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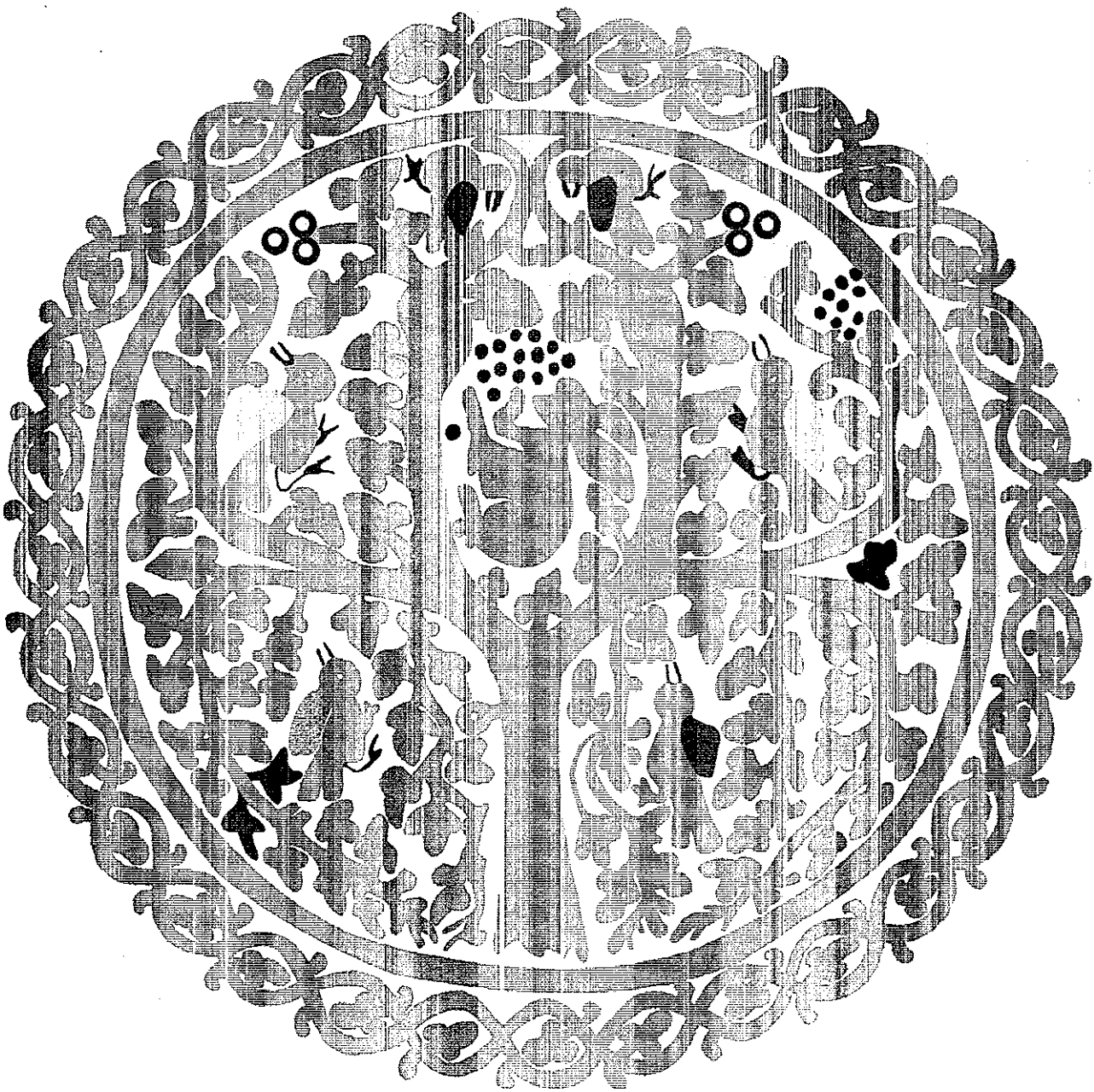
Environmental Education Activities

For Green Corner Libraries



December 2000

Environmental Education Activities

For Green Corner Libraries

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For Green Corner Libraries

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Green Corner

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Introduction

Environmental Education Activities for Green Corner Libraries is a training guide aimed at introducing activity ideas that can guide those who work in the field of environmental education with boys and girls whose ages range from seven to fifteen years.

This guide has been prepared specifically to fulfill the training needs of the Green Corner librarians. They work with large numbers of boys and girls who frequently visit their libraries all year round, and especially during the summer holiday.

We want to emphasize, first of all, that what we introduce here is not a syllabus, curriculum, or a book that should be followed line by line. On the contrary, what is between your hands is a collection of ideas and various suggestions ranging in degrees of simplicity and complexity according to the age group they are directed to. Some of these ideas and various suggestions have previously been mentioned in other published materials on environmental education. Others we have developed over the past years in many workshops in which people of different specialities, ages, and educational levels have been trained on issues related to environment and development.

Based on these experiences, we emphasize again that this guide is adaptable to continuous modifications, developments, and changes, according to the situation that the trainer finds himself or herself in, regarding the trainees, their needs, the circumstances of the site where the training takes place, the nature of the ecological issues raised and the available resources. In terms of resource availability, most of the activities depend on the simplest and the cheapest materials, so that as many people as possible may carry out these activities without financial resources standing as an obstacle in their way.

This training guide includes six chapters. The first five cover the main environmental issues: energy, land, air, water, and ecosystems. The sixth chapter is about the positive actions that youngsters and children can take to protect their environment.

Each chapter contains a group of "activity papers." These are activities that essentially aim to illustrate a concept or important ecological issue through the performance of a practical activity. This activity may be a practical experiment, an observation, a game, a research project, or a work of art. We hope that these environmental education activities will not be another burden thrown onto pupils' shoulders. We also took into consideration variations in the duration of different activities. There are short activities that may be carried out in one single and short session, and there are extended activities that may be followed up for a longer period of time. There are other activities performed outside the school building: in the street, the neighborhood, the park, or even at home.

Introduction

There is another important variable we considered in designing the activities. While some of them are individual activities, others are meant to be performed in pairs, and most of the activities should be performed in small groups. The purpose is to emphasize that environmental problems cannot be solved except with the full collaboration of all our efforts.

The reader will notice that there is a larger emphasis on activities related to the urban environment. This is intentional, because the guide was designed primarily to fulfill the requirements of the librarians of the Green Corner libraries in the Greater Cairo area, but there still remain a large number of activities that deal with general environmental issues. We hope to have the chance in the near future to issue a training guide focusing on environmental issues in rural Egypt.

In addition to activity papers, each chapter is appended with a number of information papers and illustrative diagrams that help librarians (and teachers) answer pupils' questions, as well as increase their own environmental information.

We divided the contents of this guide into separate sections, so that any part could be copied should the need arise. Also, the user of this guide can concentrate on a certain issue without being restricted by the order in which it appears in this guide. It remains to point out that we benefited a great deal from a number of books, references, and training guides that were produced by commercial publishing houses as well as the United Nations' organizations, especially UNESCO, and a number of international organizations that work in Egypt and other countries of the world. A great many of these sources are actually present in the Green Corner libraries. We also depended on what was found in the Horizon for Environment and Development library, and the reports and workshops that we previously presented in different places in Egypt.

During our preparation of this guide, we had the support and endorsement of many friends without whom we could not have achieved this work, and so we dedicate our true appreciation and best regards to all of them. We also would like to thank Mrs. Fareeda Al Reedy and all of her colleagues at the Integrated Care Society, and Mrs. Inas Lotfy and Mr. Gaber Khalil and all the staff of the Suzan Mubarak Children's Museum. We also want to thank a large number of Green Corner librarians who cooperated with us during the meetings we had with them, and we must mention the support given by the Egyptian Environmental Affairs Agency (EEAA), especially Mrs. Mona Abdullah.

Mrs. Martin Daltry from the British Council in Cairo provided us with an excellent selection of books and sources which was of great help to us in preparing this guide. Also, the chance we had to work in close collaboration with Mr. Colin Harris was a valuable experience.

We would also like to thank Mrs. Mary Paden, the environmental education consultant at the Academy for Educational Development (AED) in the USA. During her stay in Cairo, and even after returning to the United States, she supplied us not only with useful resources, but also with sharp insight.

The team at the AED/GreenCom project in Cairo took care of all our needs, and provided the best working circumstances during the preparation for this guide. We thank them all, especially Ms. Cheryl Groff and Dr. Lynn Mortensen, administrators of the project, who not only made the administrative tasks easier, but also provided very valuable ideas. In addition, we are grateful to Patricia Kubala, who spent many long hours copy editing the English version; to Tarek Abdel Salam for the design of the book; and to **A.R.** Publication for its production.

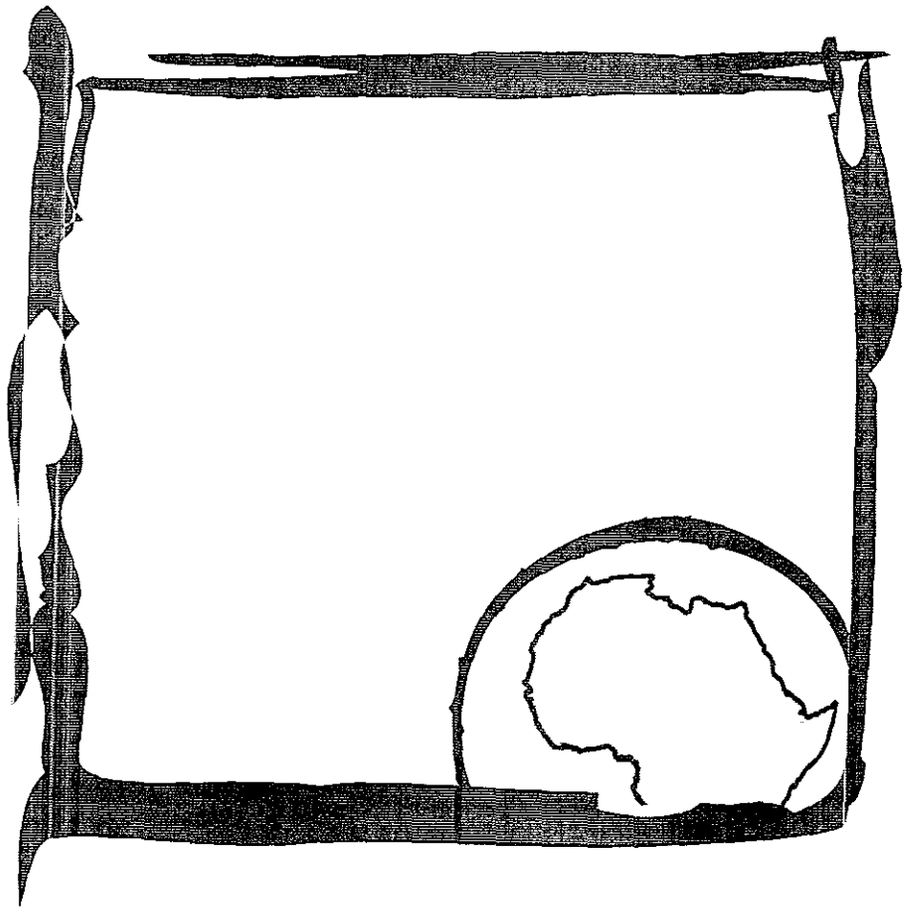
Last but not least, we would like to thank our colleagues at the Horizon for Environment and Development for the extra effort they exerted so that this work would come out by its due date.

In the end, as much as we are happy to present this work to you, we hope that you will help us in detecting any deficiencies or shortcomings that we can correct. We have no doubt that the practical application of the activities in this guide will bring about further developments, additions, and improvements, for the experiments and experiences of reality always prove much richer.

Dr. Hassan Abou Bakr
Dr. Hala Adel
Cairo
December 2000

Chapter One

Energy



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Activities In Chapter One

1.1 Why Does The Planet Earth Get Hot?

1.2 Night And Day

1.3 Where Does Water Go? (Evapometer)

1.4 Plant Energy

1.5 Little Green Factories (Photosynthesis)

1.6 Energy From Water

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1.8 Measuring Time

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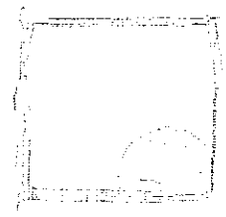

Activity 1.1

Why Does The Planet Earth Get Hot?

Concept:

The sun radiates waves with short wavelengths that reach the earth. These waves pass easily through the gases of the atmosphere. Objects on the earth are much colder than the sun, and thus radiate waves with longer wavelengths. This radiation cannot pass through the gases of the atmosphere, and as a result, the energy is held back, just as it is in a glass greenhouse.

Objective:

Studying the phenomenon by which the temperature in a greenhouse is raised, and comparing this to what happens in the earth's atmosphere due to the accumulation of carbon dioxide gas from the increased burning processes.

Method:

A small greenhouse made by the pupils using cardboard boxes and plastic bags.

Place:

Library room or classroom, and a sunny place outdoors.

Age:

Boys and girls 9 years or older, under the supervision of adults when using sharp tools.

Suggested duration:

Nearly an hour to make the small greenhouse, then separate times to take temperature readings.

Materials:

Adhesive tape - a cardboard box - scissors or a knife - transparent plastic bags - tin or plastic cans - paint (black and white) - soil - water - thermometer.

