have presented their packaging put each piece on the floor in one of four piles: reuse, reduce, recycle, dispose.
6. Ask the students who is responsible for reducing pollution and waste? (we all are)
7. Ask the students to name three ways people can help reduce the amount of waste thrown away.
8. Congratulate the students on their involvement and encourage them to start reducing, reusing and recycling at home with their families everyday.

### Evaluation

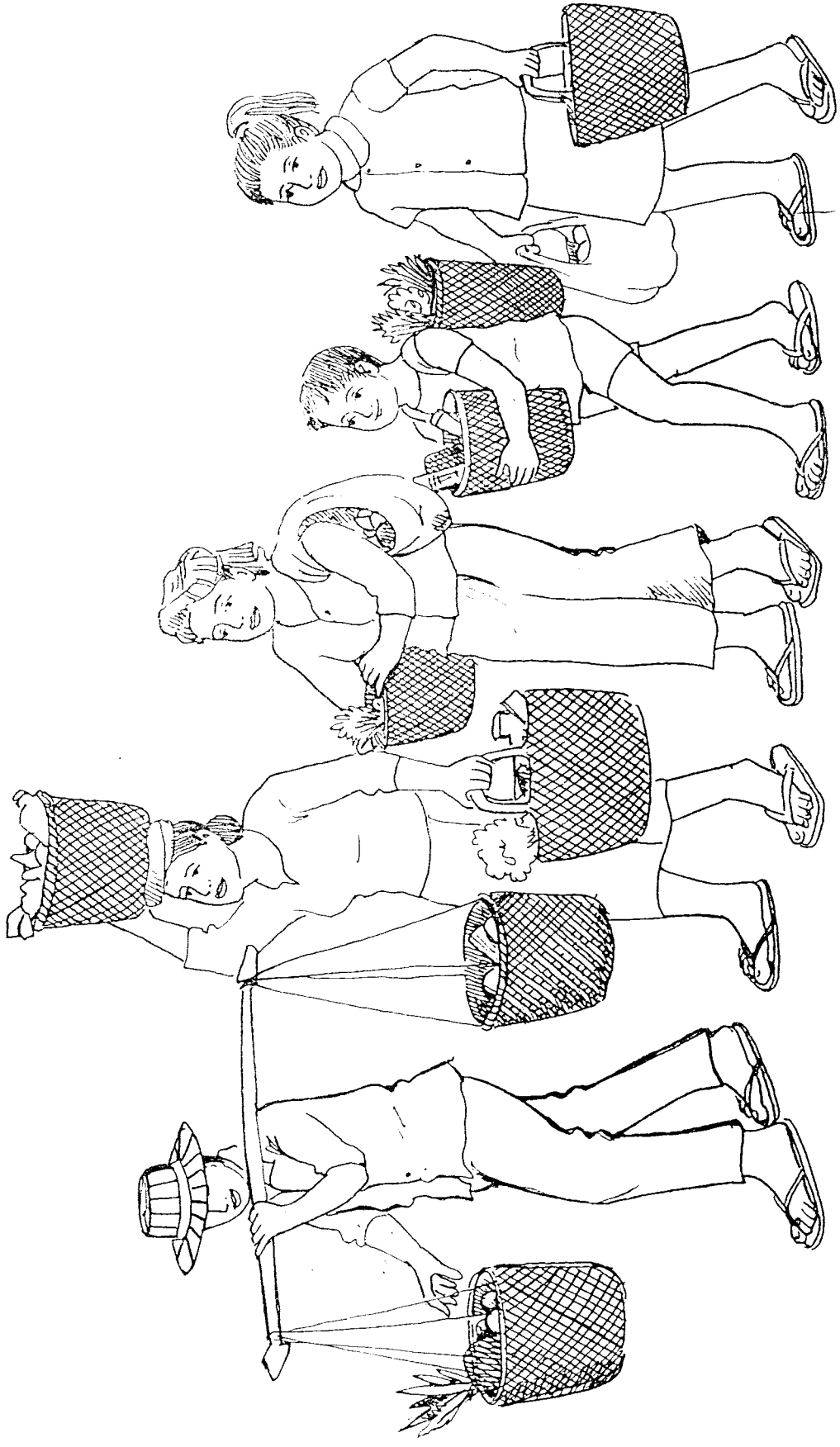
1. Explain reduce, reuse, recycle and provide one example for each.
2. Name three reasons why we must reduce, reuse, recycle.
3. Tell who is responsible for reducing, reusing and recycling waste.



### **Extension**

1. Take the students to the local landfill or the place in the village where a lot of rubbish is thrown. Write about the different types of pollution you can see. What is the waste in the landfill or dump that you see the most of?
2. Ask your parents or grandparents what packaging they used for carrying food from the market to home when they were very young? Write a list of all the packaging they used and how many times they used this product before they threw it away? Ask them if there was pollution around their village the same as there is today when they were young? Discuss your results with other students.

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## Activity 24

### HELP PROTECT WILDLIFE

#### Learning objectives

Students will be able to:

- a) plan and implement things they can do to help and protect wildlife.

#### Method

Students carry out an environmental project.

#### Teacher's instructions

Setting: Outside and inside

Group size: Up to 40 students

Age of group: Grade 4 and up

Materials needed: Writing materials

Activity length: 3 x 45 minute periods or a long term project that can be continued throughout the year.

#### Background

People can improve the environment in which we live. Sometimes our actions can improve the environment for people, sometimes for wildlife, and sometimes for both. Sometimes our effectiveness can be improved if we work with other people, sharing ideas, information and skills.

The following terms will be useful to students in this activity:

**Problem:** a difficult situation to be improved, or an opportunity to make things better; problems can't always be 'solved', but situations can usually be improved. For example, it is a problem that wildlife numbers are declining in Cambodia.

**Solution:** The act of solving a problem or question. For example, to solve the decline in wildlife numbers in Cambodia, some solutions may be to stop hunting, to stop chick collection or to protect wildlife habitat.

**Authority:** an individual or group of people with the power to make changes. For example The Department of Environment or Commune Council.

**Compromise:** a way to settle a problem in which both 'sides', usually give a little. For example people are not allowed to catch the Giant Catfish, which is an endangered species, but they are allowed to catch other species of fish that are not endangered and occur in large numbers.

The purpose of this activity is to encourage students to think about the things they can do to help wildlife.

**Key Words:** problem, solution, authority, compromise, effectiveness

#### Activity procedure

1. Ask the students to make a list of activities in their village that cause a problem to wildlife. The list might include:
  - Waste thrown on the ground or into water, such as plastic or cans;
  - Pesticide spraying;
  - Cutting down trees; or
  - Harming wildlife (such as hitting wildlife with stones or sling-shot (champeam))
2. Ask the students to look at the list of problems and think about things that could be done to overcome these problems. Ask the students to select one problem for the whole class that they think they could realistically do something about. If there is difficulty in deciding which one, the students might vote to decide. Students could also make speeches in support of the project they want.
3. Help the students to select a project. It is important that the students do not select a project that is too difficult or too complicated. It is important that the project is successful. For example planting trees in the community to increase habitat for animals.
4. Ask the students to work in small groups to discuss ways to solve the problem they have selected. Ask them to think of ways to implement the project. Each individual or small group could come up with a plan, including a written description and illustrations or sketches of how the project will work, and how it can be accomplished.
5. Ask the groups to present their plans to the rest of the students. Students may ask questions for clarification. Once all the plans have been presented ask the students to select the plan that seems most:
  - Practical;
  - Realistic;
  - Helpful to wildlife; and
  - Likely to make a lasting contribution.
6. Also ask the students to select one or more alternative plans, in case their first choice is not acceptable to authorities.
7. Once a plan, with alternatives, has been selected, ask the students to nominate a few students to act as representatives to present their proposal to the school principal or to the appropriate authority. The teacher will need to assist the students in writing their proposal and helping the student representatives in presenting their proposal. The proposal should not be too complicated or formal, but should briefly outline:
  - The problem,
  - The potential solution,
  - How the solution will be implemented; and
  - Any assistance that the students will need from the appropriate authority.
8. Ask the student representatives to practice by presenting the plan to the other students. The student representatives should also practice answering questions. Encourage the other students to ask the representatives questions about the plan.
9. The teacher should arrange for the appropriate authority to come to the classroom for the student representatives to make their presentation and report back to their class. If their plan is accepted, the students should continue with the plan until the project is completed.

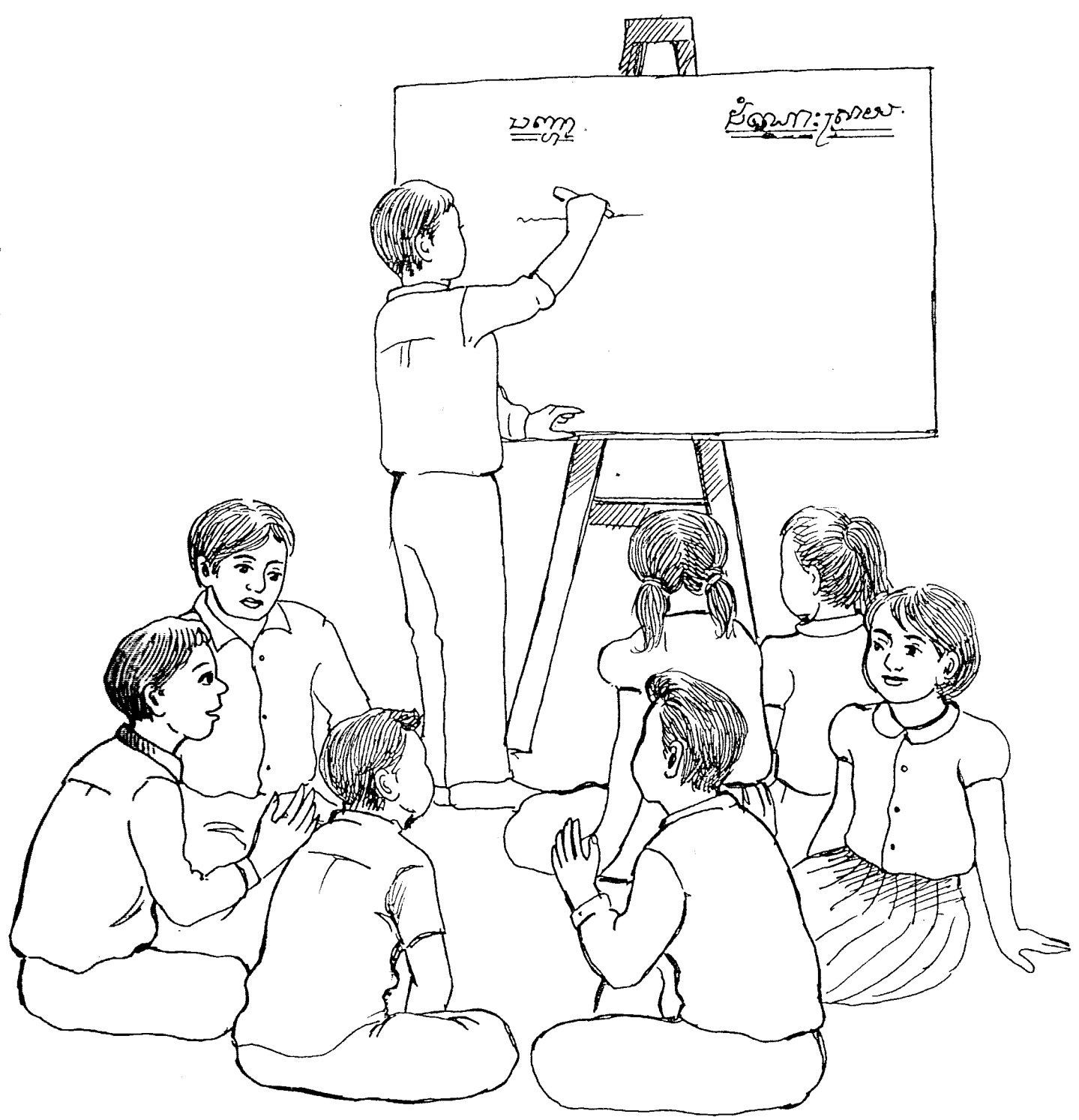
10. When the project is finished, ask the students to evaluate the results of the project. For example:
  - Did things work out like they wanted them to?
  - Were there any surprises or any unforeseen problems?
  - How might they have been any more effective?
11. Congratulate the students on their hard work and ask them to think about other things they could do to help wildlife.

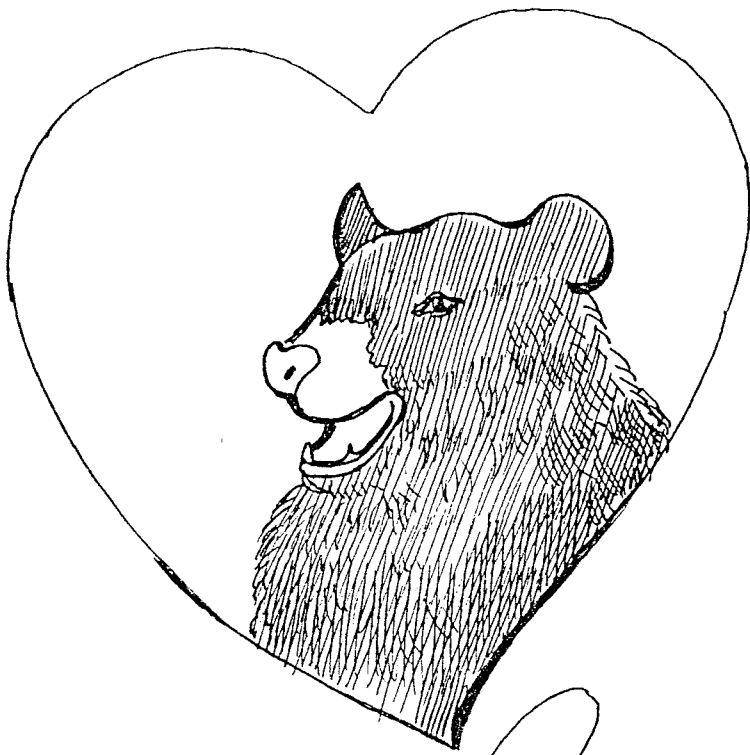
### **Evaluation**

1. Give one activity which causes a problem to wildlife.
2. Give one possible solution to the problem.
3. Prepare a plan.
4. Present the plan.

### **Extension**

1. Invite a local forestry, fishery or environment officer or environment NGO worker to give a presentation on how they solve problems involving wildlife and hunting.
2. Visit the local pagoda and discuss wildlife issues with the monks. Establish why Buddhism protects animals.





## Activity 25

### FLY A KITE WITH THE BIRDS

#### Learning objective

Student will be able to:

- a) use wildlife as an inspiration for art.

#### Method

Students design, make kites in animal shapes and fly them.

#### Teacher's instructions

Setting: Inside and outside  
Group size: Up to 16 students  
Age of group: Grade 2 and up  
Materials needed: large colored paper, bamboo strips and string  
Activity length: 1 hour 30 minutes

#### Background

Wildlife is an inspiration for many forms of art, ranging from music to mime, dance to drama, poetry to painting and more. In Cambodia this can be seen in the beautiful sculptures of wildlife on the temples at Angkor. Designing kites can be an art form and one particularly accessible to young people. A very popular Khmer legend,, Thonchey, has shown how amazing Khmer kite was.

**Key Words:** inspiration, art, design, wildlife

#### Activity preparation

1. Explain to students that they are going to design, make and fly a kite.
2. Explain to the students that their kites must use wildlife as the inspiration for the design.
3. Explain to them that they have two days to think about:
  - The animal they are going to use for the design;
  - The shape of the kite (wings for a bird, a tail for a monkey); and
  - The size of the kite.
4. Explain to the students that they will be given brightly colored paper and bamboo to make the kite. Ask the students to keep talking and think about their designs and to work on their plans on their own.

#### Activity procedure

1. Explain to the students that wildlife can be a source of inspiration for art. Ask the students for examples of different kinds of art in Cambodia where wildlife has been an inspiration (paintings, sculptures, carving etc).
2. Give the students the paper, bamboo, and other equipment and ask them to build the kites.
3. When the students have finished building their kites take them outside to fly them. If it is not a good day for flying kites, the kites should be stored in a safe place, so that they can be used again.



4. Explain to the students that it is dangerous to fly kites near power lines and cables or in a thunderstorm.
5. Display the kites in the classroom so that other students can see the designs.
6. Congratulate the students on their work and encourage them to fly them.

### **Evaluation**

1. Describe the features of your wild animal that made it seem like a good choice for a kite.

### **Extension**

1. Arrange a kite-flying day so the village can see all the kites and learn about the importance of wildlife.

## LEARNING ABOUT WATER

Water is the source of life for plants, animals and people. Understanding of water and its protection is vital to the health of our ecosystem and people. While fresh water is scarce in many countries, Cambodia is fortunate to have monsoonal rainfall and the Mekong-Tonle Sap river system which supplies water for crops and habitat for fish and other aquatic species. The activities in this section teach the students about the main sources and cycles of water, the importance of clean drinking water, methods for students to investigate the condition of local water sources, and activities for them to help protect water.