Make it:

1. Cut the corners of the box downwards so that it has free edges. Leave about 4 centimeters (cm) from the base to maintain the stability of the box.
2. Bend the sides outwards, and make a rectangular window by cutting a rectangular area in each of the longer sides of the box, leaving a rim 3 cm wide.
3. Put the 2 long ends together at the top. Now trim the other 2 sides and join their ends to the rest of the box, as shown in the picture. Fix all parts using adhesive tape.

Use it:

1. Put the greenhouse in the sun. Hang the thermometer from the top of the greenhouse roof and record the temperature.

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Activity 1.1

2. Glue the transparent plastic to the windows' rims. Place the greenhouse in the sun again and then record the new temperature.
3. Compare the thermometer reading that you took after gluing the plastic to the rim, to the one that was recorded first. Is there a difference?
   - Make sure to place the box in the same place as when you took the first temperature readings, and make sure there are no undesired air currents.

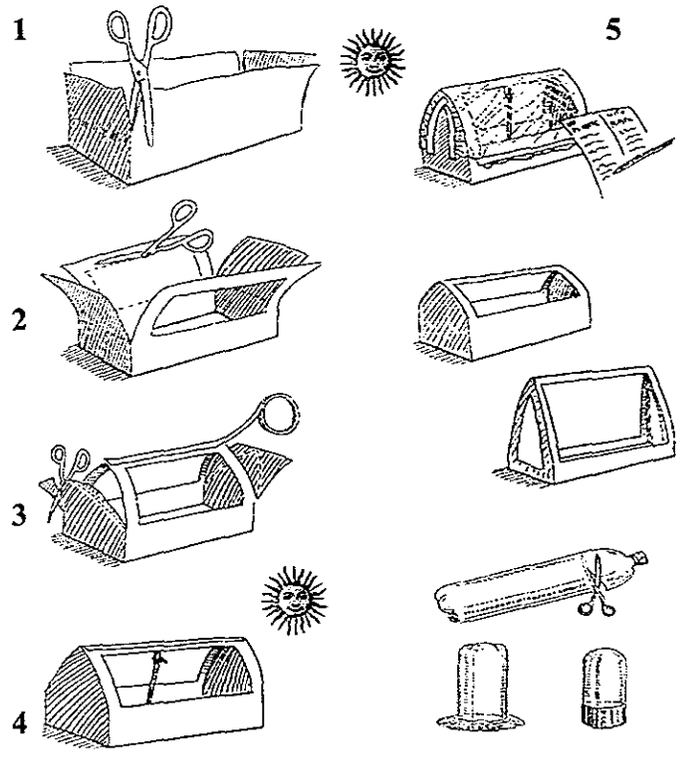
Variations:

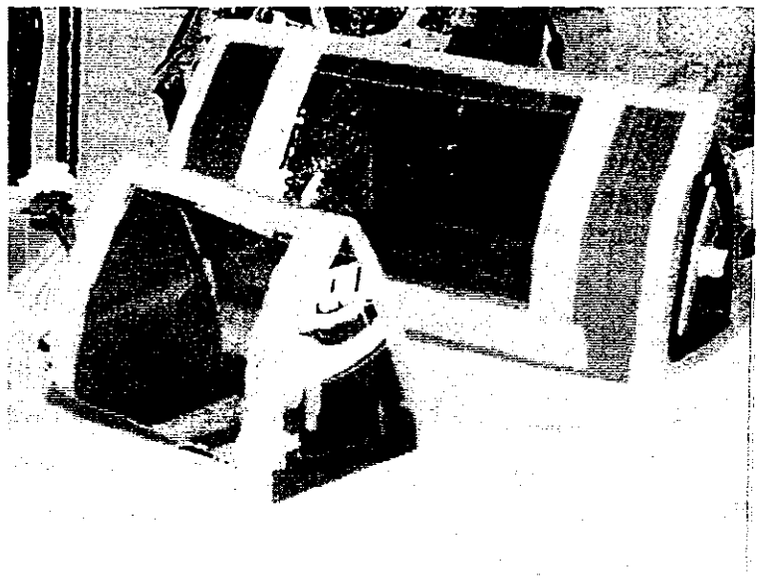
1. Try to make multiple forms of the greenhouse by changing the angle of the windows.
   - See if the change in shape has an effect on the temperature inside, and therefore, on the amount of "stored" energy.
   - From this simple study, you can explore other factors that affect how the greenhouse retains its temperature.
2. Bring another box and make a greenhouse with a window on each side but without windows at the two ends. Line the greenhouse base with plastic, and before closing it make a door at one of the two ends to make it easy to get inside. Now you can change many other features to see if they will alter the effect of the greenhouse:
   - Try painting the inside of the box with different colors, and then observe the temperature.
   - Put cans with nothing inside them, and then cans with pieces of stone or gravel or water inside them, into the greenhouse. These materials can act as radiating sources that maintain the temperature over time.
   - Think of how you can make use of the ability of the greenhouse to maintain a temperature that is good for planting seeds and growing plants.

Alternative greenhouse:

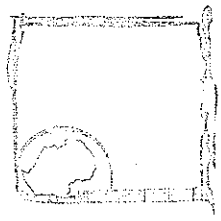
You can develop alternative designs of the greenhouse by using plastic bottles. Cut off the conical part and separate it from the rest of the bottle body. If you are using a bottle with a corrugated base, turn the bottle upside down to make the greenhouse. You can close the greenhouse tightly by putting a clay ring around the edge. If the bottle has a solid base, separate the black cup from the bottle base. You can put the bottle body upside down in the cup.

Activity 1.1





Source: *Environmental Education Activities for Primary Schools*. Environmental Education Series (21). New York: UNESCO, 1992.



Activity 1.2

Night And Day

Concept:

During the earth's movement in its orbit around the sun, the earth is also turning once a day around its north/south axis. This rotation is responsible for the succession of night and day. But the tilt in the axis causes different parts of the earth to receive different amounts of energy during the different seasons of the year.

Objective:

Explaining the cause of the difference in night and day in different parts of the world due to the spherical shape of the earth and its position in relation to the sun's rays, as well as the presence of hot and cold regions because of the amount of energy they receive from the sun.

Method:

Making a globe from paper pulp.

Place:

Library room or classroom, and a sunny place outside.

Age:

Boys and girls 9 years or older.

Suggested duration:

This activity takes over half an hour in the first day to prepare the paper pulp. Then an hour on the second day is needed to make the planet and let it dry, and then an hour on the third day to draw the map. Separate times are needed to write down notes regarding the way the sunlight is falling.

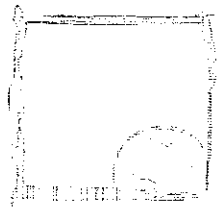
Materials:

Paper planet: Balloon - old newspapers - bucket - water - torch - glue - clay - cornflour or starch - a map of the world from an atlas or geography book. **Sundial:** Card of cardboard - a stick or bamboo sticks.

Make a paper planet:

1. Cut the newspapers into long strips.
2. Fill the bucket with a mixture of water and flour, so that the consistency is like that of a liquid pulp. The amount of flour used will differ according to the size of the bucket and the amount of water.
3. Soak the newspaper strips in the pulp overnight.
4. Cover the partially inflated balloon with the soaked paper strips so that the strips are crossing each other, in order to make a ball of paper. Remember not to fill the balloon completely with air if you want to make a spherical ball.

   You will get a better result if you let the first coat of the paper pulp dry around the balloon, and then



afterwards add the next layer. Also, the use of starch instead of flour will improve the result.

5. If you release the air inside the balloon, the paper ball will remain. This ball can be carried on a table using a stick and clay. Simply fix the stick in the clay, and then put the ball (the planet) on the stick.
6. You can draw the continents and color them on the ball, or you can make "planets" of different sizes.

Use it:

1. Put "the planet" in the middle of a dark room, then project the torch light onto it. Observe the area of the planet that is covered with light. It might be useful if you limit the light rays by covering the torch with silver paper (candy wrap paper) so that you leave only a small hole for the light to pass through.

   You can fix the torch to the table with a stand and a big clasp. Try projecting the light from different angles, or turn the ball around it. Is there a certain area that always receives the light? What are the regions that get the least amount of the sun's energy? What happens if the angle of inclination is increased?
2. You can follow up this activity with a similar one outside by making a simple sundial to monitor the sun's path during the daytime and over many months.

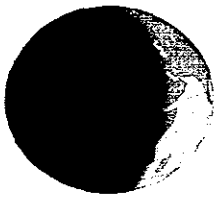
Make a sundial:

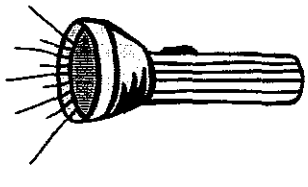
It is easy to make a sundial using a straight stick (like a lollipop stick) and a piece of cardboard. Put the piece of cardboard on the ground and carefully make a hole in the middle. Insert the stick through the hole and into the ground. Make sure that you do not put the sundial in the shade.

Variations:

Try to measure the stick's shadows during the day. Notice the time when the longest shadow and the shortest shadow are on the card. Record the time and mark the site of the shadow.

- Compare the shadow lengths at different times of the year. How can you connect the differences in the measurements of the lengths to the weather conditions?
- You can make the paper ball in a different way by using old cloth, such as muslin, after soaking it in a soft dough of gypsum or mud.





Source: *Environmental Education Activities for Primary Schools.* Environmental Education Series (21). New York: UNESCO, 1992.

Activity 1.3

Where Does Water Go?
(Evapometer)

Concept:

When a liquid absorbs energy, from the sun for example, or from the heat on the stove, the liquid molecules move faster, and some of them gain enough energy to separate from the liquid and turn into gas. This process is known as evaporation.

Objective:

Explaining how the sun's energy evaporates water in oceans, lakes, ponds and other water surfaces. This can be easily monitored by watching the shallow little puddles left by the falling rain.

Method:

Watching and recording the changes in a little puddle of water.

Place:

The library or school yard where there are both shaded and sunny places.

Age:

Boys and girls from 7-10 years old, under the supervision of adults when using the different liquids.

Suggested duration:

Separate times of the day, in between which the children can do other activities.

Materials:

Chalk or thick felt pens - pens and papers - a small water puddle - a surface that is impermeable to water - a big ruler or measuring tape - watch - small bottles containing amounts of alcohol, benzene, kerosene and oil - small flat sheets of plastic or aluminium - teaspoon.

Make it:

1. Choose a little water puddle that has formed on the asphalt, concrete or polyethylene.
2. Draw the outer boundaries of the puddle on the ground using chalk or felt pens.

Use it:

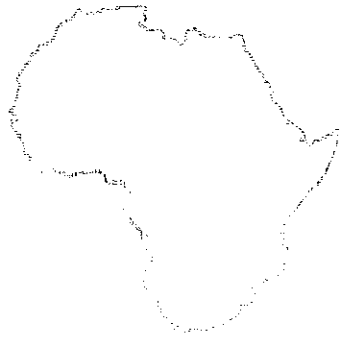
Measure the diameter of the puddle. Draw another circumference around it later in the daytime, and then record the time at which you did so. You can compare different puddles in different places in order to form an idea about the time needed for water to evaporate from puddles of different sizes. How does the depth of the puddle affect the evaporation rate? You can refill

Activity 1.3

the puddle with water up to the drawn boundaries to calculate the amount of water evaporated over the time in which you have recorded your readings.

Variations:

- Try comparing the evaporation rates from different surfaces such as asphalt and concrete. Try also to do the experiment on different days and under different weather circumstances (link this to the ideas of "the weather forecasting station" in the chapter on air).
- Compare the rate of evaporation of equal amounts of different liquids. Record your results in a table so that you can calculate the fastest and the slowest evaporation rate.
- How can we benefit from the evaporation phenomenon in our daily life?



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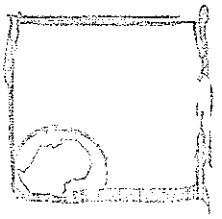


Activity 1.4

Plant Energy

Concept:

During the process of germination, growing seedlings consume reserves of energy stored in seeds, tubers or bulbs.

Objective:

Watching the process of germination and studying some of the factors that affect the growth of seedlings.

Method:

Germinating seeds, bulbs and tubers in the presence of moisture, but without the plant obtaining its food from the soil.

Place:

A place beside a window through which the sun comes in, in the library hall or classroom.

Age:

Boys and girls 7 years or older.

Suggested duration:

This activity extends to several days or weeks. It could start in the library or classroom and continue there, or it could start there and continue in the pupils' homes. In the latter case, it should be in coordination with parents or elder brothers or sisters.

Materials:

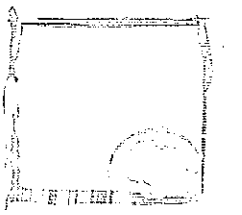
Glass jars - tissue paper - seeds of beans, wheat, corn, barley, fenugreek or clover - an onion - a potato - a sweet potato - clay.

Make it:

You can easily study the germination of seeds by filling a jar with wet tissue papers. Put a seed of beans between the tissue papers and the jar wall. Cover the jar with a cardboard cover to prevent the seed from being exposed to light. Make a door in the cardboard cover that can be opened and closed. Always keep the tissue paper wet, and watch the seed germination. Now you have made a "roots observatory."