## Activity 26

### THE IMPORTANCE OF WATER

#### Learning objectives:

Students will be able to:

- a) Describe four ways water is used
- b) Name three reasons water is important to plants, animals and people

#### Method

Students discuss words related to water and draw word trees to show how all things are connected to water.

#### Teacher's instructions

Setting: Inside

Group size: Up to 20 students

Age of group: Grades 4 to 6

Materials needed: Board paper, colored paper (cut into shapes of water drops, rivers, etc), writing materials, pictures/drawings (optional), tape

Activity length: 2 hours

#### Background

We live on a planet called planet earth. Sometimes it is called the "Blue Planet". This is because nearly seventy five percent of the earth's surface is covered with water. Without this water there would be no life on planet earth. Plants and animals, including humans, must have water to survive. In fact water represents about seventy five percent of a person's body weight. Nearly everything on earth is directly or indirectly connected with water. Rocks channel water into streams; streams and rivers carry water across the land to the ocean. Trees draw water from the soil and transport it up into leaves and out again into the air. Clouds carry water across the sky.

On planet earth water can be found in many places. The main sources of water are:

- surface water;
- rainwater;
- groundwater; and
- glacial water.

**Surface water** is the water that collects in streams, rivers, lakes, ponds, reservoirs, dams, seas and oceans. It does not soak into the ground. Surface water is easiest to use because it can easily be scooped up into containers, pumped or diverted for irrigation. Traditionally this is the main source of water for Cambodian people's daily use.

**Rainwater** is water that falls from the clouds and is collected from the roofs of houses and channeled into jars. If it is stored in clean jars with a cover it can provide a supply of fresh safe drinking water for many months of the year. Rainwater is an important source of water for Cambodian people.

Ground water is the water that soaks into the soil, and sinks down into the underlying sub-soil and rock. These underground stores of water are a very important source of water. In fact some dry countries have no rivers, and groundwater is the only supply. Groundwater is becoming a more important source of water for people in Cambodia, thousands of wells have been drilled around the country in the last few years. Groundwater is generally pure and unpolluted and a very safe supply of drinking water. Deep wells can often provide a reliable supply of water, after other sources have dried up.

Glacial water is water that is frozen and generally is found in very cold countries, such as Antarctica and Alaska. The water trapped in the ice and can not move. In the future this water may become an important source of water if others sources of water become too polluted to use.

The world contains enormous reserves of water but people cannot use most of it. Approximately ninety-seven percent of the world's water is salt water and cannot be used for drinking, irrigation or industry. The remaining three percent is fresh water but there is a big problem with using this because it is trapped in ice. Large amounts of fresh water are located in very deep groundwater, which can not be easily accessed by people. Groundwater and ice together make up 2.997 percent of this three percent. So all the enormous amounts of water on the planet only a very small proportion, about 0.003 percent can be used by people. For example, if you could put all the worlds water in a 1litre bottle, only one teaspoon would be available to drink.

Fresh water is one of the most important resources we have. We drink it, we cook with it, and we wash with it. However, much of the available fresh water is becoming scarce throughout the world for a number of reasons:

- the rising world population is increasing the overall demand for water;
- as people's standard of living increases their demand for water increases; and
- existing water resources are being contaminated by pollution.

Cambodia is fortunate that it has vast quantities of water passing through it, and also stored in the Tonle Sap system. Given the shortage of safe fresh water in many parts of the world the water resources of Cambodia must be carefully managed.

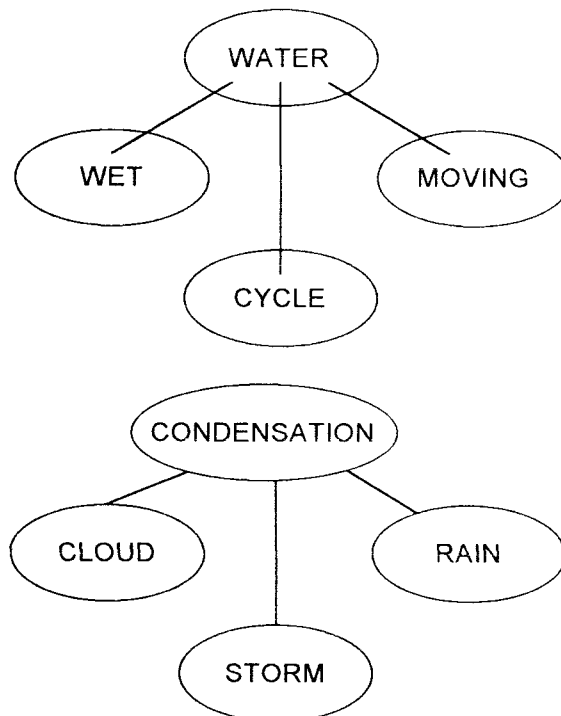
The purpose of this activity is to make students aware of the importance of water for plants, animals and people.

**Key words:** water sources, surface water, groundwater, rainwater, glacial water

### **Activity procedure**

1. Explain to the students that today they are going to learn about the importance of water to plants, animals and people.
2. Ask the students to draw pictures that show water. Ask them to draw pictures that show how living things (plants, animals, humans) depend upon water.
3. Display all the drawings to use them as a basis of discussion about the importance of water.
4. Ask students to think about some of the ways they have used water that day. Emphasize that water is important and that all life depends on it.

5. Ask the students to list at least fifty words that have something to do with water and write their responses on the board. Ask them to think of words about water, including its importance to plants, animals and people. Suggest the following examples and categories:
- Sources of water: rain, groundwater, stream, river, pond, ocean, sea, waterfall, lake, wetland, mangrove, glacier, ice cap, steam, snow, cloud, storm.
  - Water storages: well, water pump, tank, bottle, glass, flask, bucket, pail
  - Human uses: to drink, to wash, to cook, to irrigate, to clean, to water, to cure, to travel, to bath, to play, to enjoy, to dive, to swim.
  - Animals: fish, crab, shrimp, dolphin, tortoise, snake, plankton, shell, mollusque, frog, waterbirds (heron, egret, stork, pelican, cormorant, ibis, adjutant, cranes, ducks), dragonfly, crocodile, elephant, fishing cat, tiger, etc.
  - Plants: aquatic plant, tree, flower, bush, algae, flooded forest, lotus.
  - Others: thirsty, wet, flooded, growing, moving, cycle, drought, dry, desert, mountain, boat, shower, etc.
6. Ask the students to create word trees of water-related words using the words on the board. Begin with a simple word tree like the examples below:



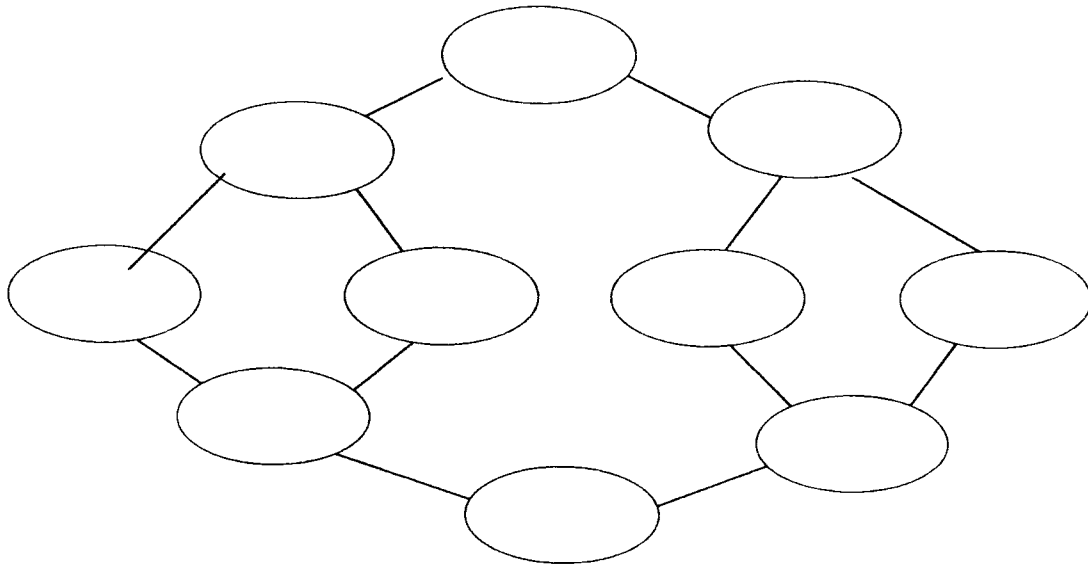
7. When the students have completed their word trees, have them write the words on to various shades of blue, gray, white and green paper cut into shapes that represent something to do with water ( for example in the shape of a stream, river, pond, lake, ocean or water drop). Arrange the cut outs shapes on a wall for other students see.
8. Congratulate the students on their work and ask them to think about the importance of water for all plants, animals and people.

### Evaluation

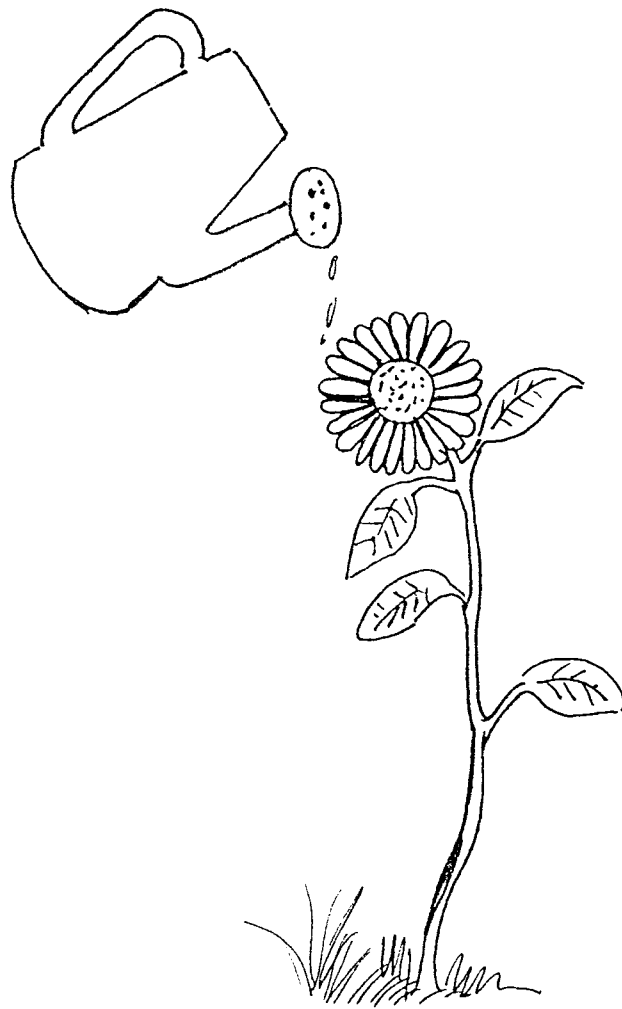
1. Name three ways water is used.
2. Why is water important.

**Extension**

1. Ask the students to create even more complex word trees like these:



2. Take water as a theme for a month and hang in the classroom artwork related to water.



## Activity 27

### WATER IS THE SOURCE OF LIFE

#### Learning objectives

Students will be able to:

- a) Describe how water is home for many different types of animals and plants.

#### Method

Students collect aquatic insects in a pond.

#### Teacher's instructions

**Setting:** Preferably collect insects in a pond or other water body with grass/plants.

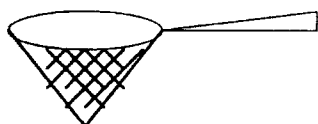
**Group size:** Up to 20 students

**Age of group:** Grade 6 to 8

**Materials needed:**

At least one net to catch aquatic insects. A net can be made using a plastic coated wire clothes hanger for the handle and old mosquito net for the mesh. Existing small hand nets (diameter of opening < 40 cm) can be used as long as the mesh size is small (no bigger than half a centimeter).

The net can be any shape (round, square etc.)



At least one white, flat-bottomed container e.g. a plastic tray or bowl to put the insects in.

Pictures of aquatic insects provided in this manual

Activity length: 1-2 hours

#### Background

One of the reasons why surface water (ponds, lakes, rivers and rice-fields) is important is because it provides a habitat for many types of animals and plants. A habitat is a place where plants and animals can live and reproduce.

Surface water is important for plants and animals in many different ways. Some animals and plants live only in water (or survive in a wet place such mud) such as:

- aquatic plants (e.g. water hyacinth, morning glory, duckweed, lotus, etc)
- algae
- fish
- eels
- shrimps
- crabs
- aquatic snails and mussels
- some leeches
- turtles
- crocodiles



Some animals spend the first part of their lives in the water and the last part of their lives out of the water such as:

- frogs
- some types of aquatic insects (e.g. mosquitoes and dragonflies)

Adult dragonflies lay their eggs in the water (ponds, streams, etc) and the eggs hatch in the water. The young dragonfly grows and changes until it is ready to leave the water and fly. It then crawls out of the water, changes its skin and flies away. As an adult it will come back to lay its eggs in the water too and the cycle will happen again. This cycle is known as the life cycle.

Some animals and plants live near the water and rely on aquatic life for food:

- snakes
- aquatic birds (e.g. egrets, ducks, etc)
- people!

The purpose of this activity is to make students aware that surface water provides a place for animals and aquatic insects to live and reproduce.

**Key words:** aquatic insects, habitat, lifecycle

### **Activity preparation**

Find a good place to collect aquatic insects and animals. Aquatic insects and animals can usually be found in a pond with shallow water, grass and plants in it.

### **Activity procedure**

1. Explain to the students that they are going to learn about plants and animals that live in the water.
2. Discuss with the students about what plants and animals they think live in the water and write their responses on the board.
3. Ask the students which of these plants and animals live all or part of their lives in the water.
4. Take the students to the pond to collect aquatic insects. Show the students how to submerge the net in the water and sweep it quickly through the water moving forward and backward in short strokes. Explain that they must avoid collecting a lot of mud because it will make the animals difficult to see.
5. Empty the net into the white container(s) and take out pieces of plants and leaves so it is easy to see the animals. Ask the students how many different types of animals they can see. Explain that some may be very small so they must look very carefully.
6. Explain the concept of life cycles using the dragonfly picture.
7. Return to the classroom and ask each student to draw an animal or plant that lives in the water all the time.
8. Ask each student to draw an animal that doesn't live in the water but gets its food from ponds, streams, etc.
9. Congratulate the students on their drawing skills and ask them to think about the plants and animals that live in the water.

### **Evaluation**

1. Name one type of plant that lives in water all the time.
2. Name one type of animal that lives in water only some of the time.

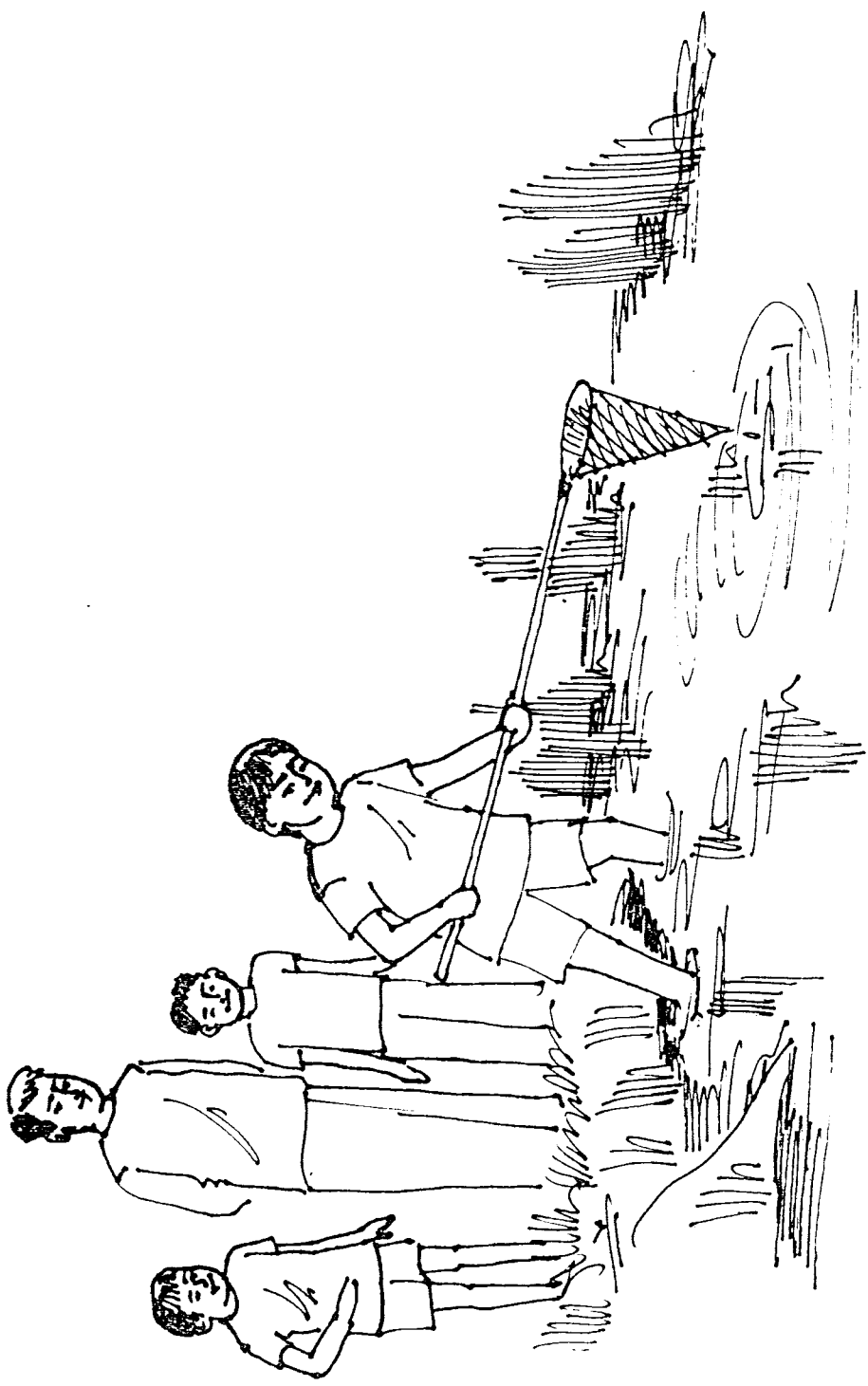
### **Extension**

1. Visit the pond after rain and look at the different types of animals and plants that live in them.
2. Collect some tadpoles and place them in your schools pond or water jar. Each day watch the tadpoles change into frogs. Draw the life cycle of a frog.

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## Activity 28

### THE RAIN DANCE

#### Learning objectives

Students will be able:

- a) Describe the water cycle and how it works.

#### Method

The students perform a dance to role play the water cycle.

#### Teacher's instructions

Setting: Inside or outside.

Group size: Up to 15 students.

Age of group: Grades 4 to 6

Materials needed: a blue carpet or a mat, a chair, a blanket, 3-4 meters of rope, a music tape and a cassette player or a source of music

Activity length: 45 minutes

**Background** Water is an important resource. Without water there would be no streams, rivers, lakes, ponds, sea, oceans, plants, animals or people. As water is so precious it is important that students understand where it comes from and how it moves around planet earth. This process is called the water cycle. Every day the sun rises and heats up surface water (ponds, oceans etc). When water becomes hot it rises up into the atmosphere and becomes the clouds. When the clouds come in contact with cold wind, those clouds become water drops and fall down to earth as rain. The rain water soaks into the ground and runs off the land and flows back into streams, rivers, lakes, ponds, sea, and oceans. The water is heated again by the sun and rises up into the atmosphere. So the water cycle begins again.

The purpose of this activity is to introduce students to the water cycle.

**Key words:** water cycle, clouds, rainwater, atmosphere

#### Activity preparation

1. Spread out the blue carpet/mat on the floor and cover the chair with the blanket.
2. Place the chair covered with the blanket 3-4 meters away from the carpet/mat.
3. Connect the chair and the carpet with the rope.

#### Activity procedure

1. Explain to the students that today they are going to learn about the water cycle.
2. Draw a simple water cycle on the board.
3. Explain to the students that they are to perform a dance about the water cycle. They are going to play the part of the drops of water.
4. Ask all the students to sit close together on the blue carpet. Explain that they are water drops in the ocean.
5. One at a time, ask each student to stand up, break away from the others and dance quickly. Explain to the students that they are now drops of water rising up into the atmosphere.

6. Ask the students to come together in small groups. Explain that they are now drops of water in the clouds.
7. One at a time, ask the students step on and off the chair covered with the blanket. Explain that they are now the rainwater falling on a mountain.
8. One at a time, ask the students to crawl along the rope back to the blue carpet. Explain to the students that they are now drops of water traveling along a river.
9. When all the students have crawled along the rope ask them to sit quietly together on the blue carpet explain that they are now the water drops in the ocean again.
10. Congratulate the students on their ability to perform the water cycle dance and encourage them to perform it several times to show that each water drop passes through each stage over and over again.

### **Evaluation**

1. Name at three different places that water drops can be found.
2. Draw a simple water cycle.

### **Extension**

1. Collect and measure rain in the schoolyard: cut off the top third of a plastic bottle and put the top upside down to make a funnel. With a ruler, mark a measurement line every centimeter from the bottom to the top. Find an open spot outside the class away from buildings and trees and put the bottle on the ground packed with stones around it for support. Check your measurement line each time it rains. How much rain has fallen into the bottle? Record the amount in a notebook. Empty the bottle after you have recorded the amount of rainfall. If it's raining a lot, you can take a reading once a day or once a week. Be sure to record the dates of your reading.
2. Keep rain records for a month or a whole season. Make a graph of your results.





## Activity 29

### THE WATER CYCLE

#### Learning objectives

Students will be able to:

- a) Describe the cycle of water on earth and on air.
- b) Explain why the water cycle is a natural constant mechanism.

#### Method

Students carry out an experiment to understand the different states of water and how it circulates in the natural system.

#### Teacher's instructions

Setting: Inside

Group size: Up to 16 students

Age of group: Grades 7 and 8

Materials needed: two bowls or pots (one for freshwater, one for saltwater), boiled water, small amount of ice, two small glass jars, one transparent plastic sheet, wire mesh, salt

Activity length: 1 hour

#### Background

The freshwater that we can use on earth is being constantly recycled through the water cycle. Rain water that soaks into the ground, runs off the land and flows into streams, rivers, lakes, ponds, sea and oceans is heated by the sun and rises up into the atmosphere to form clouds. When it rains again the process starts all over again. There are four stages to the water cycle:

##### 1. Storage

Huge quantities of water are stored in rivers, oceans, lakes and glaciers.

##### 2. Evaporation

Water rises up (evaporates) into the atmosphere

##### 3. Condensation and rain

Drops of water in the atmosphere form into (condense) clouds and fall to the ground again as rainwater.

##### 4. Runoff and infiltration

Rain water runs off the land and flows into oceans, lakes and rivers. Rainwater can also soak into the soil, subsoil, and rock to become groundwater.

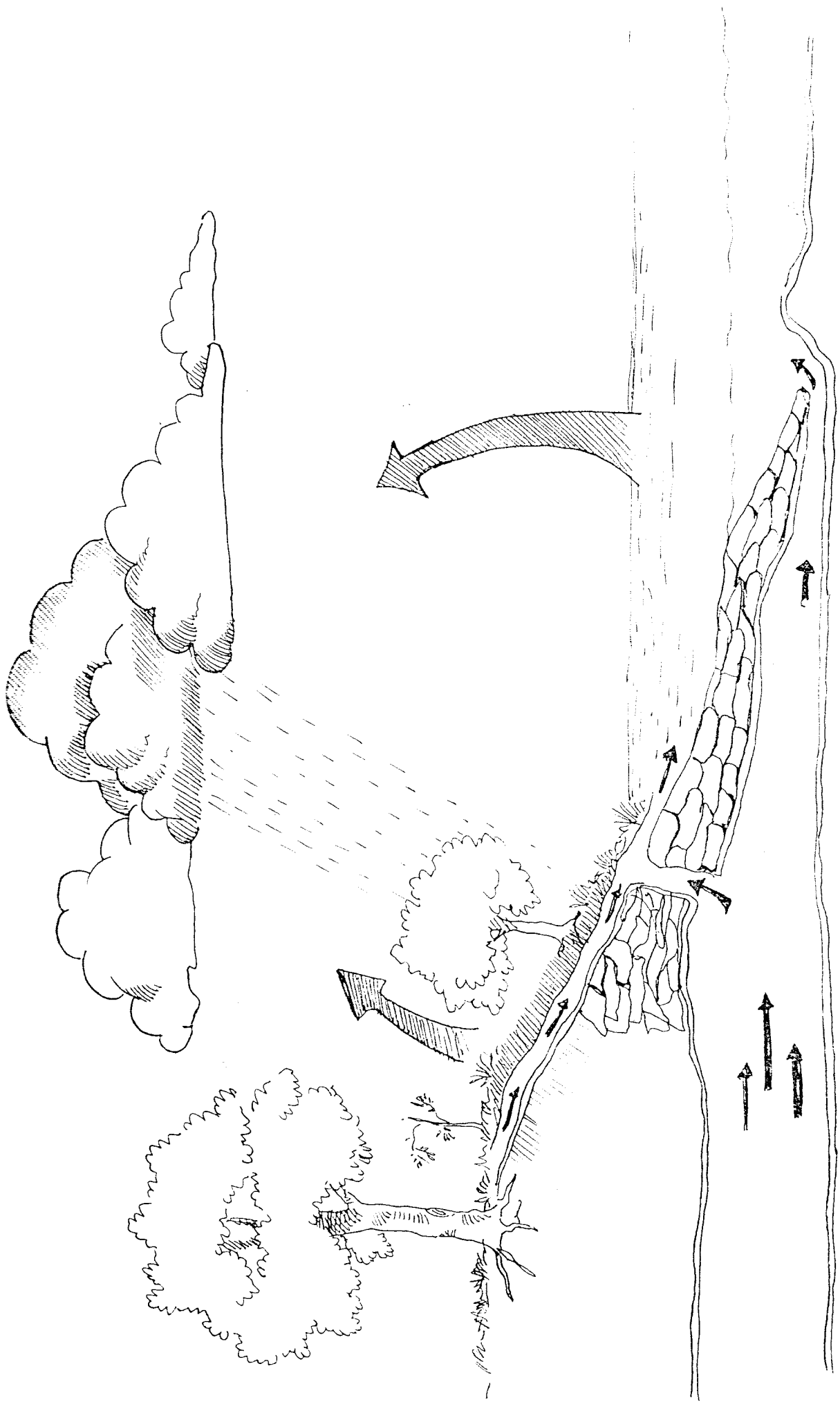
For rainwater that infiltrates into groundwater it may take millions of years to complete the water cycle. However rain water that falls a few kilometers from the sea completes the cycle in a few days.

The purpose of this activity is to demonstrate students how the water cycle works.

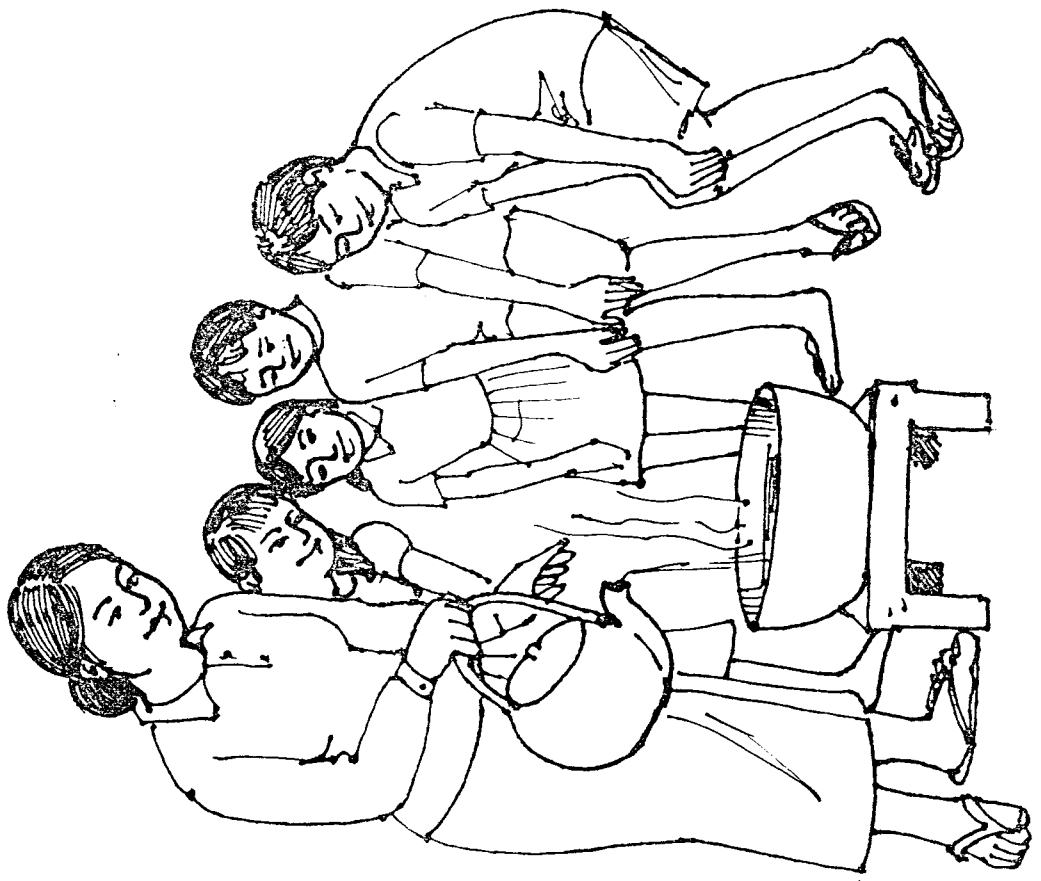
**Key words:** water cycle, storage, evaporation, condensation, and runoff.

#### Activity procedure

1. Explain to the students that today they are going to conduct an experiment in the classroom which demonstrates the water cycle.
2. Pour very hot water into a bowl, so the students can see steam rising.



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## Activity 30

### SURVEY OF WATER SOURCES IN YOUR VILLAGE

#### Learning objectives

Students will be able to:

- a) Describe several different sources of water
- b) Describe the sources of water in their village

#### Method

Students survey the different sources and uses for freshwater in their village.

#### Teacher's instructions

Setting:	Inside and outside
Group size:	Small groups of 3-4 students
Age of group:	Grades 4 to 8
Materials needed:	Writing books and pen/pencils
Activity length:	1 hour for data collection and 1 hour for report in classroom

#### Background

On planet earth water can be found in many places. These places are called water sources. The main water sources are surface water, rainwater, groundwater and glacial water. Although seventy five percent of planet earth is covered with water, only 0.003 percent is available for people to use. The sources of available water for people to use are ground water, surface water and rain water.

In Cambodia, a water source is called "me-teuk" (mother-water). Water is a source of life like a mother who brings a child into the world. The greatest natural surface water source in the Kingdom of Cambodia is the Mekong River and the Great Tonle Sap Lake. Surface water is easiest to use because it can easily be scooped up into containers, pumped or diverted for irrigation. Traditionally this is the main source of water for Cambodian people's daily use. Rainwater is also an important source of water for Cambodian people. If it is stored in clean jars with a cover it can provide a supply of fresh safe drinking water from many months. Nowadays ground water is becoming a more important source of water for people in Cambodia. Thousands of wells have been drilled around the country in the last few years. Groundwater is generally pure and unpolluted and a very safe supply of drinking water. Deep wells can often provide a reliable supply of water, after other sources have dried up.

The purpose of this activity is to make students aware of the different sources and uses of water in their own village.

**Key words:** ground water, surface water, rain water, human use

#### Activity procedure

1. Explain to the students that today they are going to learn about the different sources of water in their village.
2. Divide the students up into groups of three or four students. The groups should be made up of students who live near each other.

3. Select one student from each group to be the interviewer, student to take notes and one to make a report to the other students when they return to the classroom.

4. Ask the students to copy the following questions into their notebooks:

- a) Where do you get your water from?
- b) Is it rainwater, groundwater or surface water?
- c) What do you use the water for? (drinking, washing etc)
- d) How far is it from your house?
- e) How many times a day do you go to the water source?
- f) Describe the activities around the water source?
- g) How far is the closest toilet to the water source?
- h) Can you see waste around the water source? If yes, can you describe it? (plastic bags, food scraps etc)
- i) Are there any animals using the same water source? If yes, what type of animal (pigs, cows, buffalo etc)?
- j) Was anybody from your family sick from drinking the water last year?

5. Explain to each group that they should interview four or five different people in their village.

6. When the students have completed the interview and have returned to the classroom ask one student from each group to report the results of their interview to the other students.

7. Ask the students to compare their reports. Draw a map of the village with the main roads and with all the different sources of water, toilets and waste dumps. Ask each student to draw their house on the map.

8. Explain to the students that only there are three different sources of water and that only a small amount of water on earth is available for people to drink.

9. Congratulate the students on their hard work and ask them to think about the sources of water and how important water is.

### **Evaluation**

- 1. Name the three different kinds of water sources for human consumption.
- 2. Name three main daily uses of water from villagers.

### **Extension**

- 1. Discuss with the students what water pollution is and what the different sources of pollution are.
- 2. Use the map of the village as a starting point to draw a poster about preventing pollution of the water sources in the village.



## Activity 31

### THE MEKONG RIVER-TONLE SAP SYSTEM

#### Learning objectives

Students will be able to:

- a) Explain the water cycle of the Tonle Sap - Mekong River system.
- b) Name three important uses of the Mekong River system for Cambodia.

#### Method

Students make a map of the Mekong river system.

#### Teacher's instructions

Setting:	Inside
Group size:	Up to 40 students
Age of group:	Grade 8
Materials needed:	Poster of water cycle of Cambodia, paperboard, tracing paper, drawing paper, crayons.
Activity length:	2 hours

#### Background

The Mekong River – Tonle Sap system dominates the water cycle of Cambodia. The Mekong River rises in the Tangha Shan Mountains in the Tibetan Plateau and flows through Burma, Laos, Thailand, Cambodia and Vietnam (show map). The Mekong River is reported to be between 4200 kilometers and 4900 kilometers long and is the twelfth longest river in the world. 500 billion meters<sup>3</sup> of water flows down the Mekong River each year making it the third largest river in the world.