Use it:

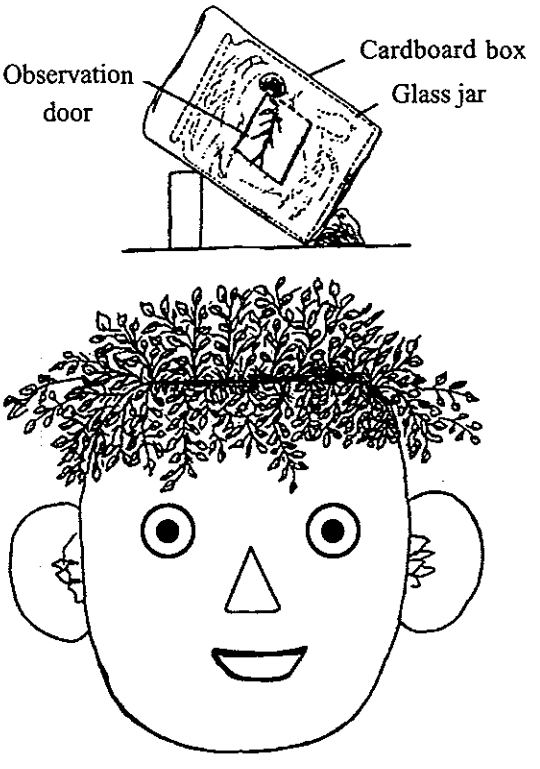
Place the roots observatory at an angle by supporting it as shown in the drawing. The roots will respond to gravity and will grow downwards. You can watch the growth through the door you have made in the cardboard cover.



Activity 1.4

Variations:

- You can test the effect of light by covering the observatory in a cardboard box big enough to allow the growth of the seedlings, and by making a longitudinal cut in one of its sides. Make sure that the box's seams are tightly closed so that the only source of light is through the cut. Remember that most plants can germinate in the absence of light or in the presence of a very little amount of it, depending on the stored food in the seeds that provide energy. Remember also that the plant will need light after germination to perform photosynthesis, so preferably, the experiment should last for a long period. The seedlings will grow in the direction of the light source.
- You can also put an onion, sweet potato or potato tuber on the top of a jar containing water and watch them. What happens? Where do the roots grow and where do the little green branches appear? From where do the onion and the tubers get the energy for germination and growth?
- You can grow a "field" of clover or fenugreek by making a cavity on top of a potato tuber and planting the clover or fenugreek seeds in it. They will grow depending on the amount of water in the potato tuber. By using pieces of cucumber and carrot, you can make a funny face on the tuber, as shown in the drawing.



Source: *Environmental Education Activities for Primary Schools*. Environmental Education Series (21). New York: UNESCO, 1992; and Bailes, M. *Experiment with Plants*. Cairo: Egyptian Culture Group, 1999.

Activity 1.5

Little Green Factories
(Photosynthesis)

Concept:

Photosynthesis is a reaction fuelled by energy from the sun. It allows the plant leaves (or any other green parts of the plant containing chlorophyll) to make food by combining carbon dioxide and water to produce sugars. Oxygen is released during this process. Photosynthesis is at the base of all the food chains, as plants create the necessary fuel for cell growth, and therefore, supply the nutritional energy for animals that feed on plants.

Objective:

Explaining the importance of sun light for the green plants to perform photosynthesis and continue to grow.

Method:

Exposing some plants in different stages of growth to light, and preventing light from reaching other plants.

Place:

By a window through which sunlight comes in, in the library room or classroom.

Age:

Boys and girls 7 years or older.

Suggested duration:

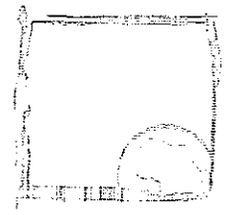
This is an extended activity that lasts for many days. It requires several minutes to record the observations every couple of days or every 3 days. The supervisor should help the children prepare the growing seeds long enough before the experiment date.

Materials:

Seeds of fenugreek or beans germinating on wet cotton in small dishes or yoghurt cups - a small pot of plants - pieces of cardboard - adhesive tape or a stapler - scissors.

Plant them:

1. Plant the beans or fenugreek seeds on a piece of wet cotton in small dishes or empty yoghurt cups so that you have at least 2 similar cups.
2. After green small leaves appear, make a lid of cardboard to cover one of the 2 cups or dishes to black out the light from the growing seedlings. Leave the other cup or dish exposed to the light.
3. After 2-3 days remove the cover and compare the



Activity 1.5

plants in the 2 cups. What happened to the covered plants? Did their color and growth differ from the color and growth of the plants that were exposed to the light? How do you explain this?

4. You can conduct this experiment in another way, by making a cardboard cover using the stapler or adhesive tape so that the cover is a little bit larger than the area of the leaves of the plants growing in the pot. Place one of the plant leaves inside that cover. After many days, remove the cover and observe the leaf that was covered. Does its color differ from the color of the rest of the leaves? What happened exactly?

Source: *Environmental Education Activities for Primary Schools*. Environmental Education Series (21). New York: UNESCO, 1992; and Bailes, M. *Experiment with Plants*. Cairo: Egyptian Culture Group, 1999.

Activity 1.6

Energy From Water

Concept:

Water power can be a useful and beneficial energy source.

Objective:

Explaining principles of water power.

Method:

A simplified model of a water wheel operated by a stream of water. If this simple model is successful, then other more complicated models may be developed.

Place:

Activity room, classroom, a laboratory with a tap, or any other place that will not be harmed by water.

Age:

Girls and boys 10 years or older.

Suggested duration:

Nearly one hour.

Materials:

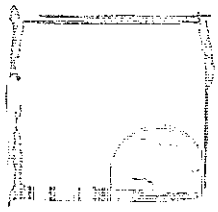
Small plastic cups or photography film containers - waxed cardboard or plastic lid covers of butter oil cans - adhesive material that is water resistant, or a silicon gun - paper pins (different sizes) - thick wire (clothes hanger) - cork - thin plastic board.

Make it:

1. Cut 2 equal circles from wax painted cardboard or obtain two plastic lids from butter oil cans.
2. Use glue to fix the cups on the wax side of the paper circles in order to manufacture a water wheel, as shown in the figure.
3. Through the water wheel's center, pass a wire, then bend its 2 ends so as to make the water wheel upright and free to move.

Use it:

1. Put the water wheel under a light water current under an open tap or under a filled tin can with a hole in the bottom of it.
2. After making the main design, you can try different numbers of cups in different positions. Try to design a pivot and a stand which can lift light weights.

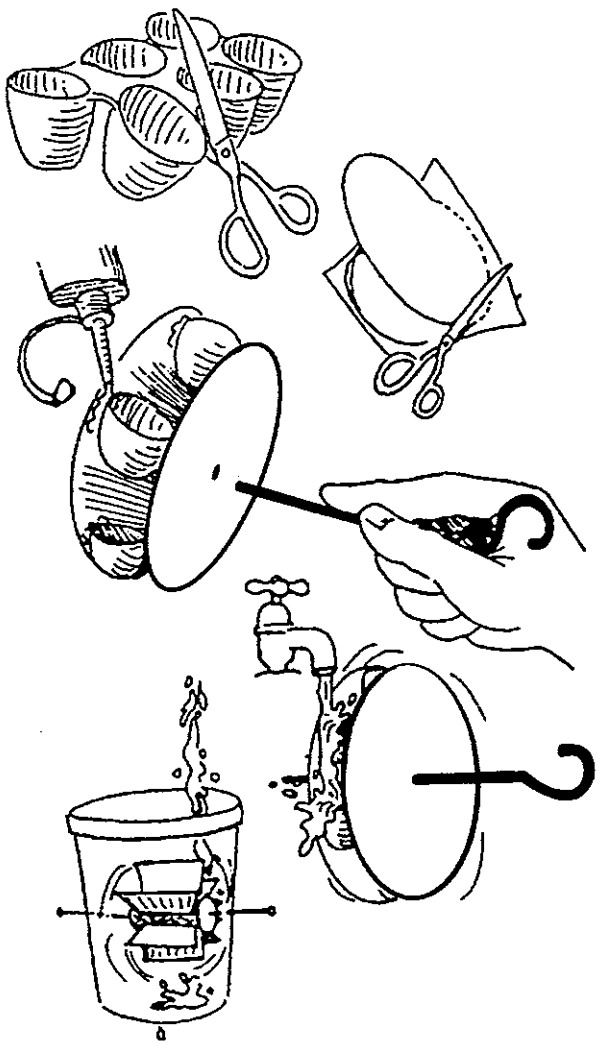


Activity 1.6

Variations:

Another simple water wheel can be made by using cork and a big plastic board.

- Begin cutting the plastic board into long ribbons. Such plastic pieces can be fixed in slots made along the cork. Put a long pin across the longitudinal axis of the cork in order to complete the water wheel. Try using a plastic cup without a base to drain the water falling above the water wheel.



Source: *Environmental Education Activities for Primary Schools.* Environmental Education Series (21). New York: UNESCO, 1992.

Activity 1.7

Energy From Wind

Concept:

Wind power can be used as an alternative renewable source of energy.

Objective:

Demonstrating how wind can move a windmill.

Place:

Library room, classroom, or any place beside an open window or outdoors where air currents are found.

Age:

Boys and girls 7 years or older, under the supervision of adults, especially when using sharp tools.

Suggested duration:

Nearly half an hour.

Materials:

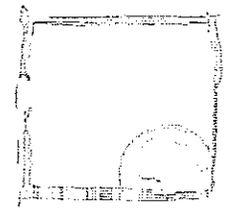
10 cm squares made of cardboard - corks - plastic sheets - wire - pins - small wooden sticks - tub full of water - small pieces of wood or cork - plastic boxes or boxes made of waxed cardboard - clay - paper funnel.

Make it:

A paper wind mill can be made of 10 cm squares made of light cardboard. Draw two diagonal lines as shown in the diagram. Mark places for five holes using a pin. Cut along the diagonals to the center. Bring the wind mill corners to the places marked by the pins, put them through the holes and then insert them on a wooden stick.

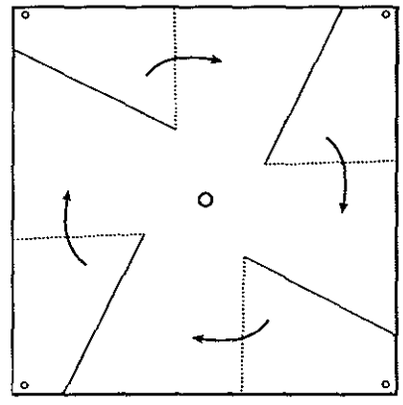
Variations:

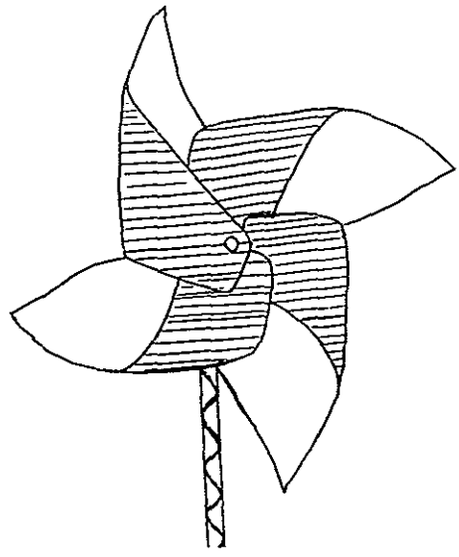
1. You can make another design using a cork and plastic sheets. Make slots in the cork and insert plastic sheets in them. Try different lengths and forms of plastic. Try also different angles (ninety degree angles or angles aligned with the wind's direction) for the edges.



Activity 1.7

2. You can also make a model of a small boat out of clay, small pieces of wood, or small plastic cans (to make the body of the boat). Make the sails from cardboard, fix them with wooden sticks and use small pieces of clay to insert them into the boat's body. Put the boats in water, and each child can blow air towards his or her boat to push it forward.
3. Try to change the sail size. Will the speed of the boat increase when the size of the sail is increased? Is the boat's speed increased with stronger wind?





Source: *Environmental Education Activities for Primary Schools*. Environmental Education Series (21). New York: UNESCO, 1992; and Murphy, B. *Experiment with Air*. Cairo: Egyptian Culture Group, 1999.

Activity 1.8

Measuring Time

Concept:

Energy exchange, absorption and transfer can be monitored all the time. Simple means can be created to measure time. These can be made and used during the experiments which require the monitoring of time.

Objective:

Demonstrate that enough time should pass in order to show the effects of an event and that humans devised several methods to measure time before inventing the modern watch.

Method:

Manufacturing simple devices to measure time.

Place:

Activity room or classroom.

Age:

Girls and boys 10 years or older.

Suggested duration:

Almost one hour.

Materials:

Small glass or plastic bottles - water resistant felt pen - jars with screw caps - very fine sand - water - glue - hammer - nails - borrowing a watch or clock with a seconds hand to calibrate the time-meter you have made.