Eighty-six percent of the land of Cambodia lies within the catchment of the Mekong River. The Tonle Sap Lake, also known as the Great Lake, lies in the center of Cambodia and is connected to the Mekong River at Chaktomuk by the Tonle Sap River. The Great Lake is the largest permanent freshwater lake in Southeast Asia. The Tonle Sap – Mekong River system has a unique feature. Each year during the wet season the Tonle Sap River reverses its direction allowing the floodwaters of the Mekong to flow into the Great Lake.

During the dry season (November to June), many rivers enter into the Tonle Sap Lake. Some originate from the Kravanh mountain chain: Stung Bahour, Stung Pursat, Sangker, Stung Mongkol Borey. Others originate from the Dangrek mountain chain: Stung Sen, Stung Sreng, and Stung Sisophon. Water flows out of the lake during this time into the Tonle Sap River and out to the Mekong Delta.

During the rainy season (July to October), the water level in the Mekong rises and the Tonle Sap River reverses the direction of its flow into the Tonle Sap Lake. So in the rainy season the Tonle Sap Lake has many input rivers but no output river. The surface of the lake ranges from 2,500 kilometers<sup>2</sup> at the low water level season to more than 10,000 kilometers<sup>2</sup> at the high water level season. Depth varies from one meter to ten meters.

The fisheries productivity of the freshwater sources of Cambodia is among the highest in the world due to high temperatures of the Great Lake and the annual flooding. The area of the flooded forest around the lake is very important in contributing to the overall productivity of the system. It provides a rapid development of microorganisms for fish feeding, a reproduction zone for some fish and shelters for juvenile fish. The freshwater fish stocks are not just vital to the human population, as the lakes and rivers are home to a variety of other fish-eaters, including the largest remaining waterbird colonies in Southeast Asia and some other endangered species such as Hairy-nose Otter, the Fishing Cat, the Irrawaddy dolphin and the critically threatened Siamese crocodile.

The Tonle Sap - Mekong River system is very important to Cambodia as it provides water for human uses, (drinking, food, cooking, washing, cleaning), agriculture and irrigation, industry, energy, transport and recreation/tourism. It is also an important fishery and habitat for some endangered species.

The purpose of this activity is to make students aware of the importance of the water cycle of the Mekong River-Tonle Sap System to Cambodia.

**Key words:** catchment, input rivers/output rivers, fisheries, Mekong River, Tonle Sap Lake

### **Activity procedure**

1. Explain to the students that today they are going to learn about the importance of the water cycle of the Mekong River and Tonle Sap System to Cambodia.
2. Show the poster of the water cycle of Cambodia to the students and ask them to describe rivers and lakes and how they are connected. From the poster or their own experiences ask the students to describe the surroundings of the Mekong river and the Tonle Sap lake (provinces, towns, mountains, input rivers, vegetation, etc.). Write their answers on the board.
3. Ask the students what they know about the seasonal changes of the Tonle Sap. Write the students responses on the board.
4. Explain the water cycle of the Tonle Sap - Mekong River system. On the poster show where the Mekong river and Tonle Sap connect. Explain that each year, the water level in the Mekong River rises and reverses its direction to flow into the Tonle Sap Lake. Show on the map all the input rivers entering the lake, name them. Show the five provinces around the lake (Kompong Chhnang, Pursat, Battambang, Siem Reap, Kompong Thom). Describe briefly the vegetation (flooded forest, swamp forest, grassland, rice fields) around the lake and along the Mekong river. Ask the students to think about why this type of vegetation grows here.
5. Divide the students into groups of five students. Ask half of the groups to draw the Mekong River – Tonle Sap system during the dry season on the board and the other half to draw the Mekong River - Tonle Sap system during the wet season on tracing paper. Ask the students to use different color crayons.
6. Ask all the groups:
  - a) to draw arrows to show the direction of the water flow;
  - b) to write the name of the provinces around the lake and along the Mekong River; and



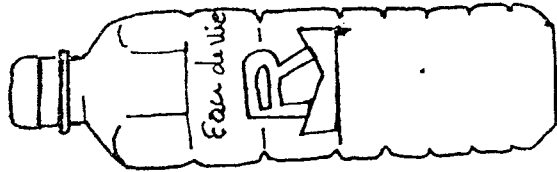
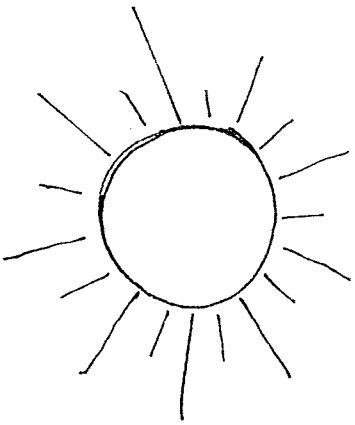
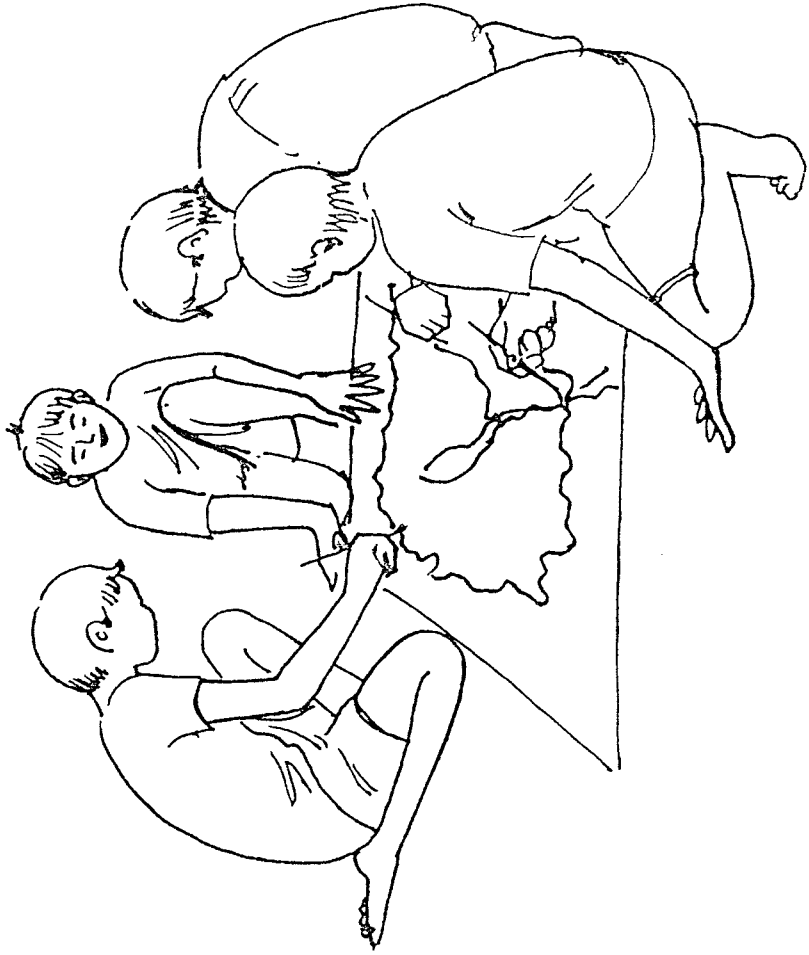
- c) to write the names of the main rivers entering the Tonle Sap Lake and the Mekong river.
7. Allow the students twenty minutes to complete the drawing. When they have finished ask one student from the group which drew the Mekong River – Tonle Sap system during wet season on tracing paper to put their drawing over the top of the drawing on the board.
  8. Explain to the students that water resources are important for forest, wildlife, fish production, human domestic use (drinking, cooking, bathing, washing), agriculture and irrigation (rice fields, vegetables, *chamcars*), transport, recreation and tourism.
  9. Ask the students to draw some fish in the water (fish production), boats on a river or lake (transportation), rice fields along the Mekong river (agriculture), a tourist boat near Phnom Kraom on the north part of the lake (tourism and recreation) on their map.
  10. Congratulate the students on their drawing ability and ask them to think about the importance of this water system for Cambodia.

### **Evaluation**

1. Explain the water cycle of the Tonle Sap - Mekong River system.
2. Name three important uses of the Mekong River system for Cambodia.

### **Extension**

1. Display the maps in the classroom for other students to see.



## Activity 32

### THREATS TO WATER

#### Learning objectives

Students will be able to:

- a) Name and describe two main water problems caused by humans.
- b) Name two effects of these problems on plants, animals or humans.

#### Method

Students connect causes and effects to water problems.

#### Teachers instructions

Setting: Inside  
Group size: up to 40 students  
Age of group: Grade 6 and up  
Materials needed: paper, pencils  
Time frame: 1 hour

#### Background

People, plants and animals need water to survive. However sometimes we cannot use the water because there is too much, too little or it is contaminated. Floods (too much water) and droughts (too little water) are part of natural changes in the climate and cannot be prevented. However, sometimes the activities of people have caused water to become polluted and sometimes the activities of people have increased the frequency and effects of flooding or drought.

#### Floods

Annual flooding of certain rivers, including the Mekong River, is very important as the floods deposit a layer of sediment that is rich in organic matter for plants. However, flooding has become more destructive in recent times largely because of the activities of people, such as logging and the construction of buildings on flood plains. The effects of floods on people and the environment can be serious. People and animals may be killed, crops and plants may die, communications may be cut, and houses may be destroyed or abandoned.

#### Drought

Forty percent of the world's population lives in dry regions of world known as arid or semi-arid lands, mainly in Africa and Asia. Parts of Cambodia also experience water shortages at the end of the dry season. Droughts can be caused by a number of reasons:

- a drop in the normal rainfall over a season or even a number of years;
- higher than average temperatures cause water stored in ponds and lakes to evaporate, and rainfall does not have time to soak into the soil.
- increasing population and limited available supplies of water means that there is less water available per person.
- poor land use practices can upset water supplies. For example logging or bad farming techniques can lead to flooding in the wet season and lower river flows in the dry season.

The effects of drought are equally serious. People spend a lot of time and effort trying to find water and when water cannot be found, people, animals, crops and plants may die

### **Water pollution**

In most parts of the world, water sources are being contaminated by human waste, industrial waste, sewage, silt (from eroded land), chemical waste and nutrients (from agriculture run-off).

The sources of water pollution can come from specific points such as sewage treatment plants, factories, drainage pipes or oil wells or from large areas such as agricultural runoff (fertilizers, pesticides), mining wastes, urban wastes and construction sediment.

Polluted water has a very bad impact on the health of people. In Cambodia only nineteen percent of the population has access to safe drinking water. This means that eighty-one percent of the population is facing a daily risk of contaminated water. In other developing countries, water kills at least twenty five million people each year. Sixty percent of these people are children.

The purpose of this activity is to make students aware that the problems with water are sometimes caused by the activities of people.

**Key words:** flood, drought, pollution, health, pollution

### **Activity preparation**

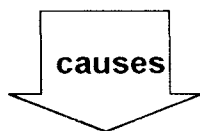
1. Copy the following diagram onto the board.



too much water  
**flooding**

too little water  
**drought**

**water pollution**



### **Activity procedure**

1. Explain to the students that today they are going to learn about the threats to water and that the activities of people sometimes cause and effects of these problems.
2. Explain to the students that there are three main problems with water:
  - too much (flood);
  - too little (drought); and
  - contamination (water pollution).
3. Ask the students what type of activities they think cause these problems with water and list their responses on the board (deforestation, sewage, solid waste, siltation, pesticides, dam, irrigation, population growth etc).
4. Ask the students what they think the effects of these activities are and list their responses on the board (water shortages, low plant growth, loss of life, spread of diseases, damage to houses etc).
5. Divide the class into three groups. Give each group one of the three water resource problems: floods, drought and water pollution. Ask each group to discuss the problem their group has been given and to think about:
  - the activities that cause the problem; and
  - the effect of that problem on people plants and animals.
6. Ask each group to draw lines from the causes and effects (listed on the board) to the problem their group was given to think about.
7. Congratulate the students of their excellent effort and ask them to think about the causes and effects of draughts, floods and pollution.

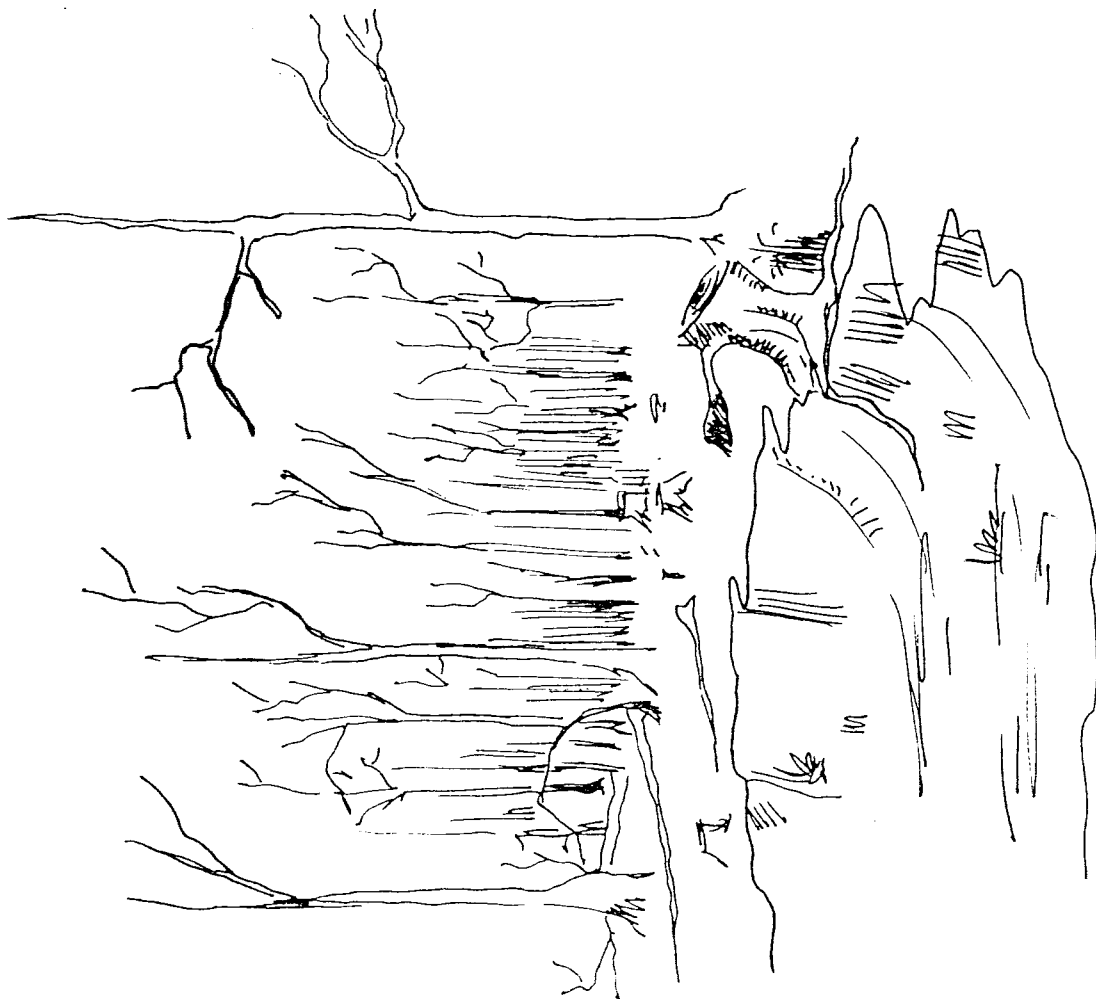
### **Evaluation**

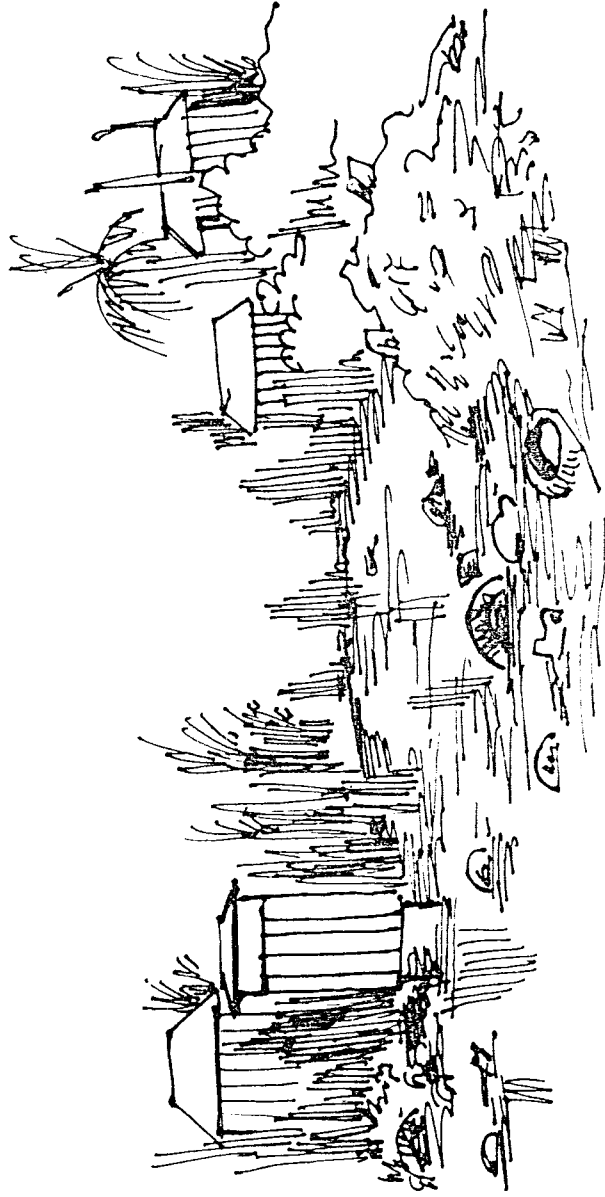
1. Name three main problems with water.
2. Name two effects on plants, animals or people caused by flooding, drought or water pollution.

### **Extension**

1. Carry out the same activity near your house in a pond or river to see if you can identify the main threats to your local water source.
2. Carry out the same activity for the Tonle Sap to see if you can identify the main threats.

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## Activity 33

### PURIFICATION OF WATER

#### Learning objectives:

Students will be able to:

- a) Demonstrate a simple technique of purification for drinking water

#### Method

Students conduct an experiment to show how water is purified.

#### Teacher's instructions

Setting: Inside and at home

Group size: Up to 20 students

Age of group: Grade 4 and up

Materials needed: muddy water, small jar, five empty transparent bottles, alum (*slatchourn* - optional), ladle, oil.

Activity length: 1 hour

#### Background knowledge

The **freshwater** that we can use on earth is being constantly cycled and purified during the **water cycle**. There are four stages in the water cycle:

1. **Storage**

Huge quantities of water are stored in rivers, oceans, lakes and glaciers.

2. **Evaporation**

Water rises into the air (evaporates) from storage and condenses in clouds

3. **Rain**

Drops of water form into clouds and fall as rain .

4. **Runoff**

Rain water runs off the land and flows into oceans, lakes and rivers. Rainwater can also **infiltrate**, or soak into the soil, subsoil, and rock to become groundwater.

The purpose of this activity is to demonstrate to the students how the water cycle purifies water.

**Key Words:** Purify, water cycle, storage, evaporation, run off.

#### Activity preparation

1. Collect four clean and empty transparent plastic bottles.
2. Three days before the activity, fill two of the three bottles with muddy water. One of the bottles (bottle 1) must be open on the top. The second one (bottle 2) must be carefully closed. At the same time, fill a small jar (jar 1) with water from the same source and cover it.
3. One day before the activity, fill the third bottle (bottle 3) with muddy water from the same place.
4. On the morning of the activity, fill a clean transparent bottle (bottle 4) with the water of the jar (jar 1). Put it in a sunny place close to the classroom.



### **Activity procedure**

1. Explain to the students that today they are going to learn about the natural water purification system which takes place during the water cycle.
2. Ask the students where drinking water comes from. Ask if anyone at home treats water before they drink it. Ask the students how they keep water clean. List all the students responses on the board.
3. Explain how nature keeps water clean and how we can also purify water when it is polluted. Show the students the four bottles which were prepared earlier. Ask the students to compare the four bottles: in the bottles 1 and 2, the dirt is at the bottom and the water color is clear. In bottle 1, there are some dead insects and other particles. Ask the students for ideas as to why the water is muddy colour? Compare the water color with bottles 3 and 4. Tell the students that the bacteria in the water are concentrated into the dirt, sediment and particles. By allowing the dirt to settle at the bottom, seventy percent of the contaminants are removed from the water.
4. Explain that the sun helps to purify the water. Take a clean and empty transparent bottle (bottle 5). With the ladle, carefully collect water in the small jar (Jar 1) and fill 2/3 of the bottle. Ask the students to put it on a sunny place around the classroom. Show the bottle you prepared in the morning (bottle 4). Explain that the heat of the sun evaporates the water. The water vapor rises and touches the side of the bottle. When it touches the side of the bottle it cools and condenses back into a liquid, which falls to the bottom of the bottle again like rain. Explain to the students that if you collect the water that falls to the bottom of the bottle ninety percent of the contaminants would have been removed. Explain to the students that this is how the water cycle purifies water. However remind the students that if they want to drink water they must always boil the water to remove contaminants that can not be seen.
5. Congratulate the students on their experiment.

### **Evaluation**

1. Describe how to reduce contaminants of contaminated water by seventy percent.
2. Describe how to reduce contaminants of contaminated water by ninety percent.

### **Extension**

1. Ask the students to note and draw a diagram about the experiment in their notebook.

## Activity 34

### CLEAN WATER FOR A HEALTHY CHILD

#### Learning objectives

Students will be able to:

- a) Name two water-borne diseases.
- b) Describe three reasons to protect yourselves and your family from water contamination.

#### Method

Students learn songs about water and health.

#### Teacher's instructions

Setting:	Inside or outside
Group size:	Up to 40 students
Age of group:	Grade 2 to 6
Materials needed:	Copies of song
Activity length:	30 minutes

#### Background

Water pollution can have very severe impacts on human health. More than 1.23 billion people in developing countries do not have access to safe water and 1.47 billion people do not have adequate sanitation facilities. In developing countries, contaminated water kills at least 25 million people each year, sixty percent of them are children. Unsafe drinking water can cause trachoma blindness, malaria, typhoid, cholera, hepatitis, leprosy, yellow fever and diarrhea.

A shortage of safe drinking water is a major problem in Cambodia, especially in rural areas. There is an abundance of surface water but it is often contaminated. In Cambodia only nineteen percent of the population has access to safe drinking water. Which means that eighty-one percent of the population is at risk of becoming sick from drinking contaminated water.

In most areas of the country, there are no proper sanitation facilities, and people defecate in fields or by water bodies, resulting in contamination of drinking water resources.

The purpose of this activity is to make students aware that drinking water can make people sick unless it is boiled, purified or cleaned.

**Key words:** boiled, purified, sanitation, developing countries, safe drinking water, contaminated water

#### Activity procedure

1. Explain to the students that today they are going to learn a song about clean water and healthy children.
2. Ask the students how many of them:
  - a) drink boiled water;
  - b) drink normal water; or
  - c) drink pure water (in bottle).

3. Write the students responses on the board.
4. Divide the class into three groups. Give each group a copy of one song and ask the students to learn them. Allow ten minutes.

First song – Drink only boiled water

*We, children, should always drink boiled water,  
If we drink unclean water, we will get sick,  
We will get intestinal parasites and diarrhea,  
Sometimes we might get typhoid fever too.*

Second song – Water-borne diseases

*To drink unboiled water causes a lot of troubles,  
There are many kinds of water-borne disease in the water,  
After drinking unboiled water, you will get diarrhea and abdominal pain,  
We should get rid off these troubles by drinking only boiled water.*

Third song – Clean your hands and cut your nails

*I shall wash my hands with soap after leaving the toilets and before meals,  
By doing so Mum and Dad will be very happy with me,  
I will be a nice child in their eyes  
I will cut my nails and clean my hands,  
I will not put my fingers into my mouth, because I might get sick.*

5. Invite each group to stand up at three different places. One after one, each group should sing the song following the music of *svay chanti* song.
6. Congratulate the students and ask them to think about the link between water, sanitation and health.

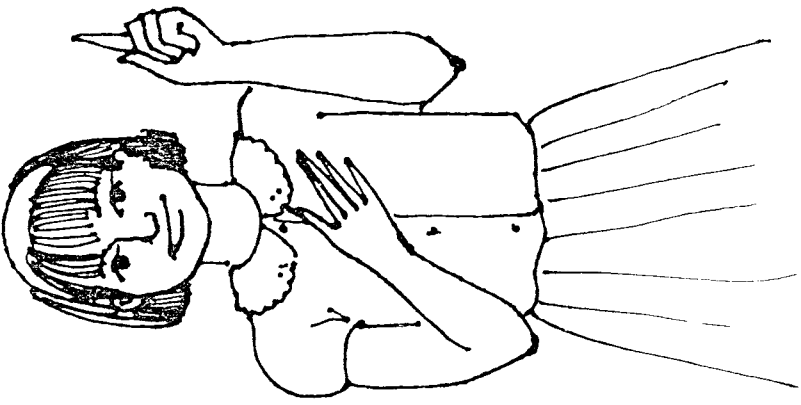
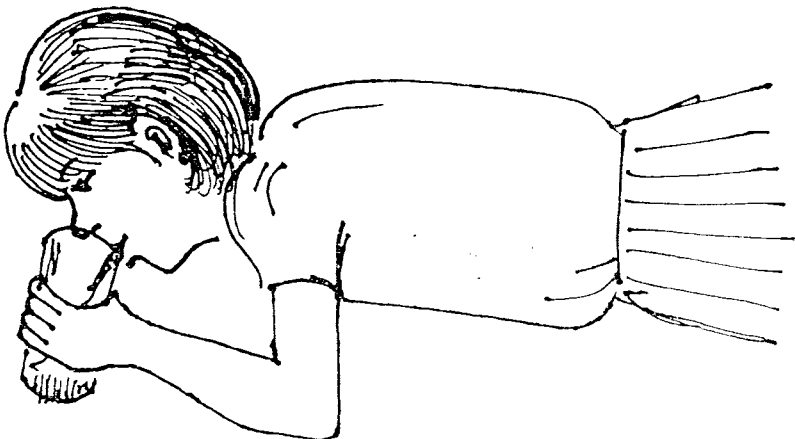
**Evaluation**

1. Name two diseases that you can get from water that is not clean.
2. Name three things you can do to protect yourselves and your family from getting sick from contaminated water.

**Extension**

1. Sing these songs at a local ceremony (Pagoda, school).

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## LEARNING ABOUT WASTE AND POLLUTION

Rapid development in Cambodia is leading to increased problems of waste management and pollution. While industrial development is still limited, increased urbanization, population expansion and lack of infrastructure are contributing to the degradation of the environment. The contamination of our environment causes many problems for both humans and animals through the spread of disease and sickness. These activities teach students to understand the problems of waste and encourage them to become active in keeping our environment healthy for everyone.

## Activity 35

### WHAT IS WASTE?

#### Learning Objectives

Students will be able to:

- a) Describe what waste is and where it comes from; and
- b) Name two different types of waste.

#### Method

Students learn about waste as a group activity.

#### Teachers instructions

Setting:	Inside or outside
Group size:	up to 30 students
Age of group:	Grade 4 and up
Materials needed:	Ten Biodegradable waste including: paper, fruit skins, lotus leaves, wood, banana leaves, coconut shell, rattan basket, krama, kapok pillow, bamboo. Ten Non-biodegradable waste including: plastic bags, aluminum cans, steel cans, styro-foam, glass jar, plastic packet, coat hanger, plastic water bottle, cooking pot, light bulb. Two natural baskets and one sign reading 'Biodegradable' and one sign reading 'non-biodegradable'
Activity length:	1.5 hours

#### Background

Waste is something that is unwanted or has no useful purpose. Waste can be a solid (for example bottles and cans), a liquid (for example sewage) or a gas (for example fumes from a car).

There are three main sources of waste:

1. Domestic waste;
2. Commercial waste; and
3. Industrial waste.

1. Domestic waste is produced in the home. Domestic waste includes unwanted glass bottles, plastic bags and food scraps.

2. Commercial waste comes from markets, shops, hotels and health clinics. Commercial wastes includes unwanted packing materials, wood, glass, plastic, food scraps.

3. Industrial wastes are produced in factories. Industrial waste includes unwanted chemicals and other by-products generated in the manufacturing of products.

Waste is a big problem in towns and cities because there are many people, markets, shops and factories which all produce waste. Waste can also be a problem in small rural communities if it is not disposed of correctly.

Pollution is contamination of the environment with waste people produce. If waste is thrown into the environment it causes pollution. If people do not dispose of their waste correctly it can have serious impacts on the environment and the health of people. If people throw their waste into the river, the water will become polluted. If people drink water from a polluted river they will become sick. If people throw waste into the street, rats will scavenge in the waste and spread disease.

#### Biodegradable and Non biodegradable Wastes

In the natural environment there are small organisms and insects which can eat many of the waste people produce. For example, if we mix unwanted food scraps, paper or cardboard with soil the organisms in the soil will eat the food scraps and other materials until nothing is left. Wastes which break down through natural processes are called biodegradable wastes.

Wastes which can not be eaten by these organisms are called non - biodegradable wastes. These wastes do break down, but the processes can take a very, very long time, sometimes thousands of years. The following examples indicate how long certain wastes will stay in the environment before they are broken down:

#### Waste Lasts How Long?

Banana skins	2 weeks
Aluminum Cans	80 - 100 years
Plastic Bags	10 - 20 years
Glass Bottles	1 Million years
Tin Cans	50 years
Plastic Bottles	Indefinitely

When some non biodegradable wastes do eventually break down they break down into smaller component parts. Sometimes these smaller components can also cause pollution.

The following techniques can be used by people to protect the environment from pollution.

The best way to protect the environment from pollution is to reduce the amount of waste we produce. For example when we buy something from a shop which is already packaged in a cardboard box or wrapped in paper, we do not need to put it in another plastic bag. It is even better to bring your own bag and avoid packaging altogether.

It is better to buy something from a shop which is wrapped or packaged in a biodegradable material such as paper or cardboard than something which is wrapped or packaged in a non biodegradable material such as plastic.

155 Never throw waste into the street or a river or anywhere else in the environment.

The purpose of this activity is to encourage the students to reduce the waste they generate and protect the environment by managing the waste they do produce.

**Key words:** waste, unwanted, pollution, biodegradable, non-biodegradable.

### Activity Procedure

1. Explain to the students that today they are going to learn about the different types of waste.
2. Ask the students who they think produces the most waste in their community? (domestic, commercial or industrial activities) If you have time, go for a walk in the school or village and look at the waste. Ask the students what type of rubbish they see the most of. Ask the students what they do you do with their waste.
3. Ask the students if they think the waste they see around them disappears or just stays in the same place forever? Ask them what happens to a banana skin when it is thrown away? Ask them if it is the same with an empty bottle? On the board list products that can disappear in a short period of time and products that takes a long period of time to disappear.
4. Explain to the students that bio-degradable waste breaks down naturally in the environment. Illustrate this by showing the students materials that are biodegradable, for example paper and vegetables. Ask where these products come from (the garden or a tree). Explain that biodegradable wastes are eaten by very small animals and insects.
5. Explain to the students that non-biodegradable waste does not break down naturally. Illustrate this by showing materials that are not biodegradable such as plastic bags and aluminum cans. Ask where these products come from? (factory and shops). Explain that non biodegradable waste can take thousands of years to break down in the soil.
6. Explain one basket is for 'biodegradable' materials and one basket is for 'Non biodegradable' materials.
7. Ask one student at a time to pick up one piece of waste and put it in the correct basket. If the student is unsure they can ask the group to help with the decision. Ask the other students if they think the waste was put into the correct basket.



8. For each piece of non biodegradable waste ask the students how long it might last in the environment before it is broken down? Compare with biodegradable waste.
9. Ask the students what happens if biodegradable waste is buried in the soil?
10. Ask the students what happens if non-biodegradable waste is buried in the soil (it lasts a very long time and the component parts may still cause pollution).
11. Ask the students which materials are better to use, biodegradable or non-biodegradable. (biodegradable materials) Ask the students what will happen if everyone decreases their use of non-biodegradable materials. (There will be less waste in the environment).
12. Congratulate everyone on their good work and encourage everyone to use biodegradable materials instead of non-biodegradable materials.

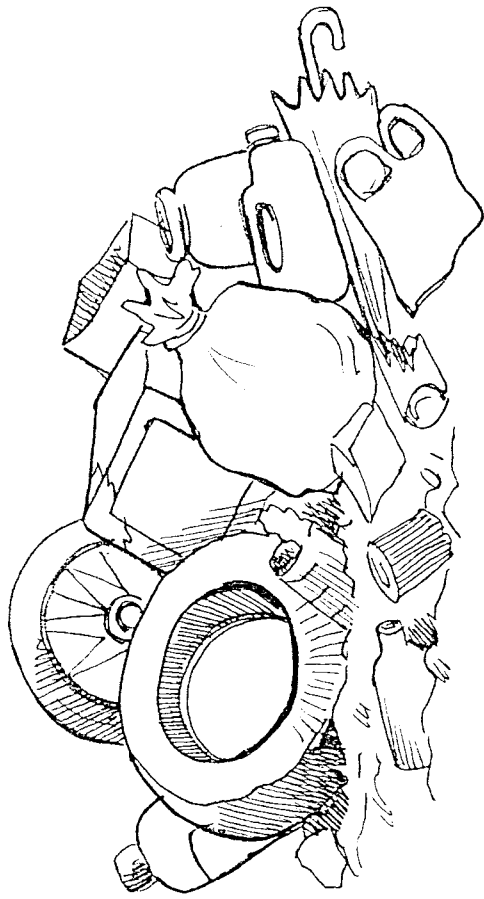
### **Evaluation**

1. Describe waste.
2. Name two different types of waste and give one example of each.
3. Explain two effects on the environment and people when waste is not disposed of correctly.