Make it:

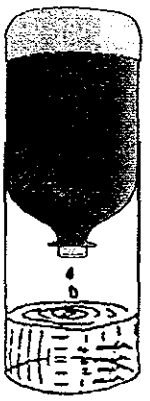
Water dial

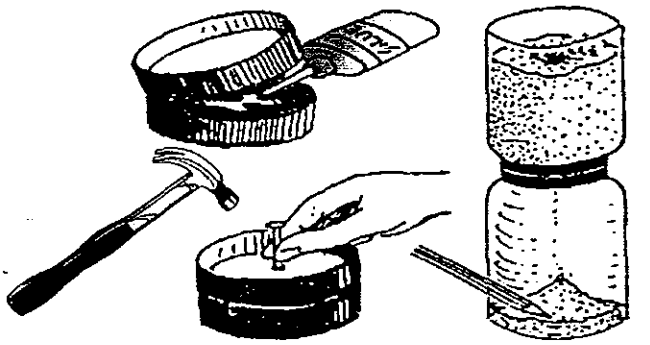
1. Cut off the conical (upper) part of a plastic bottle (keep that cone; you may need it for other activities).
2. Using a nail, make a hole in the cap of another bottle, and a similar one in its base. You may need to use a small hammer. Remove the cap and put your finger on the hole in the bottom of the bottle and fill it with water. Put the cap back in place and screw it on tightly.
3. Place the bottle carefully upside down on the remaining part of the first bottle.
4. Observe the water dripping from the cap hole. Using the watch or the clock and the felt pen, mark on the sides of the lower bottle the water level whenever a minute passes. Continue this until all the water has passed through the bottle. How much time passed until the bottle was empty?
5. Now you have a water dial.

Activity 1.8

Sand dial

1. Bring two similar-sized jam jar lids.
2. Glue the two lids together (back to back) so that it is still possible to close each jar with its lid.
3. When the glue dries, make a small hole in the center that passes through each of the two lids.
4. Fill one of the jars with fine sand. Close the jar with its lid, then turn the other jar upside-down and close it with the double cover. Turn the time meter upside-down so that sand falls from the upper jar to the lower empty one through the hole. Count how much time is needed until all the sand passes from one jar to the other. Now you have a sand dial.
5. You can make another sand dial using two juice bottles, following the same previous steps.
6. Think of the different uses of your water dial and your sand dial, such as measuring the time needed to finish an activity, a project, or half of a game.





Source: *Environmental Education Activities for Primary Schools.* Environmental Education Series (21). New York: UNESCO, 1992.

Background Information For Chapter One

- Energy
- Photosynthesis
- The Carbon Cycle In Nature
- The Oxygen Cycle In Nature
- Why Are Some Places Cold And Other Places Warm On The Earth?
- Global Warming
- Important Information
- Condensation And Evaporation
- The Sun's Rays And The Atmosphere
- Advice For Drivers To Help Them Reduce Energy Use And Air Pollution
- Participate In Conserving Energy

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Information

Energy

Definition Of Energy:

It is the means by which any work is able to be done. In other words, energy is an action or the ability to make an action. The measuring unit of energy is the "joule."

Types Of Energy:

There are two basic types of energy in the universe:
a) Latent energy: Potentially can make an action.
b) Kinetic energy: Actually makes an action.

Latent Energy:

It is also called "potential energy" and it is reserved by the material according to its state, composition, or its existence in a certain strong energy field. Examples include the energy stored in a rock on a hill or in the water behind a dam.

Kinetic Energy:

This is associated with bodies in motion when they do work - for example, the motion of cars and the motion of waves in seas and oceans.

Forms Of Energy:

Energy always takes different forms. There are many forms of energy, such as thermal energy, electrical energy, chemical energy, and the energy of the sun. All forms of energy can transfer into one another either directly or indirectly. Thus, electrical energy can transfer into kinetic energy in an electric engine, and into thermal energy in a heater or a boiler, or into light energy in a lamp. Electrical energy, in its origin, comes from nature, i.e. coal, petroleum, wind, and water. The transformation of energy is ruled by two basic laws:

Law No. 1:
Energy can be neither lost nor created. It only transfers from one form into another.

Law No. 2:
Although the total amount of energy during any process of transformation usually remains unchanged, yet, it may happen sometimes that a part of the energy changes into a "useless state." Therefore, when coal or ore are burned in an electricity generating plant, the stored energy turns into electrical energy. But during this process, part of the energy is inevitably wasted and released into the surrounding environment, causing its temperature to increase.

Energy Sources:

The sun is the main energy source on earth; it is a renewable source. There are other, non-renewable sources of energy such as coal and oil.

Source: *Environmental Education Activities for Primary Schools: Suggestions for Making and Using Low-Cost Tools.* New York: UNESCO, 1992.

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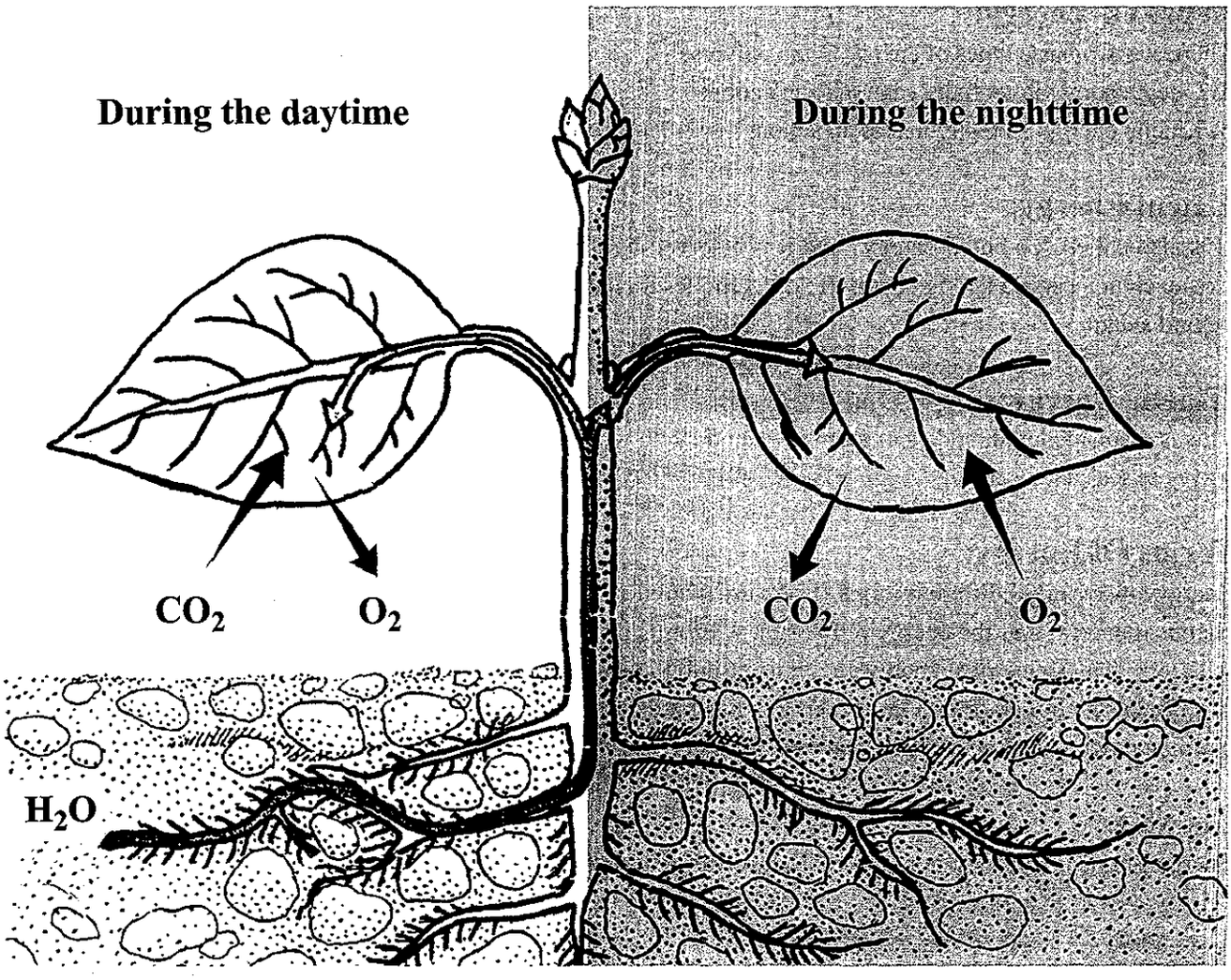
Information

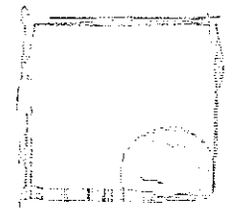
Photosynthesis



During the daytime plants absorb carbon dioxide and release oxygen.

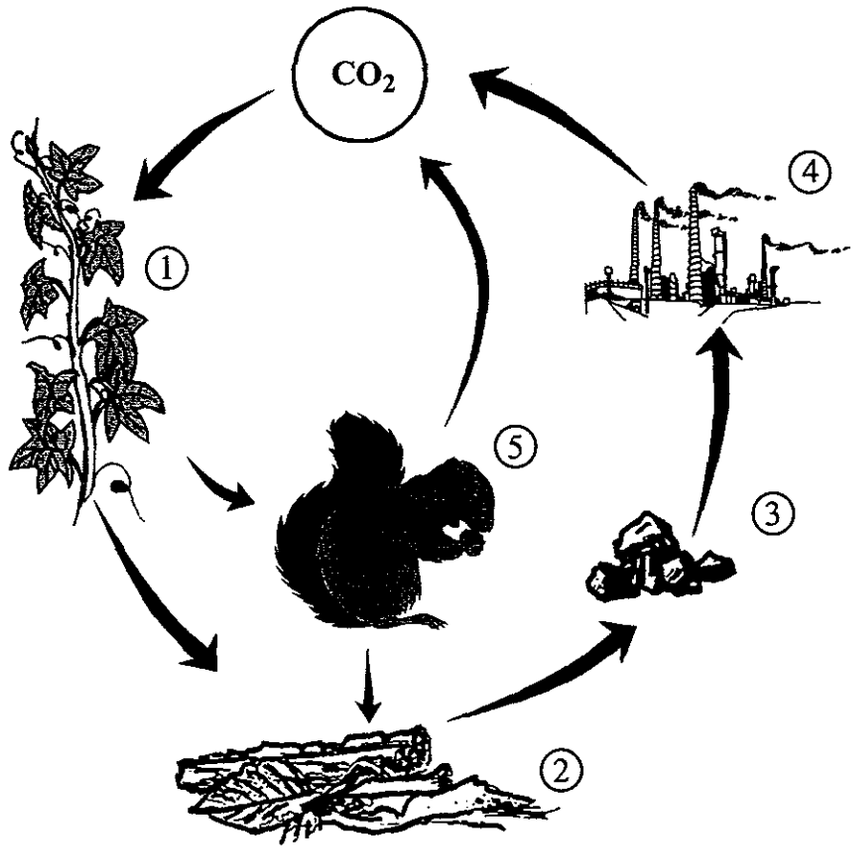
During the nighttime the process reverses, and plants absorb oxygen and release carbon dioxide.

Source: Schmidt, T., Nozdling, E., and Larsen, T. *Ecology*. Denmark: Av. Media, 1977.



Information

The Carbon Cycle In Nature

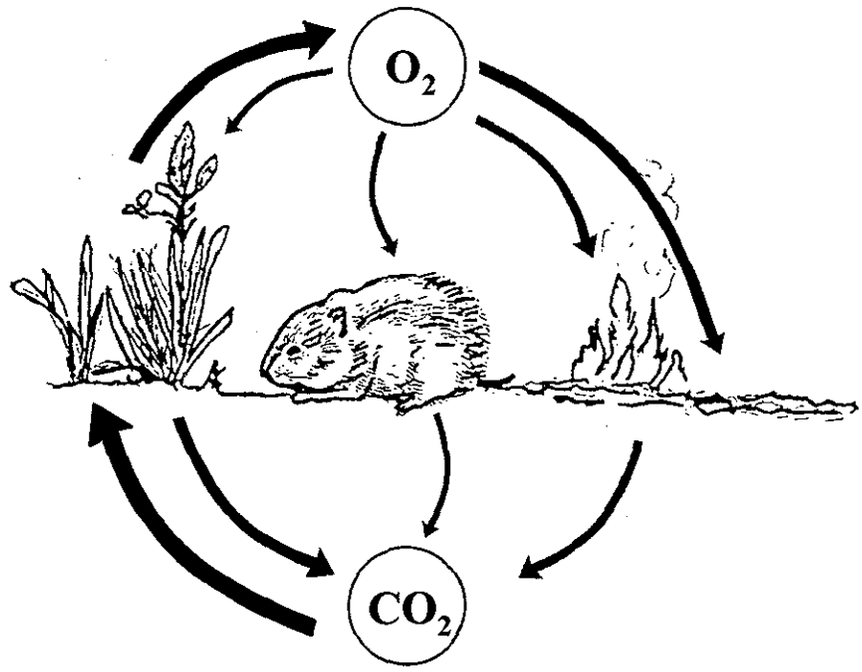


1. Green plants absorb carbon dioxide through photosynthesis and then release it through respiration.
2. Some of the carbon dioxide is stored for long or short periods of time in the remains of deceased animals and plants.
3. A part of the stored substances turns into coal, oil, and natural gas.
4. Stored carbon might return to the atmosphere through the process of combustion.
5. Part of the carbon formed in plants continues its cycle in animals' bodies, thus CO_2 is released once again through animals' respiration.

Source: Schmidt, T., Nozdling, E., and Larsen, T. *Ecology*. Denmark: Av. Media, 1977.

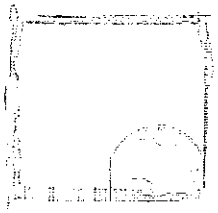
Information

The Oxygen Cycle In Nature



1. Plants produce oxygen through photosynthesis, and absorb it through respiration.
2. Animals absorb oxygen when they breathe.
3. Through combustion, oxygen combines with carbon and with other materials.

Source: Schmidt, T., Nozdling, E., and Larsen, T. *Ecology*. Denmark: Av. Media, 1977.



Information

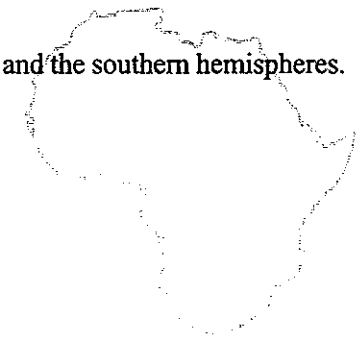
Why Are Some Places Cold And Other Places Warm On The Earth?

As the earth moves in its orbit around the sun, it revolves around its own axis once a day.

Due to the slope of this axis, different parts of the Earth receive different quantities of the sun's energy throughout the year.

These different quantities of energy lead to differences in temperature and atmospheric pressure from one place to another.

This is the reason why the weather differs in both the northern and the southern hemispheres.



Source: *Environmental Education Activities for Primary Schools: Suggestions for Making and Using Low-Cost Tools.* New York: UNESCO, 1992.

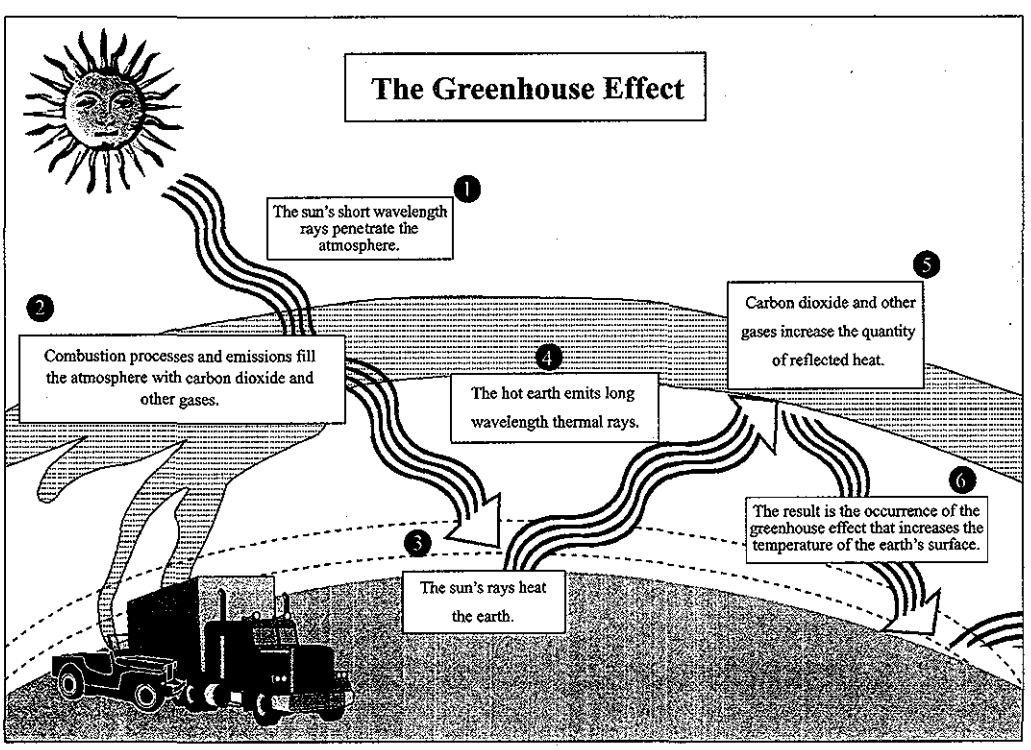
Information

Global Warming

This is also known as "the greenhouse effect" or "earth's heating" or "the rise of earth's temperature," in addition to "global warming." Industrial activities have led to a change in the composition of the atmosphere. Because gases such as carbon dioxide and nitrogen and sulfur oxides are emitted during industrial processes, scientists consider that human activities are a contributor to a rise in the earth's temperature. These gases allow the short wavelengths of the sun's ray to reach the earth, but they block out the longer wavelengths emitted by the earth back into space. The higher the concentration of these gases in the air, the more capable they are of blocking the longer wavelengths; consequently, they work as a blanket to keep heat on the earth's surface.

Why Is It Called The "Greenhouse Effect"?

The answer is simple. What happens in nature is similar to what happens in a greenhouse. The sun emits energy in the form of waves. The sun is extremely hot; hence, most of these waves are short. Short wavelength radiation can penetrate glass, but objects on earth are much colder than the sun, so they emit long waves. These long waves cannot penetrate glass; instead, the glass absorbs or reflects them. Hence the sun's rays penetrate the glass of the greenhouse easily, and they warm the plants inside. Without this greenhouse effect, the earth would freeze.



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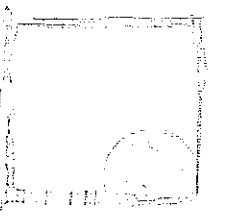


Information

What Will Happen If Global Warming Persists In The Coming Years?

Studies forecast a gradual increase in the earth's temperature which might be as much as 5°C during the next fifty years. This increase could lead to:

1. A change in the patterns of rainfall in an unpredictable way, and this will affect the rates of agricultural production and the kinds of agricultural crops grown.

2. Profound effects on the distribution of water resources in the world. For example, water levels in some rivers will decrease due to evaporation, and the opposite may occur in other rivers. The scarcity of water in some rivers means the potential occurrence of droughts and famines in the countries where agricultural activity depends on these rivers. On the other hand, the increase of the water level in some other rivers may lead to the submersion of deltas and the occurrence of large-scale destructive floods which threaten the lives of millions of people and lead to the disappearance of entire towns.

3. The potential rise in the earth's temperature may also lead to the partial melting of the ice in the Arctic and the Antarctic, which may in turn lead to an increase of up to several meters in the water levels of seas and oceans.

4. The daily disappearance of about fifty kinds of living creatures because of their inability to adapt to the differences in weather, the disappearance of the areas in which they live, or food shortages or diseases.

5. Changes in the economic and cultural base of some communities and regions with positive or negative consequences.

Source: *Reference for Environmental Education for Formal and Informal Education.* Cairo: Project of Environmental Training and Awareness (DANIDA) and the Egyptian Environmental Affairs Agency (EEAA), 1999.

Information

Important Information

- The sun is a glaring ball of gases; its diameter is about 1.39 million kilometers.

- The distance between the sun and the earth is about 1.496 X 10^8 kilometers.

- The temperature of the sun at its surface is about 5762°C, while its temperature at the center ranges between 8 X 10^6 and 40 X 10^6 °C.

- The sun derives this immense energy from the nuclear fusion reactions that happen among the nuclei of hydrogen atoms .

- About 47 percent of the sun's rays are visible, while 45 percent are infrared and about 8 percent are ultraviolet.

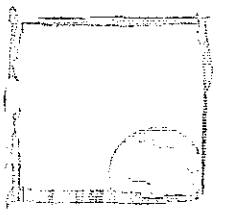
- What reaches the earth is merely 70 percent of the sun's energy, and the remaining 30 percent is reflected into space again in the form of waves and radiation. Moreover, of the 70 percent that reaches the earth, 47 percent is absorbed in the atmosphere and the oceans, and what actually reaches the surface of the earth is only 23 percent of the sun's energy. It is this percentage that gives the warmth needed for life to continue on our planet.

- Egypt's share of the emissions of global warming gases does not exceed 0.34 percent of the world's total emissions.

- The production of the main agricultural crops in Egypt may be strongly affected. For example, corn production may lose about one million tons, maize about two million tons, and rice about 500,000 tons, while cotton may increase in production.

- The rise in sea level, resulting from the melting of ice and the rising of the oceans' temperatures, may reach half a meter. This, in turn, may immerse more than 300 square kilometers (km^2) of Alexandria's land (49 percent of the current area), which will cause the evacuation of more than 50 percent of its population and about a third of its industrial activity.

Source: *Reference for Environmental Education for Formal and Informal Education.* Cairo: Project of Environmental Training and Awarenes (DANIDA) and the Egyptian Environmental Affairs Agency (EEAA), 1999.



Information

Condensation And Evaporation

What Is Evaporation?

Evaporation means changing from the liquid state into the gaseous state. The best example is the water cycle in nature. This cycle is driven by the sun's energy. When water in the sea absorbs some of the sun's energy, the water molecules get extra energy that makes them move much faster than their normal speed. As a result of this movement, some of the water molecules are separated and escape to the atmosphere. This is evaporation.

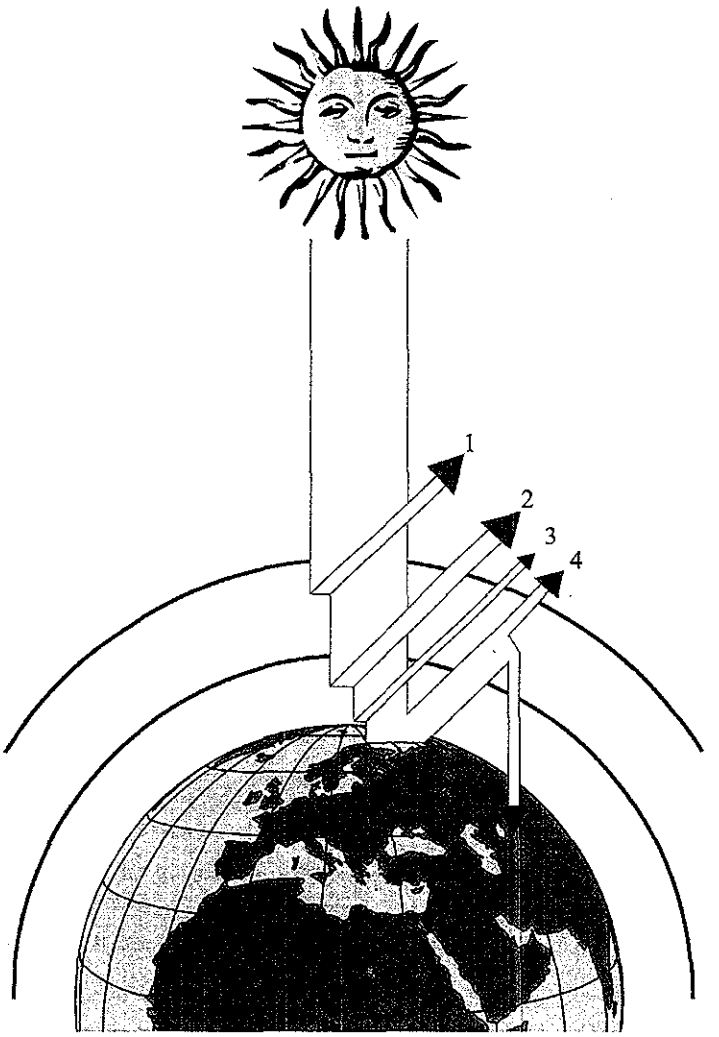
What Is Condensation?

Condensation is the opposite of evaporation, and condensation means the transformation of a substance from its gaseous state into its liquid state. The clearest example of this phenomenon is the second stage of the water cycle in nature. After the separation of water molecules they escape to the atmosphere, where they meet layers of cold air. The cold air causes a decrease in the temperature of the molecules, so they turn into liquid again and fall in the form of rain.

Source: *Environmental Education Activities for Primary Schools: Suggestions for Making and Using Low-Cost Tools*. New York: UNESCO, 1992.

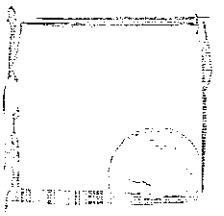
Information

The Sun's Rays And The Atmosphere



1. The sun's rays penetrate the atmosphere and split into several parts.
2. Most of the infrared rays penetrate the atmosphere.
3. The light reaches the earth's surface and part of it is reflected back into space.
4. The infrared beams that reach the earth's surface are reflected back into space.
5. Part of the reflected infrared beams are trapped in the atmosphere.

Source: Stoce A. *Discover the World.* UK: The Earth Atlas and Cartographic Publishers Ltd., 1999.



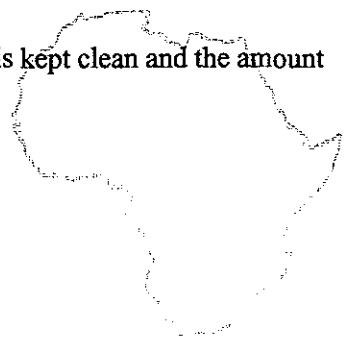
Information

Advice For Drivers To Help Them Reduce Energy Use And Air Pollution

- Tell the driver to stop his car engine while he is waiting for someone. That will save energy, protect the air from pollution and decrease noise.

- If there is black smoke emitted from a car, tell its driver that this smoke pollutes the air and affects you and your family's health, so the source of this smoke should be removed.

- Tell the driver that when driving at a moderate speed, the air is kept clean and the amount of energy used is reduced.



Source: *Fifty-one Suggestions for Protecting the Ocean*. Cairo: Egyptian Ministry of Environment and Soil Treatment and the National Agency for Ocean Protection, in cooperation wih the United Nations Development Program (UNDP), 1994.

Information

Participate In Conserving Energy

- Energy is an important resource for life to continue on the earth.