### **Extension**

1. Take the students for a walk through their village or around the school and estimate what percentage of rubbish is bio-degradable and what percentage is non-biodegradable.
2. Ask the students to write a report on waste in their village. Questions could include:
  - What is the main source of rubbish in their village?
  - How is this waste disposed of?
  - List alternative methods of waste disposal that could be used in your village.

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## Activity 36

### Waste and Economic Development

#### Learning objectives

Students will be able to:

- 455 a) Explain that as Cambodia develops economically the type of wastes that are being generated are also changing.

#### Method

Students survey people in the community about waste.

#### Teacher's instructions

Setting:	Outside
Group size:	Up to 30 students
Age of group:	Grade 6 and up
Materials needed:	Pen and paper or exercise book
Activity length:	2 -3 hours

#### Background

About 60 years ago the environment was a lot cleaner because people used more materials that were biodegradable. However, as countries become more developed people want to buy new and modern products. For example as electricity becomes more available people want to buy TV's, as communication infrastructure improves people want to buy mobile telephones and as roads are improved people want to buy cars and motorbikes. Many of these products are manufactured using non-biodegradable materials such as plastic and metal.

When these products break and can no longer be repaired they are thrown away, but because they are non-biodegradable, they do not break down quickly in the environment. When they do eventually breakdown after many years their component parts may still cause pollution.

Countries with high economic development are now realizing that when modern products are unwanted they can be very difficult and very expensive to dispose of in a way that they do not cause pollution to the environment or harm human health. For example, trucks are needed to transport waste, bins are needed to collect waste and large areas of land are needed to bury waste.

Cambodia has only recently started to develop, but already there is an increasing demand for products made of modern, non biodegradable materials. These products are rapidly replacing products made of traditional biodegradable materials. For example, in many places plastic bags have replaced banana leaves to wrap food in. Unlike banana leaves, when plastic bags are thrown away they stay in the environment for a very long time.

In the future many more of the modern non-biodegradable products now available in the shops and markets will be thrown away when they become unwanted. These wastes will need to be disposed of so that they do not cause pollution.

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The purpose of this activity is to make students aware that as their country develops the waste they produce also changes.

**Key words:** economic development, modern products, non biodegradable, biodegradable

### Activity procedure

1. Explain to the students that today we are going to learn that the type of waste people produce has changed.
2. Ask the students what the main types of waste they see thrown away in their village are? Write their responses on the board.
3. Ask the students to write down the following questions in their note book:

<p>Date:</p> <p>School and Class:</p> <p>Teachers Name:</p> <p>Village and location:</p> <p>What are the main waste materials seen in the community?</p> <p>Ask an elder member of the community living near an area where waste is dumped:</p> <p>1. How long has the dumping site been here?</p> <p>2. Has there always been the same type of waste thrown here?</p> <p>3. What are some of the new products in the last 5 years?</p>	<p>4. What are some of the older products that you used before instead of these?</p> <p>5. What effects do you think this waste has on the community?</p> <p>6. Do you have any ideas how to improve this waste area?</p> <p>7. Who should be responsible for cleaning up and reducing waste and pollution?</p>
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4. Divide the students in small groups (2-4 people). Explain that each group is going to ask an elder in the village all the questions they have written in their note book. All students should write the answers to the questions in the note book. Explain to the students that when they have finished answering the questions they should return to the classroom or education area.

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5. The teacher should let the students ask all the questions, but walk around and help any groups that need assistance.
  6. When the students have returned to the classroom, ask them to sit in a circle and discuss their answers. Write their answers on a piece of paper or on the board.
  7. Ask the students to compare how waste has changed.
    - Many years ago
    - Now
    - In the future
  8. Congratulate the students on their work. Ask them to think about who is responsible for creating waste and who should help dispose and manage waste? (Everyone)

### **Evaluation**

1. Name two of the main types of waste disposed of in the village.
2. Name one modern product which has replaced a traditional natural product.

### **Extension**

1. Conduct an experiment with three different types of waste (for example, banana skin, plastic bag and plastic bottle) and record how long they take to break down in the environment. Tie each of these products to a tree outside on a string. This will allow the sun, wind, rain to help break down the waste. Record the following measurements every two weeks.
  - a) Name of the product.
  - b) Date.
  - c) Is the colour the same?
  - d) Is the waste broken in any way?
  - e) What are the main changes that have occurred?
  - f) Sketch a drawing of the waste.



## Activity 37

### Pollution

#### Learning objectives

Students will be able to:

- a) Name the three main types of pollution; and
- b) Describe how pollution can impact on people's health.

#### Method

Students visit a pond, stream or channel.

#### Teacher's instructions

Setting:	Outside
Group size:	Up to 30 students
Age of group:	Grade 4 and up
Materials needed:	Two bottles, one with drinking water and one empty Colour pencils, flipchart paper and A4 paper
Activity length:	2 hours

#### Background

Pollution is contamination of the environment with waste which is not disposed of correctly. Waste which is not disposed of correctly can pollute the land, the air and the water. It is the activities of people which cause waste to be produced and it is the waste people produce which causes pollution. When pollution occurs the environment becomes unhealthy and dangerous for people, plants and animals to live in.

There are three main types of pollution:

- water pollution;
- land pollution; and
- air pollution.

#### Water Pollution

When people throw their waste into ponds, streams, canals, lakes and the ocean, it can cause water pollution. If people take drinking water from rivers or ponds which have been contaminated with domestic waste, they may become sick. When factories throw their waste into rivers and lakes it can also cause water pollution. If people eat fish or drink water from rivers and lakes which have been contaminated by unwanted metals and chemicals from factories, they may also become sick. Water can also become polluted from sewage. Sewage is waste which leaves the human body when people use the toilet. Sewage contains many types of organisms called bacteria. Bacteria live in the body but when some of these bacteria get into the water they make people very sick, causing sicknesses such as diarrhea and typhoid fever. Harmful bacteria can be passed

from a sick person to other people who will then become sick also. Pollution is also harmful to other organisms such as plants and animals.

### **Land pollution**

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When people throw waste onto the ground it is called littering. Littering causes the land to become polluted. If animals scavenge in the waste thrown onto the ground and people eat or touch these animals they may become sick. When large quantities of non-biodegradable waste are buried on the land it can also cause pollution of the land. Non biodegradable wastes take a very long time to break down so people can not use the land for building houses or growing crops. When non biodegradable wastes do eventually break down, their component parts can cause pollution.

### **Air Pollution**

When smoke and harmful gases are released into the air they can cause pollution. When people burn wastes the smoke from the fire causes the air to become polluted. For example when people burn plastic on a fire the gas released into the air is contaminated with chemicals which are dangerous to breath. The black smoke released into the air from a fire is made up of millions of tiny particles. These particles can sometimes stay in the air for many hours and can make it difficult to breath. The gas released from the exhaust of cars, trucks, buses and motorbikes also causes air pollution. In big towns and cities where there are many vehicles it is sometimes difficult to breathe the air.

The purpose of this activity is to make students aware that there are three types of pollution and that when the environment becomes polluted people can become sick.

**Key words:** pollution, contamination, land pollution, littering, water pollution, sewage, bacteria, air pollution, smoke and gas.

### **Activity procedure**

1. Explain to the students that today they are going to learn about pollution.
2. Ask the students to name three main types of pollution. Write their answers on the board. Ask the students where they have seen pollution in their village. Write the responses on the board.
3. Ask the students to provide one example for each of the types of pollution. For example sewage causes water pollution, pesticides cause land pollution and exhaust fumes from vehicles cause air pollution.
4. Take the students to the closest pond, stream, channel or lake (if possible a place that you know has pollution in the water or on the land).



## Water Pollution Activity

1. Fill the empty water bottle with water from the pond. Show the students the bottle with the drinking water and the bottle with the pond/river water. Ask the students to compare the water in each of the bottles. Write down the results of each on paper or note book:

- What is the colour?
- What does the water smell like?
- Is there anything floating in the water?
- Can you see through the water?
- Look around, where did the pollution come from?
- Is there any pollution that may be in the water but can not be seen with the naked eye?
- If the water looks clear does it mean that it is safe to drink?
- What are three problems caused by water pollution?

## Air Pollution Activity

1. Ask the students to sit in the circle. Ask them what air pollution do they see in their community? Ask them if they see any air pollution from where they are sitting now? Explain to the students that smoking is a type of air pollution.
2. Ask the students to explain how they feel when someone is smoking very close to them. Does it smell bad? Do their eyes water? Do they cough? Do they have to walk away to find clean air? Explain that if people breathe in gases from plastic burning in the fire they will become sick. What are some other examples of air pollution? (exhaust fumes, fires, factories, generators, dust).
3. Demonstrate the pollution coming from a motorbike exhaust by putting tissue paper over the exhaust. Show the students the tissue paper. Ask the students where this pollution goes if we breath exhaust fumes? (our lungs). Ask the students if this will make them sick? (Yes).

## Land Pollution Activity

1. Ask the students where the pollution in the water came from? (from solid or liquid waste thrown on the land or dumped in a canal).

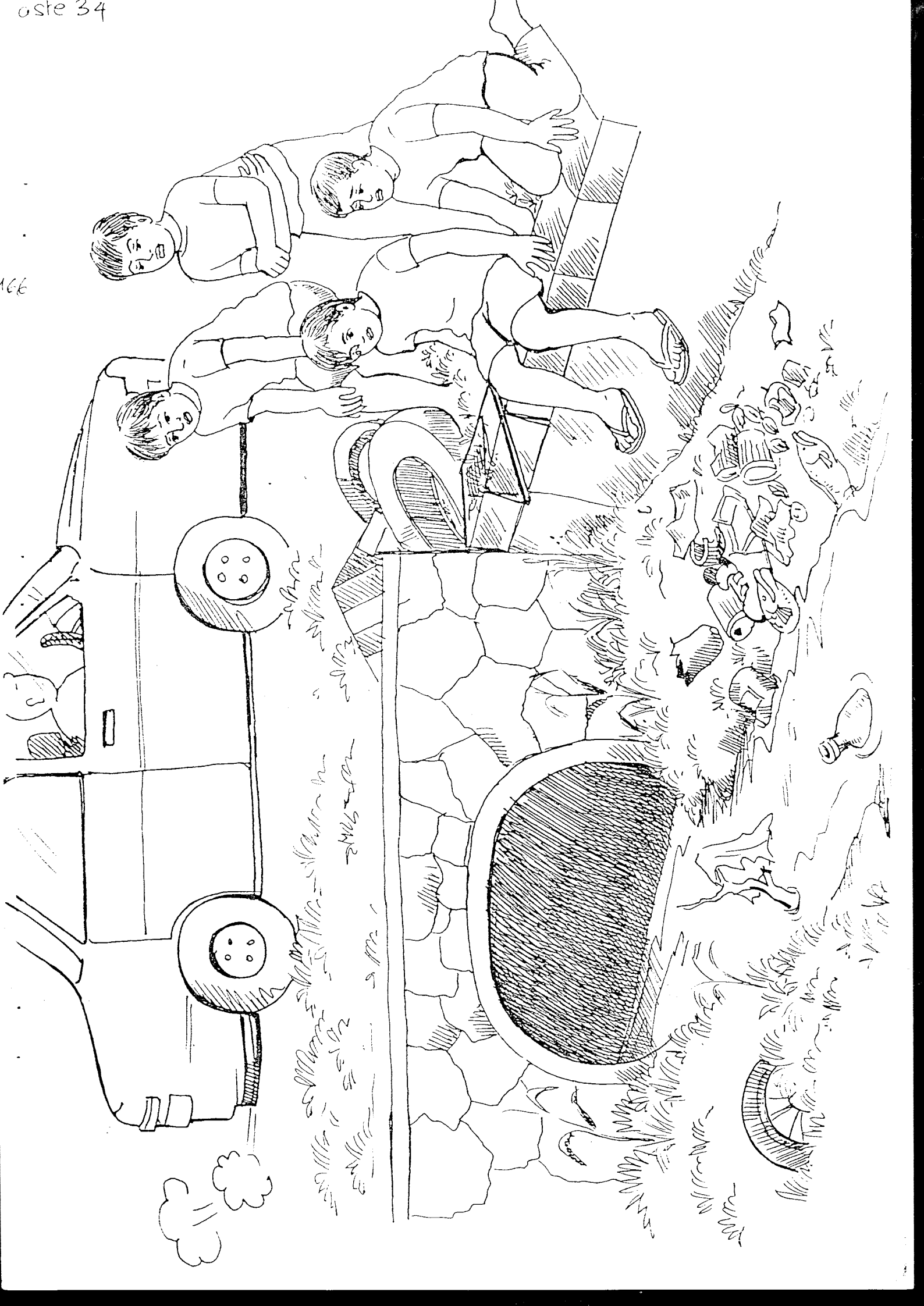
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2. Explain to the students that one of the easiest ways to keep the environment clean is to put all rubbish in the bin and never through waste away.
  3. Ask the students to pick up at least 5 pieces of rubbish each to help improve the local area. Place the rubbish in a garbage bin or landfill.
  4. Divide the students into groups of approximately – 2-4 students. Ask half the group to draw the river or pond and land they visited today. Ask the students to draw the pollution and sources of pollution on one piece of flipchart paper. They will need to discuss what they saw and organize who is going to draw each part of the picture.
  5. Ask the students in the other half of the group, to draw one problem caused by pollution on small pieces of paper. When all the groups are finished ask them to explain their drawings and then ask the group to connect the pollution source with the effect.
  6. Ask everyone to wash their hands because dirty hands can make us sick.
  7. Congratulate everyone on their effort and participation and encourage them to tell their families about everything they have learned today about pollution.

### **Evaluation**

1. Name the three types of pollution.
2. Name two types of pollution and give one example of a problem caused for each.
3. Give one reason why we should reduce pollution.

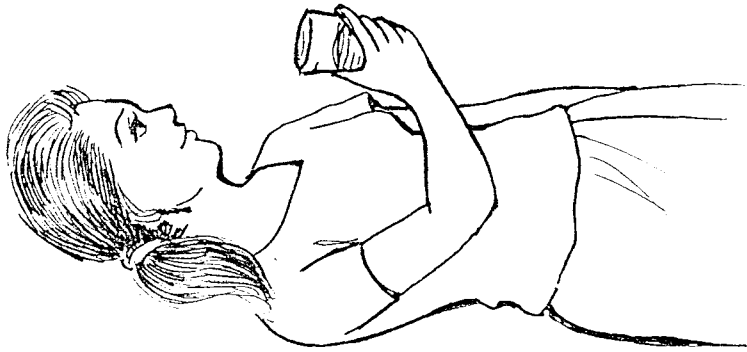
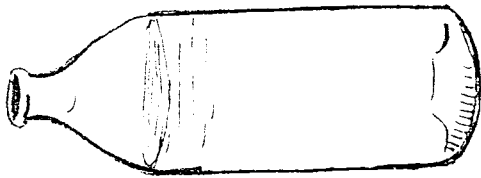
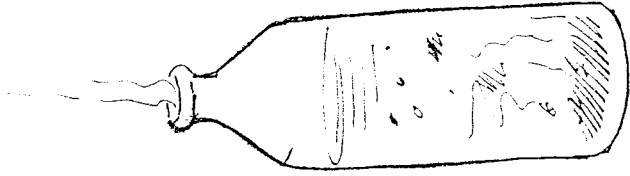
### **Extension**

1. Walk around the local area to see if they can find sources of pollution such as the markets, restaurants, car wash and school. Ask the student to write a list of pollution they saw in their village and then to write in the next column who caused the pollution. Record if and where clean water can be found in the village.
2. Interview some older people in the village and ask them if there was pollution when they were young. Ask questions like:
  - Was there pollution in the river when you were young?
  - Did you drink the water from the pond, river without getting sick?
  - When did you notice that pollution started in the village?
  - What was this pollution caused by?
  - Is this the same pollution as we see today in your village?
  - Do you have any suggestions for reducing the pollution in your community?



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## Activity 38

### Plastics Everywhere

#### Learning objectives

Students will be able to:

- a) Describe why we should use alternative products to plastic.

#### Method

Students compare plastic products.

#### Teacher's instructions

Setting:	Inside or Outside
Group size:	Up to 16 students
Age of group:	Grade 6 and up
Materials needed:	One product listed below per student: Six different types of plastic bags (thin, thick, big, small) Two different types of drink bottles Two different types of shopping baskets Two different types of cups Two different types of plates Two lunch boxes (Khmer and plastic).
Activity length:	1 - 1 hour 30 minutes

#### Background

Plastics are produced from chemicals extracted from oil, natural gas and coal. Oil, natural gas and coal are called natural resources which are formed under the earth over millions of years. Some natural resources can not be replaced when they have been used up. These are called non-renewable natural resources. Oil and coal are non-renewable natural resources and nobody knows when they will be used up.