- Everyone, including you, can participate in conserving energy.

- When you leave your room or home, turn off the T.V., the lights, the radio and anything else operated by energy.

- Curbing energy consumption and using it in an economical way helps power stations to reduce their production; consequently, air pollution is reduced.

Source: *Fifty-one Suggestions for Protecting the Ocean.* Cairo: Egyptian Ministry of Environment and Soil Treatment and the National Agency for Ocean Protection, in cooperation wih the United Nations Development Program (UNDP), 1994.

Chapter Two

Landscape

Activities In Chapter Two

2.1 Origins Of Things

2.2 Sensing The World (1)

2.3 Sensing The World (2)

2.4 Profiling The Soil

2.5 Earthworms....Friends Of Plants

2.6 The Living Earth

2.7 Compost Corner

2.8 Protecting Agricultural Soil

2.9 Picture Of Our Street

2.10 Our Town

2.11 The Earth....Marvelous Diversity

2.12 Features Of Cities

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Origins Of Things

Activity 2.1

Concept:

All things we see and use in our daily life come from nature, but their shapes vary according to the processes of manufacturing and preparation.

Objective:

Encouraging pupils to recognize the original state of materials and products they deal with every day, and linking these products with the raw materials from which they are made. Hence, this will encourage students to recognize the importance of nature and natural resources.

Method:

Reclassifying different materials and arranging them in a way that shows their interrelatedness.

Place:

Library or classroom.

Age:

Boys and girls 8 years and older.

Suggested duration:

45 minutes.

Materials:

Different but related materials:

Sand - marble beads - a glass - a small mirror.

Agricultural soil - corn seeds - flour - a slice of bread - a piece of biscuit - macaroni.

Soil - a sugar cane - sugar - candy.

A piece of tree stem - sawdust - a wooden chair - a piece of paper or cardboard.

Fresh and dried vegetables and herbs - fresh and dried mint or Jew's mallow.

Nails - small iron tools - iron powder.

Clay - a brick - a china cup.

A piece of a sheep fleece - a ball of wool string - wool pullover - a piece of wool cloth.

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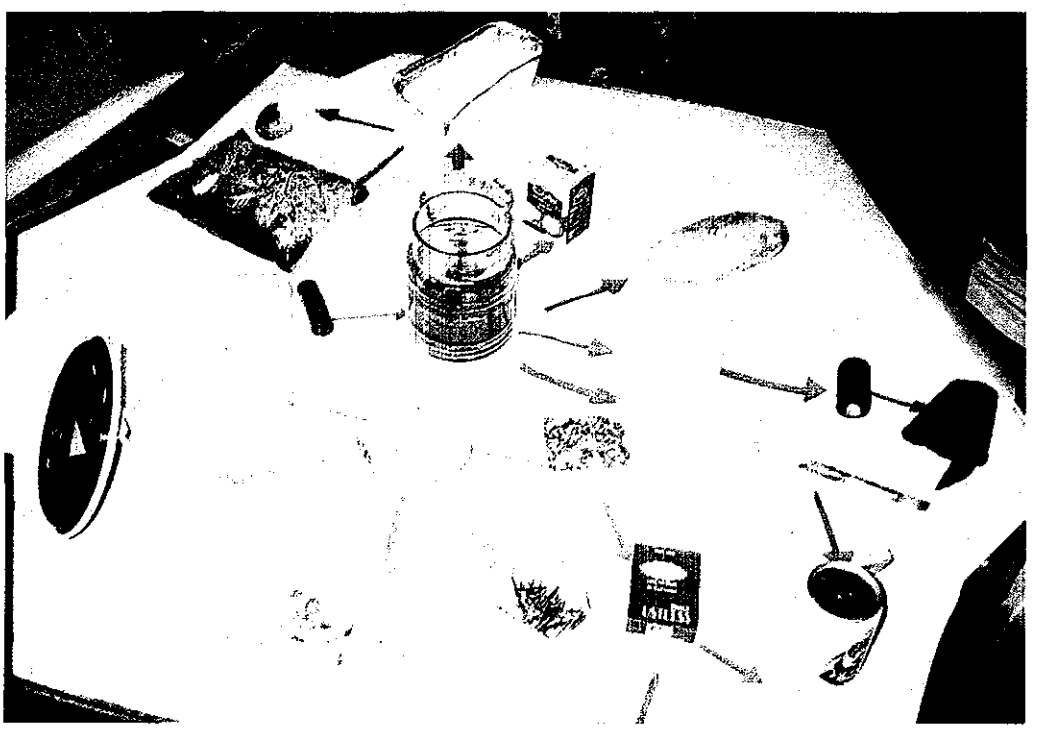
Activity 2.1

Liquid milk - powdered milk - cheese - yoghurt.

Chalk - a piece of rock - calcium carbonate.

Arrange them:

1. The facilitator puts the previously prepared things on the table in a random way.
2. Boys and girls are asked to choose the things which they think are interrelated, and arrange them.
3. The older students can classify things into objects of plant origin, animal origin, or non-living materials.
4. Students are asked to draw a flow-chart representing the relations among these things. The map will show that all these things, in spite of being different, come from the earth.



Source: H. Abou Bakr and H. Adel, Environmental Education Workshop, Horizon for Environment and Development, Cairo, 1999.

Activity 2.2

Sensing The World (1)

Concept:

All creatures - including humans - depend on their various sense organs to recognize their surroundings. The world around us is full of diversity and difference not only in its living things but also in the materials that form it.

Objective:

To encourage using the sense of touch to recognize different things and materials, and to know that the texture of a material or a thing is a part of its identity, i.e. its texture is a means to recognize it.

Methods:

Using only the sense of touch to recognize different things.

Place:

The library or classroom.

Age:

Boys and girls 7 years or older.

Suggested duration:

30 minutes.

Materials:

Suitable vessels (of plastic, for example) with openings wide enough to accommodate hands.

Different objects such as:

Flour - sugar - rice - dried grains - fine sand - dried tea leaves - bean seeds - marble beads - an onion - garlic - an orange - dried dates - small pieces of cloth, paper and cartons - small handkerchiefs for blindfolds.

Touch it:

1. Put all of the objects in cans and cover them so that they are not seen by the children.
2. A child blindfolds his or her colleague with a handkerchief and brings him or her to the table with the cans.
3. The blindfolded student is asked to put his/her hand in each can and recognize, using the sense of touch, what is inside and then loudly announce what he/she has found.

Activity 2.2

4. A third child writes the answers on a chart without any comment.
5. This game can be repeated with other children and their answers can be written as well.
6. Children are asked to remove the blindfold from their eyes to see what is in the containers.
7. Compare the different answers.
8. What are the objects that most of the children recognized?
9. What are the objects that most of children didn't recognize?
10. Ask them also if they know animals or birds that depend on the sense of touch to recognize their surroundings. Encourage them to consult the library's books and other sources to get further information on this subject.

Source: *Environmental Education Activities for Primary Schools*. Environmental Education Series (21). New York: UNESCO, 1992.

Sensing The World (2)

Activity 2.3

Concept:

All creatures - including humans - depend on their different senses to recognize what surrounds them. The world around us is full of diversities and differences - not only in its living things, but also in the materials from which it is formed.

Objective:

Encouraging the use of the sense of smell in recognizing different materials, and clarifying that many creatures depend greatly on their sense of smell to recognize their food, and to navigate.

Method:

Using the sense of smell to recognize odors of different materials.

Place:

The library or class room.

Age:

Boys and girls 7 years or older.

Suggested duration:

30 minutes.

Materials:

Thick cotton threads - small bottles containing odor extracts of different materials like rose, carnation, mint, and cinnamon - clean handkerchiefs as blindfolds.

Implement it:

1. If using aromatic extracts, dip a small piece of the cotton threads into the extract's bottles, then bring every thread close to the nose of the blindfolded child and ask him or her to recognize this material.
2. Repeat the activity with a number of children and write the results.
3. What are the materials that most of the children recognized easily?
   - If actual objects are used, each object can be put in a small container or jar for the children to smell.
   - After finishing this game, hold a discussion with children on creatures that have a strong sense of smell, and how this sense is used to recognize food and to navigate.

Source: H. Abou Bakr and H. Adel, Environmental Education Workshop, Horizon for Environment and Development, Cairo, 1999.

Activity 2.4

Profiling The Soil

Concept:

Soil consists of many components, some of which are organic and others inorganic. Soil formation begins with the erosion and dislocation of rocks. The characteristics of these components determine the different formula of each kind of soil. This basic matter, after it is formed, mixes with the dead organic matter of plants and animals. The different layers of soil can be seen in the form of a soil profile.

Objective:

To study the different components of soil layers in the ground.

Method:

A soil classifier can be easily made from very simple materials.

Place:

The library or classroom.

Age:

Boys and girls 10 years or older.

Suggested duration:

45 minutes.

Materials:

Plastic bottles - different kinds of soil.

Make it:

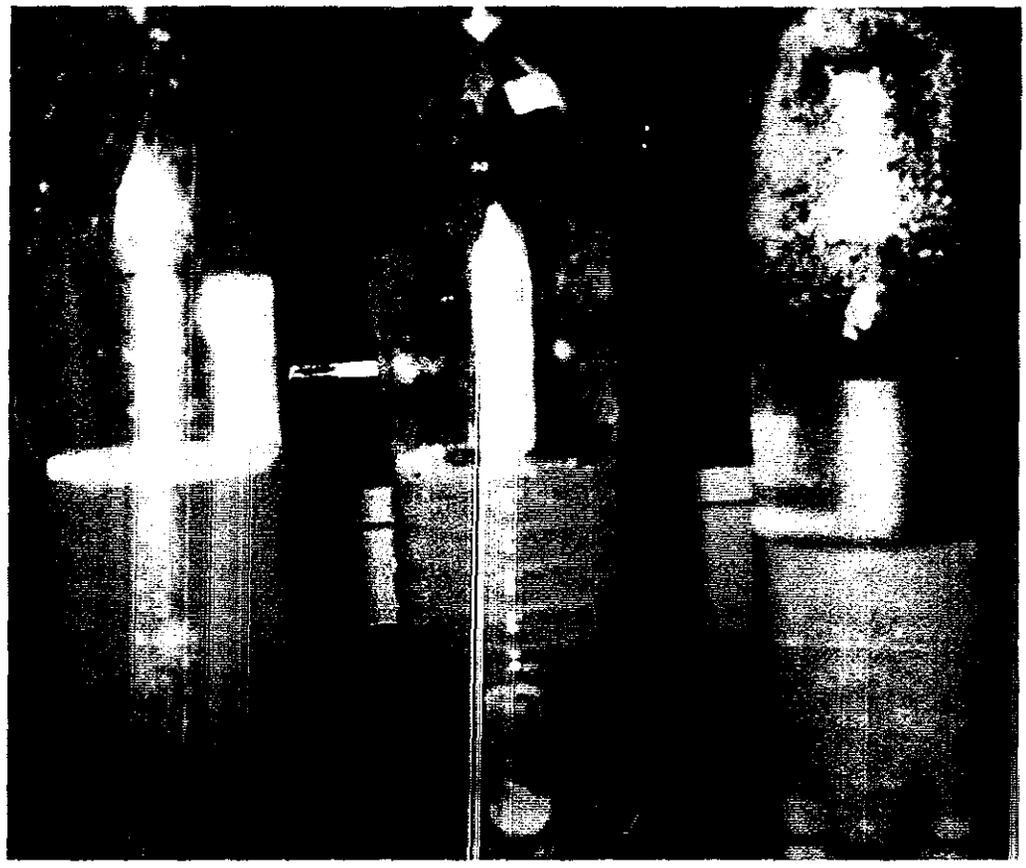
1. Fill a bottle halfway with soil.
2. Add water until it covers the soil sample. It is preferable that water reaches two-thirds of the bottle's height. Cap the bottle, screw it tightly, and then shake it vigorously.
3. Leave the mixture to settle, then observe the different layers formed.

Use it:

1. Similar bottles and jars can be used to draw a comparison between different kinds of soil, on condition that you use equal quantities of soil samples in each bottle or jar. Note that the glass jars may be heavy and difficult to carry.

Activity 2.4

2. Hold the soil sample with your fingers, then describe the soil characteristics. This might be easier if you wet the soil first. Compare the description with the results of the soil classifier. Rub the samples onto the surface of a plain sheet of paper. Notice the different colors that each sample produces on paper. These differences in color reflect the differences in the origins of the samples and their compositions.
3. Compare samples taken from under different kinds of plants and from different depths in the ground.



Source: *Environmental Education Activities for Primary Schools*. Environmental Education Series (21). New York: UNESCO, 1992.

Activity 2.5

Earthworms....Friends Of Plants

Concept:

The decomposition of dead organic matter in soil is an essential process to fertilize soil, and it is important also because it prevents the accumulation of dead bodies. Animals, and especially earthworms, mix soil matter together, and this facilitates the provision of necessary nutrients which are easily absorbed by plant roots. The decomposition of plants' leaves and other organic materials increases the surface area necessary for bacterial and fungal decomposers to thrive.

Objective:

To show the importance of animals in making soil.

Method:

Making a simple pot to breed worms and soil insects in order to demonstrate their role in decomposing organic materials.

Place:

The library or classroom, and the garden of a library or school.

Age:

Boys and girls 8 years or older.

Suggested duration:

This activity needs some weeks to be monitored so children can see the results of the decomposition process.

Materials:

Plastic bottles - strips of cardboard - newspapers - plants' leaves - earthworms - sand - mud - soil samples - plastic bags - rubber bands.

Make it:

1. Cut the funnel top off the plastic bottle.
2. Fill the bottle with layers of different kinds of soil. Exclude stones, pebbles, and clumps of clotted soil.
3. Be sure to keep the soil in a bottle that is humid,but not too wet. Add 3-4 tree leaves (leaves which are about to decompose are preferred) on the soil surface, then add a number of earthworms.
4. Cover the bottle with a perforated plastic bag to enable the bottle's contents to breathe.
5. Put the bottle in a dark, cold place. You can wrap the bottle in newspapers, and this will encourage worms to dig near the inner wall of the bottle; hence, the worms will be easily seen.

Activity 2.5

Use it:

1. After a week, examine the soil after removing the paper wrap from the bottle.
   - What happened to the tree leaves?
   - Are the soil layers still easy to see?
   - Are there any wastes left by the worms?
   - If there are any, what are their compositions?
2. Air enters the soil through mixing and digging; it is a process similar to digging a hole in the ground. Try to dig a hole in the ground, then put all the soil you dug on a sheet of plastic, and after that return the soil back to its place in the hole carefully.
   - Did the quantity fill the hole exactly?
   - Did part of the soil not fit back into the original hole?
   - What filled this space? What is the importance of this?
3. This experiment can be used as an example during a discussion on the formation of agricultural soil, and on the importance of recycling wastes to preserve the soil's fertility.

Variations:

The kinds of soil differ greatly. You can collect kinds of soil and sand of different colors. Put them in plastic bottles or jars, and put a label on every sample indicating the location and the collection date of the sample.

Source: *Environmental Education Activities for Primary Schools*. Environmental Education Series (21). New York: UNESCO, 1992.

Activity 2.6

The Living Earth

Concept:

Soil contains the remains of plants, animal wastes, and large numbers of microorganisms, most of which cannot be seen by the naked eye. These creatures are very important in forming soil and increasing its fertility, in addition to their role in the food cycle of plants.

Objective:

Collecting microorganisms and small insects that live in soil, and clarifying that soil is not merely sand and mud.

Method:

An effective and simple apparatus to separate and classify the soil's creatures. This apparatus is made by boys and girls from simple materials.

Place:

The library, classroom, activity room, garden or plant nursery.

Age:

Boys and girls 12 years or older.

Suggested duration:

An hour and a half to make a talgern's funnel, and an hour the next day to examine and classify the creatures that have separated from the soil.

Materials:

An empty flexible plastic bottle - knife - wet leaves - sieves or sieve wires of different sizes - electric lamp (desk lamp).

Make it:

1. Cut the plastic bottle two-thirds from the top so that you will have a long funnel and a small pot.
2. Remove the bottle's cap and then put the funnel top into the pot as indicated in the diagram.
3. Cut a piece of delicate sieve wire so that it is the same diameter as the funnel's neck (so as to be fixed in it) and push it into the funnel as deeply as you can. If you do not find suitable wire netting, put the soil and the rest of the plant leaves in a piece of cloth from a curtain or mosquito net, and then insert it into the funnel.
4. Fill a third of the funnel with the soil sample, and then turn on the light above the funnel.

Use it:

1. Be careful when positioning the lamp, because if it is put very close to the sample, the creatures in it

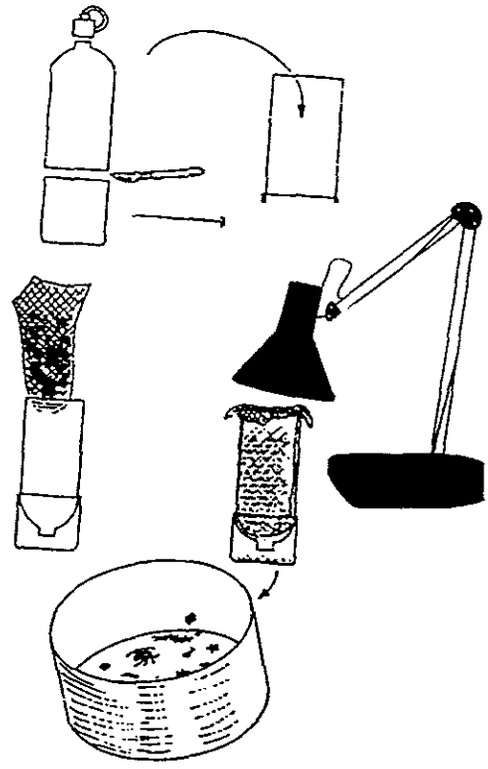
Activity 2.6

will die before being able to flee to the bottom. It is useful also to put wet leaves in the collection pot to keep the microorganisms alive.

2. Sieves of different sizes of mesh can be made by folding the wire net used in making hen houses (double or triple folds). This will enable you to classify animals according to their size.
3. If you don't find any wire netting, try to use the remainders of rough plant leaves to prevent soil from falling into the pot.
4. Discuss with boys and girls the role that these organisms play in the soil. What are the useful kinds? and what are the harmful ones? What are the interactions between them?

Variations:

Try to compare between creatures that are found in different depths of the ground or in different parts of a pile of manure.



Source: *Environmental Education Activities for Primary Schools*. Environmental Education Series (21). New York: UNESCO, 1992.

Activity 2.7

Compost Corner

Concept:

The decomposition of tree leaves in a forest is a recycling process that leads to the formation of an organic glue that holds soil particles together and provides plants with necessary food.

Objective:

Demonstrating that the decomposition of organic wastes follows the same principles as the decomposition of tree leaves and that the resulting compost can be used as an organic fertilizer for soil.

Method:

A factory to make organic fertilizer will be established by boys and girls using very simple materials.

Place:

An isolated corner in the activity room or classroom, or a shaded place outside.

Age:

Boys and girls 10 years or older.

Suggested duration:

30-45 minutes to build a place to make fertilizer; 4-5 weeks to prepare the compost.

Materials:

3 plastic bottles - kitchen wastes of food and organic rubbish - knife - tricot needle (or a big nail).

Make it:

1. Bring a bottle and cut the upper portion directly below the widest part. You will have a funnel that can slide in or out of the bottom of another bottle like a cover. Cut the bottle's bottom now and remove it.
2. Repeat this with the second bottle and remove the bottom and the top so that you have a tube. Use this tube to make an extension to the first bottle.
3. Remove the third bottle's cap and cut the bottom at the largest point. Dispose of the cap and the bottom, and in the remaining part insert bottles 1 and 2.
4. Heat the tip of the tricot needle and use it to make holes in the structure you have made, except for the funnel end of bottle 3.
5. Fill the container with kitchen garbage, wastes from the garden's plants and some soil.

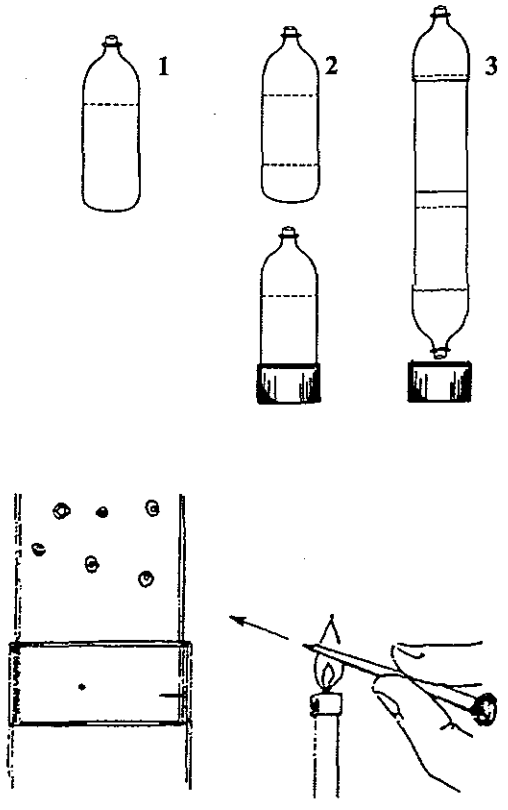
Use it:

1. Holes are very important because they encourage the growth of aerobic bacteria that make garbage decompose. If you have enough bottles, try to make

Activity 2.7

a second unit and observe what happens if you leave the cap on bottle 3 or if you do not make holes.

2. You can make a useful comparison on a larger scale with a compost pile consisting of straw and plant wastes in a corner of a garden or a school courtyard. Make sure that the waste pile is on the ground in order to make it easy for air to circulate through it. This way it can also be used to recycle wastes to make organic fertilizer for the garden.
3. Liquid that settles down in the tube's bottom can be used as liquid fertilizer. Try to make a comparison between the growth of plants that are irrigated with different dilutions of this liquid fertilizer.
4. Discuss with the children the importance of returning organic matter to agricultural soil so that it keeps its fertility and renews its ability to produce crops.



Source: *Environmental Education Activities for Primary Schools.* Environmental Education Series (21). New York: UNESCO, 1992.

Activity 2.8

Protecting Agricultural Soil

Concept:

Agricultural soil is exposed to erosion because of wind, heavy floods or destructive storms. The loss of fertile soil causes great damage that is irredeemable, so we have to protect agricultural soil.

Objective:

To clarify the importance of protecting agricultural soil from erosion by improving agricultural practices.

Method:

Minimized models that are similar to different real life cases of dealing with agricultural soil.

Place:

The courtyard of a library or school or a corner in the garden.

Age:

Boys and girls 10 years or older.

Suggested duration:

45 minutes.

Materials:

A quantity of agricultural soil in plastic bags - 3 aluminium baking trays - bricks - 3 plastic containers (for example, containers of halawa) - large plastic bottle (one litre and a half) - needle - small seedlings or grass - rubber gloves - small shovel.

Make it:

1. Fill the three aluminum trays with agricultural soil - now you have 3 fields (don't forget to wear the rubber gloves before starting).
2. At the narrow end of every tray, press the sides slightly with your fingers to make a groove or a small passage for the extra irrigation water to run through.
3. Make the soil's surface in the first field level, divide the second field into rows and plant the third field with grass or seedlings.
4. Raise the three fields onto a platform made of bricks or wooden cubes in such a way that the edges of the fields protrude slightly from the end of the platform, as indicated in the diagram.
5. Under each groove or passage, put a clean and empty plastic container.

Activity 2.8

6. Make holes in the cap of the plastic bottle, fill the bottle with water, and fix the cap on the bottle. Now you have a spray bottle through which you may squirt water if you turn it over and press it slightly.
7. Irrigate the 3 fields. The extra water will run and fall into the plastic boxes below.
8. Be careful to use equal quantities of water in irrigating the three fields.
9. Compare the quantity and color of water in the box. What do you notice? In which box was the water mixed with a larger quantity of soil particles?

Variations:

You can repeat the previous experiment by placing an electric fan before the three fields to represent wind that blows on the agricultural land. Instead of cans that receive the extra water, you can use an open plastic bag by fixing it to a large circle of strong wire, as indicated in the diagram, to receive the falling soil particles.

- Propose new ideas to protect agricultural land from erosion.

Source: LEISA, ILEA Newsletter, Vol. 3, No. 3 (1997).

Activity 2.9

Picture Of Our Street

Concept:

A large number of Egypt's inhabitants live in towns. The town's environment is a built one - i.e. it is a human-made environment. The town's environment consists of a large number of small local environments which are streets and districts.

Objective:

Encouraging boys and girls to recognize the main features of the street or district in which the library or school is located.

Method:

Drawing a rough sketch or a simple map of the street in which the library or school is located, and the surrounding streets as well.

Place:

The library's courtyard, the class room, or a place outside the library building.

Age:

Boys and girls 12 years or older, under the supervision of adults.

Suggested duration:

1.5 - 2 hours.

Materials:

A sketch notebook - pens - large paper sheet - wooden ruler - water colors or felt pens - colored cards.

Draw it:

1. Take boys and girls on a tour around the library or school building.
2. Encourage them to pay attention to the names of streets and shops, shapes of buildings and different kinds of activities in the district, and also the intensity of the movement of vehicles and pedestrians.
3. Encourage children to write down notes, and tell them that they will draw the scenes they see on a board after returning to the library.
4. After returning to the library or school, ask the boys and girls to draw an approximate picture of the library's, or the school's, site and the surrounding streets in addition to the most important sites there.
5. Encourage boys and girls to hold discussions before they start drawing. For example, they may draw a number of small sketches, and they may disagree

Activity 2.9

on a building site or on the distance or direction. These discussions would help them reach agreement on the disputed points.

6. Encourage them to draw the chart together and to create symbols that represent certain places on the map instead of writing them in words, such as symbols for a school, pharmacy, mosque, church, post office, hospital, or police station.
7. Hang the chart on a wall. The children may want to redraw it or to add new information as their views concerning the neighborhood will change from now on during their comings and goings.

Activity 2.10

Our Town

Concept:

A structure of any town is determined by two basic elements. The first element is the natural environment of the town's location and the surrounding hills, mountains, forests, deserts, or fields, or the presence of a river, sea or lake. The second element is the architecture of this town or its urban features made by its inhabitants. Towns are always changing and developing, but there are always fixed and basic features through which we recognize them.

Objective:

Encouraging boys and girls to discover the main features of their town.

Method:

Collecting information, pictures and maps of the town from different sources.

Place:

The library, adult library in the district or town, field tours.