Most of the plastics produced are used for packaging. Packaging is the material used to keep food fresh and to protect the products people buy from getting damaged, for example plastic bottles and plastic bags. About one third of the domestic waste people produce is packaging material. When people take the products they have bought at the shop or market home, they throw the packaging material away. Materials, like packaging, that people use once and then are thrown away are called disposable products. Packaging materials made of plastic are a big problem because:

1. they are non biodegradable and do not break down for a very long time; and
2. when they are burnt they release chemicals into the air and cause air pollution.

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Cambodia has a population of about 12 million people; if everybody in Cambodia used four disposable plastic bags each day it would mean that 48 million plastic bags would be thrown away every day of the year. This is a lot of plastic bags!

The purpose of this activity is to make students aware that it is better to use traditional natural products rather than disposable plastic products.

**Key words:** plastic, natural resources, non renewable natural resources, packaging, disposable product,

### Activity procedure

1. Explain to the students that today they are going to learn about plastics.
2. Ask the students what products use plastic packaging? For example when they buy a drink, vegetables or clothes at the market are these packaged in plastic? Write their answers on the board. Ask each student how many plastic bags they use in a day. Write the average number of plastic bags per student per day on the board.
3. Write the following questions on the board and ask the students to copy the questions into their notebook or on a piece of paper.

Date:	
Name of Student:	
Name of product:	
How many times can the product be used?	
Complete the following lists:	
1. Write a list of all the uses of the product.	
2. Then write a list of alternative products which be instead. For example a shopping bag made from traditional materials instead of a plastic bag.	
Uses of product	Alternative products that could be used

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4. Divide the students into pairs and ask them to come and collect two products. Ask the students to answer the questions copied into the notebook for one of the products and then answer the questions for the other product. Allow twenty minutes to complete this activity.
  5. Ask the students to join together in a big circle. Ask one student at a time to present their product by reading the answers to their questions from their notebook. At the same time pass the product from one student to the next so all the students can look at it very closely. Ask the students if they can think of alternative material which could be used instead of plastic. Continue this until all students have presented their product.
  6. Ask all the students to pick up their product. Ask the students with products that can only be used once to stand on one side of the room, and ask the students with products that can be reused to stand on the other side of the room. Make sure everyone can see all the products from where they are standing. Make some adjustments for students who are on the wrong side. Ask the students which group of products are the best to use? Ask them to explain why they think this. (The products are better in Group 2 because they can be used many times and produce less waste.
  7. Explain to the students that it is better to use plastics that can be used more than once.
  8. Everyone should wash their hands after touching waste.
  9. Congratulate them on their effort and participation.

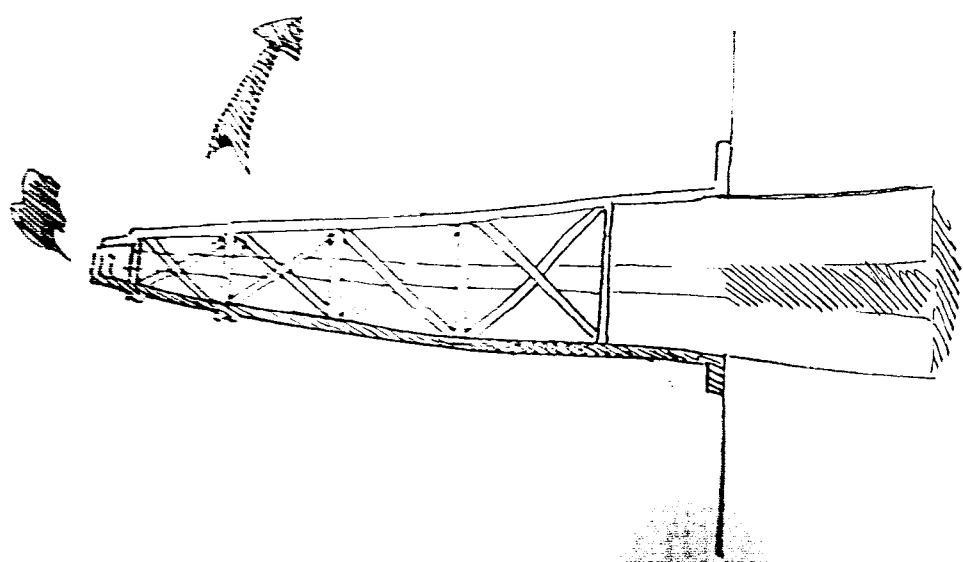
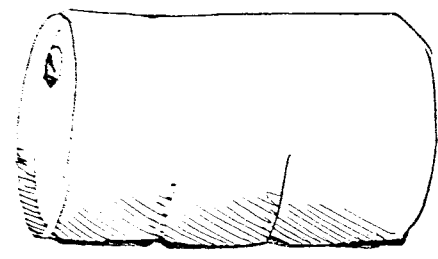
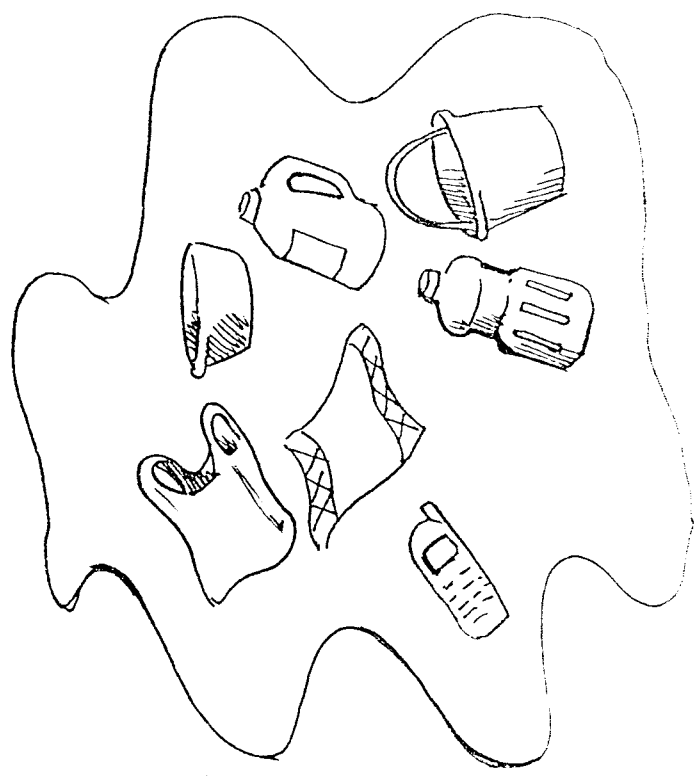
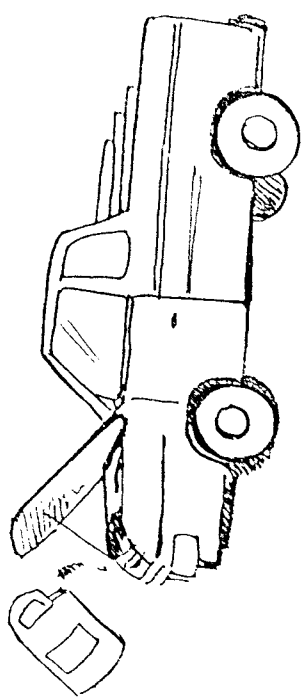
### **Evaluation**

1. Describe what a disposable product is.
2. Name three traditional products that can be used instead of plastic products.

### **Extension**

1. Organise a poster competition about plastic waste. These posters should be put up around the community to educate other people. Ask the students to draw what they have learned about plastic. The poster should explain through pictures and/or writing the best types of plastic to use or alternatives such as traditional products that should be used.
2. Students could prepare a similar activity and discussion with the food sellers outside the schools. Together develop a plan to reduce the amount of disposable plastic used by the sellers.

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## Activity 39

### WASTE DISPOSAL

#### Learning objectives

Students will be able to:

- a) Name two problems associated with burying waste in the ground and burning waste in a fire.
- b) Name two methods that can help improve the problems associated with burning and burying waste.

#### Pre-requisite Activity

Students should complete the activity "What is waste" before completing this activity.

#### Method

Students investigate waste disposal in their community.

#### Teacher's instructions

Setting:	Outside and inside
Group size:	Up to 30 students
Age of group:	Grade 6 and up
Materials needed:	Writing materials
Activity length:	1 hour 30 minutes

#### Background

There are two main ways in which wastes are disposed of in Cambodia:

1. Burying in the earth
2. burning in a fire.

#### Burying Waste

Most large towns and cities have large holes where the waste the people produce is taken for disposal. This is called a landfill. In some villages people take their waste to an area and throw it into a hole or onto the land. This is called a dump.

Sometimes there can be problems with disposing of waste in the earth, particularly with large landfills in towns and cities. When the waste disposed of in a landfill comes into contact with rain water, the water becomes contaminated with the waste. If the water leaks from the bottom of the landfill it can contact the clean ground water people take from wells. If people drink contaminated water from wells they may become sick. Once ground water has become contaminated with wastes from a landfill it may never become clean again.

Many problems can also occur when landfills and dumps are not correctly managed. Some of these problems include:

- bad smells and dust;
- scavenging animals; and
- windblown litter (waste which the wind blows away).

Some solutions to these problems are:

- Always dig a hole in the ground and cover the waste with earth to prevent bad smells, scavenging animals and litter blowing away.
- Dig the landfill away from water sources, drinking water supplies and not too close to the house.
- Dig the landfill on high ground so that the waste does not get inundated during the rainy season
- Compost biodegradable waste so that it can be used to fertilize the garden. composting waste also reduces the size of the landfill area needed and stops animals digging in the landfill site.
- Batteries, paints and other toxic waste that can leach into the water supply and affect the health of animals, plants and humans. This type of waste should be enclosed in a closed glass or metal jar or tin container before being buried. This will help prevent pollution entering the water supply

#### Burning waste

In most towns and cities the landfill is operated by a private company. If people want their waste to be disposed of at a landfill they must pay the private company to collect it and take it to the landfill. Often the private company only collect waste from areas where there are restaurants, shops and markets. People whose waste is not collected by the private company usually burn their waste in a small fire outside their house. Burning waste can also cause problems.

When people burn plastic or styro-foam wastes on a fire the gas released into the air is contaminated with chemicals which are dangerous to breathe. When the fire is not hot enough to completely burn the wastes, it will smolder and release black smoke into the air. Black smoke released into the air from a fire is made up of millions of tiny particles which sometimes stay in the air for many hours. Sometimes not all the waste on the fire will be destroyed, for example cans, bottles. If metal and broken glass are left on the ground after a fire has gone out, people may cut themselves. It is also very dangerous to burn aerosol can. These can explode in a fire and people can get very badly burnt if they are standing near the fire when a can explodes.

Some solutions to these problems are:

- Only burn dry waste as wet waste creates large amounts of smoke
- Non-biodegradable materials should be buried in the ground as they do not burn well or cause air pollution when burnt
- If burning waste, use an area that is on high dry ground and does not become inundated with water

- It is better for the environment to compost biodegradable waste and bury non-biodegradable waste than to burn waste. This will cause less pollution and is better for people's health.

174 It is the activities of people which cause waste to be produced and it is the waste people produce which causes pollution. When the land, air and water become polluted with wastes, the environment people live in becomes unhealthy and dangerous. All people have a responsibility to make sure their waste is disposed of correctly so that the environment is safe for people to live in.

The purpose of this activity is to make students aware that people produce waste and that waste can cause pollution so everybody is responsible for disposing of waste correctly.

**Key words:** disposal, landfill, dump, ground water, contaminate, land pollution, windblown litter, water pollution, air pollution, toxic waste.

### Activity procedure

1. Explain to the students that today they are going to learn about waste disposal.
2. Ask the students if they know how people in their village dispose of the wastes they produce. Write their answers on the board. Ask the students if they know of any problems caused by dumping waste in their village. Write the answers on the board. (For example smell, windblown litter, dust, polluted water and scavenging animals).
3. Ask the students to write down the following questions in their note books:

<p>Date:</p> <p>Village and location:</p> <p>What are the main materials in this dump?</p> <p>Describe the sounds and smells of this dump.</p> <p>Is there any problem with wind blown rubbish?</p> <p>Is there rubbish being burnt at the dump?</p> <p>Name any animals feeding on the rubbish? What are they eating?</p> <p>Name two problems caused by dumping waste</p> <p>1.</p> <p>2.</p>	<p>Are there any materials in the dump that could have been used again before being thrown out? Yes/No Name them:</p> <p>Name two way to help improve waste management in this area</p> <p>1.</p> <p>2.</p> <p>Who is responsible for producing waste and pollution?</p> <p>Who should be responsible for cleaning up and reducing waste and pollution?</p>
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4. Take the students to the place in the village where people dump their waste. This is usually somewhere near the market or around the school.
  5. Ask the students to answer the questions in their notebook. The students can work in pairs and help each other.
  6. When the students have finished ask them to wash their hands.
  7. Ask the students to present their answers to the class. Write their responses on the board.
  8. Explain that both burning and burying waste can cause problems. Write a list of all the problems that are caused by burning and burying. Then write a list of ways these problems can be reduced (burying: digging a hole in a dry location, composting biodegradable materials, digging a landfill away from the water supply and from where people live; burning: only burning dry biodegradable materials, composting biodegradable materials to use for fertilizer on the garden). Ask the students which is the best way to dispose of waste, that has the least affect on people's health and on the environment? (burying if the guidelines above are used).
  9. Congratulate everyone on their participation in the activity because researching dumping sites is dirty and smelly, but now we can all work together to keep the environment clean

### **Evaluation**

1. Name four problems associated burning and burying waste.
2. Name two ways to improve the management of the village dump.

### **Extension**

1. Ask the students to complete the same activity at their house and write suggestions of how their family could improve waste management.
2. Bury a time capsule in your school grounds with a summary copy of the answers to the above activity and one product currently used from each member of the class.
3. Organise a compost in the school or village. This activity could be a competition and organised in groups. Each group could try a different technique for composting and the results could be compared after a few months to establish which is the best composting method in your area.



## Activity 40

### Pesticides

#### Learning objectives

Students will be able to:

- a) Describe how pesticides enter the food chain
- b) Name three problems associated with pesticides in the food chain

#### Prerequisite Activity

Students should have completed the Activity "Food Chain" as a prerequisite.

#### Method

Students play a game.

#### Teacher's instructions

Setting:	Inside and/or Outside
Group size:	Up to 30 students
Age of group:	Grade 4 and up
Materials needed:	thirty pieces of material (pretend food) per each student, two thirds one colour such as white, one third mix colours (use large colored seeds or little pieces of paper). One plastic bag each for the grasshoppers (approximately 18-20)
Activity length:	1 hour

#### Background

Pesticides are any poisonous substance that are used to kill any plant or animal that humans consider pests. In Cambodia, many farmers use pesticides to protect their crops from insects and other pests. They often use large quantities of extremely dangerous pesticides without understanding the harmful effects on their health and the health of the environment.

These poisons frequently end up killing many other plants or animals and not only the pests which are being targeted. Pesticides can not distinguish between different plants and animals, they often kill everything. Many animals such as frogs, snake and birds which help the farmer control pests by eating the insects and rats that damage or destroy crops are also killed by pesticides. Pesticides can also contaminate the water in streams, ponds and rivers. When pesticides contaminate the water the fish living in the water may be poisoned. When birds (like hawks, eagles and pelicans) eat these fish they may also be poisoned. The pesticides will weaken the poisoned birds or kill them directly. If they continue to eat the contaminated fish, other effects can happen; for example the shell of their eggs may become too thin and they will unintentionally crush their eggs when they sit on them.

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Many chemicals stay in the environment for a long time and end up in the food and water supplies that people eat and drink. When pesticides enter the food chain they can impact on the health of people in the short term and in the long term. For example the pesticides in the water poison the fish, crabs, snails and kill them or make them very sick. When people eat these sick animals then they will become sick. Pesticides will stay in the fat in peoples bodies for a long time and can cause fever, dizziness, headache, vomiting, skin rash, burning eyes, cancer or death.

The way to reduce these problems is by using alternative forms of pest control or learning to use pesticides so that it does not harm humans or the environment. An alternative to pesticide use is a method called integrated pest management (IPM) which is a program teaching farmers about the natural ecosystem and ways to protect crops more naturally. This includes using natural pesticides such as chili and garlic, urine, physical barriers; such as a trench to stop army worms.

The purpose of the activity is to make students aware of the effects of pesticides in the environment. Complete activity "The Food Chain" first before completing this activity.

**Key words** chemicals, contaminate, food chain, herbicide, insecticide, pesticide, poison.

### **Activity procedure**

1. Explain to the students that today they are going to learn about the affects of pesticides on the environment.
2. Ask the students if their family uses pesticides in the garden or the field at home? Ask the students what do they use pesticides for? Write the list on the board. Ask the students if using pesticides causes any problems to people or the environment? Write the responses on the board. Explain to the students that pesticides are any poisonous substance that is used to kill any plant or animals that humans consider pests and today we are going to learn about how pesticides enter the food chain.
3. Divide the students into three groups. Explain to the first group (two students), that they are pelicans. Explain to the second group (six students) that they are fish. Explain to the third group that they are to be grasshoppers (eighteen students). If there is more or less students change the group sizes so that there are approximately three times as many fish as pelicans and three times as may grasshoppers as fish. (Optional – have a label on each of the pelicans, fish and grasshoppers so they can be easily identified)
4. Give each grasshopper a plastic bag or container and explain that this is their stomach.
5. Ask the students to close their eyes and spread thirty pieces of material on the ground.
6. Explain to the students that the material on the ground is food. Explain to the grasshopper group that they have 30 seconds to collect the food and put it

into their plastic bag (stomach). The pelicans and the fish sit quietly on the sidelines watching the grasshoppers collecting. After 30 seconds the grasshoppers should stop.

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7. Explain to the group of fish that they must catch the grasshoppers. The pelicans are still on the sidelines quietly watching the activity. If the game is being played in the classroom, allow 15 seconds. If the game is being played outside allow 60 seconds. Any grasshopper caught by the fish must give the bag of food to the fish and then sit down on the sidelines.
  8. Explain to the pelicans that they must catch the fish, the fish are trying to catch the remaining grasshoppers and the grasshoppers are hunting for 'food'. If a pelican catches a fish it gets the pelican's bag(s) and the fish goes to the sideline. If a fish catches a grasshopper, the fish gets the grasshopper's bag(s) and grasshopper goes to the sideline. Allow the hunting for between thirty seconds depending on the size of the area available.
  9. When the students have finished the game ask all them to come together in a circle and bring whatever food bags they have with them.
  10. Ask the students who were caught to identify what animal they are and what animal ate them. Ask the grasshoppers who were not caught to empty their food bags and count all the white pieces of material they collected and all the coloured pieces of material they collected. Ask them to remember their totals. Then ask the fish who were not caught to empty their food bag and count the pieces of white and coloured material. Ask them to remember the total. Finally ask the pelicans to empty their food bag and count the number of white and coloured pieces of material. Ask them to remember the total.
  11. Explain to the students that all the coloured pieces of material represent pesticide that were used on the farmers crop nearby. Explain that pesticides are poisonous, can enter the food chain and stay in the environment for a very long time.
  12. Explain that all of the grasshoppers that were not eaten by fish that have coloured pieces of food in their stomach are now considered 'dead'. Any fish that have more than half of their food coloured are also 'dead'. The pelican with the highest number of coloured food pieces will not die now, however has accumulated so much pesticide in its body that the eggs produced by it will be so thin that they will not hatch successfully. The other pelican is not visibly affected at this time.
  13. Ask the students to describe another food chains to the one used above. Encourage the students to include people in the food chain. Ask the students again if using pesticides causes any problems to the people or environment? Write the answers on the board. Compare this list with the original list.
  14. Congratulate the students on their good effort and participation and encourage them to tell their families more about pesticides.



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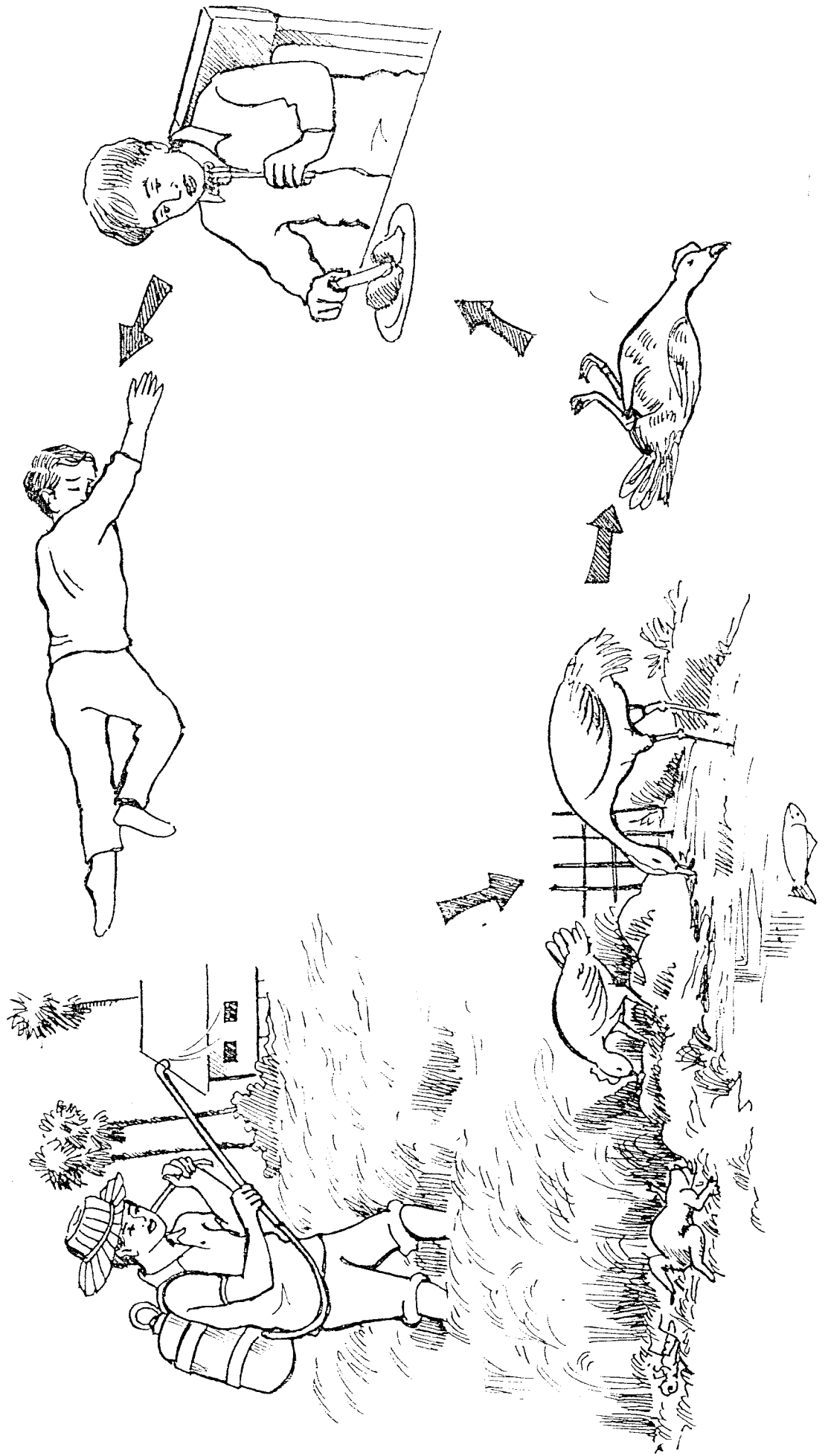
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  8. Explain to the pelicans that they must catch the fish, the fish are trying to catch the remaining grasshoppers and the grasshoppers are hunting for 'food'. If a pelican catches a fish it gets the pelican's bag(s) and the fish goes to the sideline. If a fish catches a grasshopper, the fish gets the grasshopper's bag(s) and grasshopper goes to the sideline. Allow the hunting for between thirty seconds depending on the size of the area available.
  9. When the students have finished the game ask all them to come together in a circle and bring whatever food bags they have with them.
  10. Ask the students who were caught to identify what animal they are and what animal ate them. Ask the grasshoppers who were not caught to empty their food bags and count all the white pieces of material they collected and all the coloured pieces of material they collected. Ask them to remember their totals. Then ask the fish who were not caught to empty their food bag and count the pieces of white and coloured material. Ask them to remember the total. Finally ask the pelicans to empty their food bag and count the number of white and coloured pieces of material. Ask them to remember the total.
  11. Explain to the students that all the coloured pieces of material represent pesticide that were used on the farmers crop nearby. Explain that pesticides are poisonous, can enter the food chain and stay in the environment for a very long time.
  12. Explain that all of the grasshoppers that were not eaten by fish that have coloured pieces of food in their stomach are now considered 'dead'. Any fish that have more than half of their food coloured are also 'dead'. The pelican with the highest number of coloured food pieces will not die now, however has accumulated so much pesticide in its body that the eggs produced by it will be so thin that they will not hatch successfully. The other pelican is not visibly affected at this time.
  13. Ask the students to describe another food chains to the one used above. Encourage the students to include people in the food chain. Ask the students again if using pesticides causes any problems to the people or environment? Write the answers on the board. Compare this list with the original list.
  14. Congratulate the students on their good effort and participation and encourage them to tell their families more about pesticides.

### **Evaluation**

1. Describe what a pesticide is.
2. Name three problems caused by using pesticides.
3. Describe how pesticides enter the food chain.
4. Describe one reason why we should reduce the amount of pesticides we use.

### **Extension**

1. Ask all the students to draw food chains and food webs. Ask them to explain or write
  - Who eats whom?
  - Where would poisonous chemicals enter the food chain?
  - Which creatures would suffer from the chemicals?
2. Ask the students to interview their grandparents or elder in the community and ask them what they used for pest control before there were poisonous chemicals. Write down all the different methods used and share them with the class. Experiment with these different methods and see if they are effective. Try them as a class or individually at home.





## Activity 42

### CLEAN UP OUR ENVIRONMENT

#### Learning objectives

Students will be able to:

- a) Participate in cleaning up their local environment.

#### Pre-requisite Activity

Complete the activity "What is Waste" and "Waste disposal" before organising this clean up activity.

#### Method

Students organise a clean up waste day in their local area.

#### Teacher's instructions

Setting:	Outside
Group size:	Up to 100 students
Age of group:	Grade 2 and up
Materials needed:	Disposal site Waste Bins Brooms Gloves (optional), Soap, clean water and buckets
Activity length:	Half day with preparation and follow up

#### Background

Wastes which have not been disposed of correctly contaminate the environment. When pollution occurs in the land, air and water it can make the environment unhealthy and dangerous for humans. There are three main types of pollution:

1. water pollution;
2. land pollution; and
3. air pollution.

Pollution is created by human activities so the most effective way to improve the human and environmental health is by humans being responsible for the prevention and management of waste and pollution. The best way to prevent pollution is to reduce the amount of waste we produce. One way to make people aware of the amount of waste pollution there is in the environment is by trying to clean it up. Trying to clean up wastes which have not been disposed of correctly is hard and dirty and takes a lot of time. However, cleaning up waste will help people understand that it is a lot easier to prevent waste pollution by reducing the waste that is produced, recycling and reusing wastes and only disposing of wastes which are no longer useful than to try to clean up wastes which have not been disposed of correctly. Cleaning our environment is often the first step in educating people that the person who produces the waste is the person who is

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responsible for making sure the waste is disposed of correctly. When cleaning up the environment it is important that we dispose of the waste we collect correctly. Remember, it is better to take plastics and glass which can be recycled to the village dump than to burn them on a fire.

The purpose of this activity is to encourage students to become involved in cleaning up their community.

**Key words:** waste, reduce, reuse, recycle, clean up, contaminate, pollution, dispose of

### **Activity preparation**

1. Inform the local community and commune authorities about the clean up project to get their support for the activity. It is good to involve as many people as possible in the clean up project because this will help educate the whole community about problems associated with incorrect disposal of waste.
2. Organize a place where the waste can be disposed of correctly.

### **Activity procedure**

This activity is in three phases: planning, cleanup and maintenance.

#### Planning phase

1. Ask the students where they dispose of the wastes they produce? Write the answers on the board. Ask the students to describe what the problems might be with the way they dispose of their waste or the place they dispose of their waste? Write the answers on the board. Explain to the students that today we are going to plan a clean up of our local area.
2. Discuss with the students what area of the community they would like to clean up. For example the school, near the market, or along the river. After agreeing upon an area, divide the students into smaller groups and ask them for their ideas about ways the area can be maintained after the clean up day. Ask each group to present their ideas to the class.
3. Make sure materials are available so that the students do not come into direct contact with the waste they are cleaning up. For example gloves, bins or baskets, brooms for sweeping, sticks to pick up waste, soap and clean water for participants to wash their hands after the activity.

#### Clean up day phase

1. Organise the clean up materials so that students can collect the things they need to clean up the waste.
2. Welcome all the participants and inform them of the area you will be cleaning and where they should put their waste when the bins are full. Explain that today is a clean up day, but more importantly everyone should put their rubbish in a bin in the future and dispose of waste correctly. Explain that Dumping waste on vacant land or in ponds/rivers will make the community sick and dirty the landscape. Inform everyone that on completion of the clean

up they should all wash their hands carefully with the soap and water provided.

3. Lead the way with the students who have organised the clean up day and demonstrate how a good clean up can be achieved by participating to pick up litter alongside the students.

#### Maintaining the area in the future

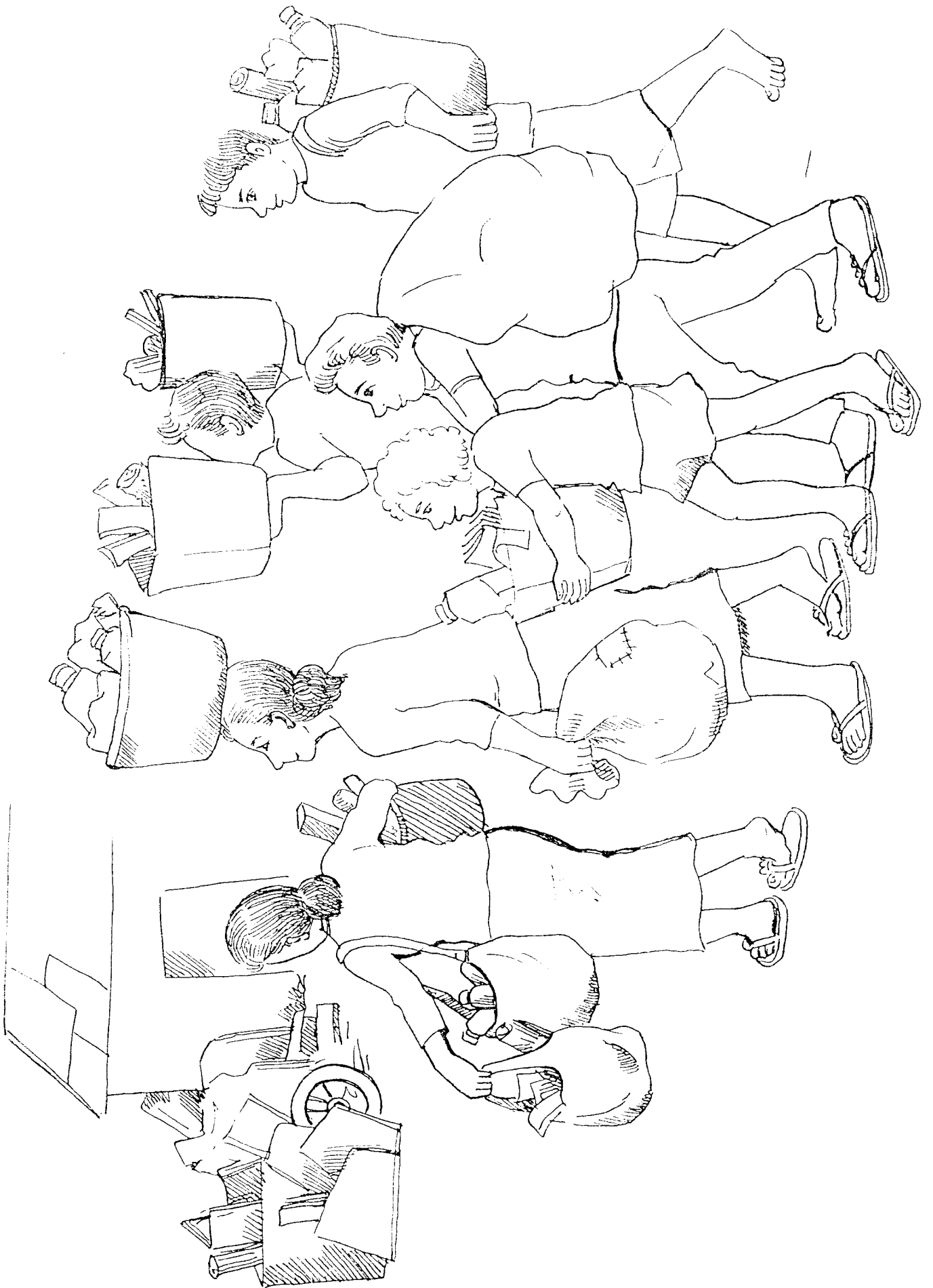
1. Emphasize to the students the importance of telling other people about the clean up and why it is important to keep our environment clean and not throw rubbish.
2. If there are problems with keeping the area clean, try to think of ideas which could help overcome the problems and invite the school principal and commune chief to listen to your ideas. The commune chief may be able to help.
3. If possible, put up signs telling people not to throw rubbish.

#### Evaluation

1. Name two reasons why people need to clean up the environment.
2. Students participated in the clean up.
3. Students disposed of the waste correctly

#### Extension

1. Return to the clean up location in one month and survey the site. Answer the following questions in the survey:
  - Has rubbish returned to the site since the clean up day?
  - What are the main types of rubbish that are now on the site?
  - Is the rubbish dispersed everywhere or is it coming from a few specific locations?
  - Discuss in groups how you can help reduce this problem.
  - Present you ideas to the local authorities.
2. Organise a second clean up to show people that you care and are serious about keeping the community clean.





GLOSSARY

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## THE CONTRIBUTING ORGANISATIONS

The following organisations were involved in developing this manual. If you have any comments or enquiries, please do not hesitate to contact us.