Age:

The activity is appropriate for boys and girls 10 years or older.

Suggested duration:

This activity is extended as more and more about the town's features will be learned from the collected information. Sometimes 30 minutes of open discussion are enough to determine the extent of the children's information on their town's features, and to stimulate their ideas concerning the objective of this activity.

Materials:

Paper and pens - photo album - bulletin boards - newspaper clips - scissors - adhesive material - tourist cards - camera if possible.

Implement it:

1. Start by opening a discussion to determine the boys' and girls' information about their town.
2. Let one of them write this information in a notebook or on a large sheet of paper.
3. Ask questions to complete the missing information. For example:
   -What is the name of the river that runs through our town?

Activity 2.10

-What are the islands existing in this river?

-When was this town built?

-Did the town have a different name in the past?

-What mountain overlooks the town? Which direction is it in?

-What are the most important bridges in it?

-What are the most important streets you know?

-What are the most important squares?

-What are the most important archaeological buildings, castles, palaces, temples, churches and mosques?

-What is the highest building?

-What is the oldest building? By whom was it built? And when?

-What is the population of this town?

-What is the number of cars in its streets?

-What is the number of factories in it?

4. Do not expect all these questions to be immediately answered, because they are meant to encourage boys and girls to search for answers.
5. Encourage them to go to the library to get some information, and urge them to make an album made of newspaper clips, tourist cards and photos that they or their acquaintances took in distinguished places in their town.
6. Some of the children may prefer to prepare a research report about a part of the town - for example, a district, street or building - while others may prefer to host an archaeologist or invite another person interested in the town's history as a guest speaker, for example, on the changes that have happened in the town regarding its land, population, and buildings.
7. This activity may lead to a discussion on the most important environmental problems that the town suffers from. Encourage boys and girls to write these problems on cards and hang them on a board. These cards will represent an environmental agenda for the town. Encourage boys and girls to think of innovative solutions to address these problems.

Source: H. Abou Bakr and H. Adel, Environmental Education Workshop, Horizon for Environment and Development, Cairo, 1999.

Activity 2.11

The Earth....Marvelous Diversity

Concept:

The landscapes surrounding us everywhere are the result of two kinds of natural processes. One is violent and sudden, and includes earthquakes, volcanoes, mighty floods, hurricanes, and storms. The other is slow but with long-lasting effects such as wind, rain, running water and temperature variations between day and night and among the different seasons.

Objective:

To show that there are various landscapes on earth such as high mountains with ice caps on their tops, deserts, rain forests, and coastal zones of seas and oceans.

Method:

Use books that are found in the Green Corner libraries such as encyclopedias and atlases. Also, collect different pictures from magazines, papers, wall calendars, and tourist cards, which show landscapes found in different parts of the world. Encourage boys and girls to use the CDs that are found in their libraries.

Place:

The library or classroom.

Age:

Boys and girls 12 years or older.

Suggested duration:

This activity is extended, but a session of 30-45 minutes can be held weekly to discuss the progress achieved by the participants.

Materials:

Large bulletin boards - scissors - adhesive material - strips of cardboard paper - pens - notebooks to write down the information collected.

Implement it:

1. The facilitator starts by stimulating the ideas of boys and girls through presenting pictures of various natural landscapes that are found in the library books.
2. The facilitator encourages boys and girls to collect pictures of various landscapes from magazines, papers, and tourist cards as much as possible.
3. In the next session, boys and girls discuss the pictures they have collected.

Activity 2.11

4. The collected pictures can be classified into groups of pictures of certain environmental areas, such as pictures of desert areas, mountainous areas, or sea coasts.
5. Boys and girls may be divided into small groups. Each looks at the photos of a certain environmental area and also collects information on life in it and the factors that formed this landscape.
6. Boys and girls compare the pictures of the landscapes they collected to the landscapes that are found in their local environment or their town environment. What are the similarities? What are the differences? In your opinion, what are the conditions that led to the similarities or differences?
7. Photos can be displayed on large bulletin boards or be kept in an album accompanied by written comments.

Source: H. Abou Bakr and H. Adel, Environmental Education Workshop, Horizon for Environment and Development, Cairo, 1999.

Activity 2.12

Features Of Cities

Concept:

A large number of people live in large groupings called cities, and the features of any city are the result of a combination of natural conditions and people's activities.

Objective:

Encouraging boys and girls to recognize the most important features, both natural and human-made, that characterize different towns and cities both in their country and in other countries.

Method:

Pictures of archaeological and historical buildings or sites, and famous landscapes in different towns inside and outside the country. These pictures are collected from newspapers, magazines and tourist guidebooks, and can be drawn from books and atlases.

Place:

The library or classroom.

Age:

Boys and girls 10 years or older.

Suggested duration:

This activity is extended, but a session of 30 minutes can be held whenever boys and girls have a new group of pictures.

Materials:

A large notebook to make an album - pictures - a large sheet of paper - adhesive materials - pens.

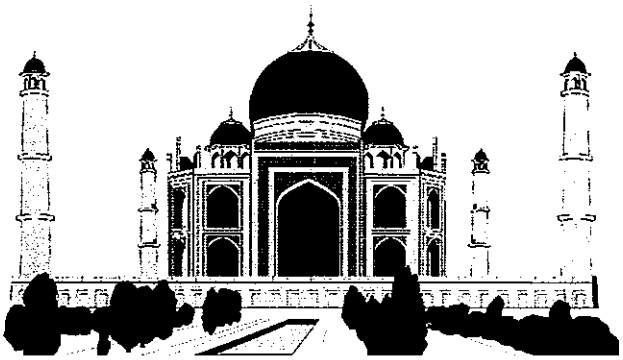
Implement it:

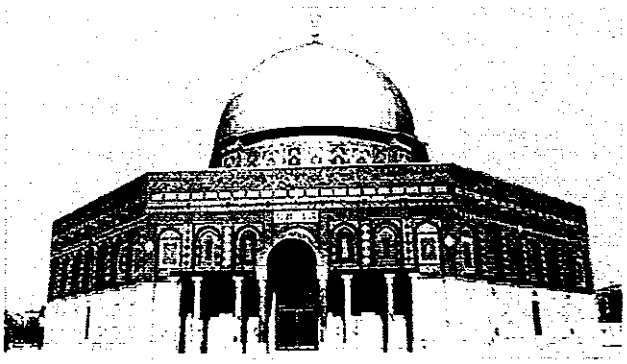
1. The activity starts with the facilitator presenting pictures of famous sites in towns and regions, such as Mount Saint Catherine (Sinai), the High Dam (Aswan), Al Sawari Bombi pillar (Alexandria), Big Ben (London), or the Mohammed Ali Mosque (Cairo). The facilitator can also raise a number of questions:
   - What are these pictures ?
   - Where were they taken?
   - Do you know something about the history of this place?

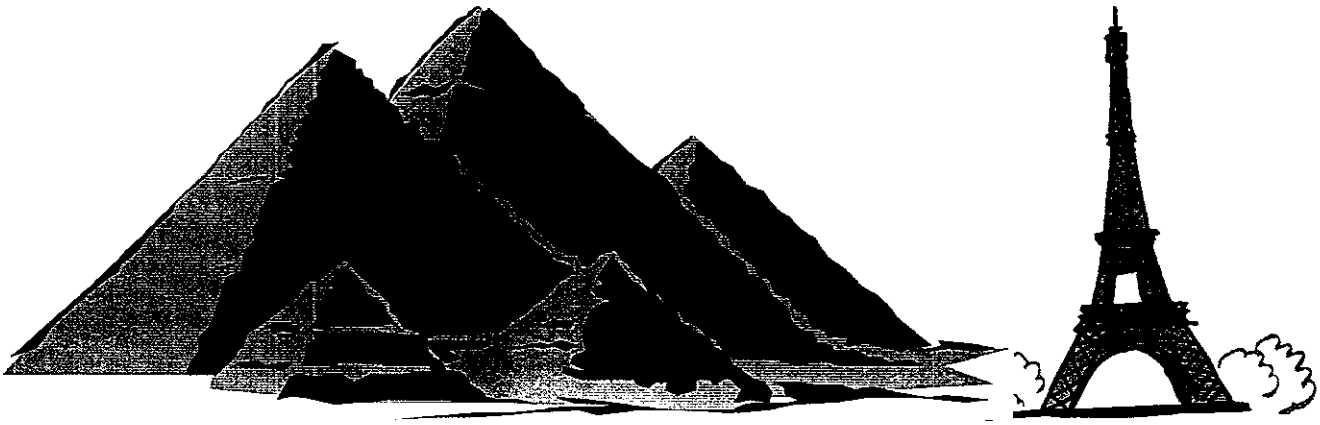
Activity 2.12

2. The facilitator then asks: Do you know other famous sites inside or outside of the country? The facilitator should encourage boys and girls to search for answers. These answers are written on the board or a sheet of paper.
3. The group may decide to bring a collection of pictures the next week and hold discussions about them.
4. A contest can be organized, later in the activity, that tests students' knowledge about some archaeological and natural sights and their locations, such as:

Taj Mahal
Statue of Liberty
The Holy Kaaba
Eiffel Tower
The Stone's Dome
The Northern Monastery Temple
Al Azhar Mosque
Notre Dame De Paris
The Umawi Mosque
Zoser Pyramid







Source: H. Abou Bakr and H. Adel, Environmental Education Workshop, Horizon for Environment and Development, Cairo, 1999.

Background Information For Chapter Two

- **Planet Earth**
- **Soil**
- **When Earth Gets Angry**
- **Desertification**
- **Important Information**
- **Some Geographical Characteristics Of Egypt**

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Planet Earth

Origin Of Planet Earth:

Up until now, scientists have not yet agreed on how the earth was formed. There are many theories on this subject, but the strongest one states that the earth originated billions of years ago from huge masses of gaseous clouds and cosmic dust revolving rapidly around the sun. The atoms of dust clouds, attracted to each other due to the forces of static electricity and gravity, gathered together, and gradually, over many years, they formed Planet Earth.

Earth Consists Of Three Basic Layers:

1. External layer (crust)

It is a thin layer with the thickness of about 31 kilometers under continents and 5 kilometers under oceans.

2. Middle layer (core cover)

The thickness of this layer is about 2800 kilometers, and it constitutes three-quarters of the earth's thickness. The temperature of rocks in this layer ranges between 870°C and 2200°C.

3. Internal layer (core)

This is a huge ball of melted iron under great pressure. The core is the center of the magnetic field of the earth.

Source: Gamal, Agha Shaher. *Earthquakes: Their Reality and Impacts*. Kuwait: National Council for Culture and Arts, 1995.

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Information

Soil

What Is Soil?

Soil has many definitions depending on the person defining it, and his or her relationship to it. The farmer may define soil as the surface to plant crops and perform other different agricultural processes. The geologist may see the soil as layers of the earth's crust, and consider its surface as a meeting point of the hydrosphere, atmosphere, biosphere, and lithosphere. If we come to define soil, we can say that it is a natural, complex body, formed by the breakdown of rocks and organic substances during the processes of earth formation, and plants can grow in it.

How Was Soil Formed?

The process of soil formation started by the crumbling of stones and metals. Rocks and metals in the earth's crust break down into small, fine fragments without any change in their chemical or mineral structure, and without forming any new substances. This process is very slow, and it happens as a result of the heating and cooling of the rocks due to the differences in temperature between day and night and summer and winter, in addition to the freezing and melting of water between the rocks and metals. Moreover, running water, wind and the effects of living organisms cause crumbled rocks and metals to grind against each other.

What Are The Components Of Soil?

Soil consists of five main components: mineral substances, water, air, organic substances, and living organisms. The concentration of these components differs from one type of soil to another.

What Are The Types Of Soil?

There are three different types of soil:

1. Sandy soil: contains at least 85 percent sand.
2. Silty soil: contains between 21 percent and 50 percent clay.
3. Clay soil: contains more than 50 percent clay. We can make other types of soil, such as light or heavy clay soils, according to the proportions of sand and clay.

Source: *Reference for Environmental Education for Formal and Informal Education.* Cairo: Project of Environmental Training and Awareness (DANIDA) and the Egyptian Environmental Affairs Agency (EEAA), 1999.

When Earth Gets Angry

Information

1. Volcanoes:

The term "volcano" is attributed to the Roman God of Fire, called Vulcan. A volcano is a hole in the crust of the earth which spits out hot gases and melted rocks called lava. This substance comes from a depth ranging from 30-60 kilometers. The lava flows at the speed of 80 kilometers per hour. There are about 500 active volcanoes in the world today. Three-quarters of these active volcanoes are located in a place called the "Ring of Fire" in the Pacific Ocean. About one million people have been killed because of volcanic activities since the birth of Jesus.

2. Earthquakes:

Earthquakes are the most destructive natural phenomena. Although it is rare for an earthquake to last more than 8 seconds, the resulting energy may equal up to 200 million tons of explosive T.N.T., which is 10,000 times more than the energy of the first atomic bomb. Earthquakes cause the death of 14,000 people every year.

The rocks forming the earth's crust, located at a great depth beneath the surface, are always moving. This motion increases until the huge blocks of rocks, called tectonic plates, crash suddenly at the weakest points, known as faults, causing the quaking of the earth's surface.

The most famous earthquakes in the world are the San Francisco Earthquake of 1906 and the Tokyo Earthquake of 1923, which together caused the death of more than 100,000 persons and the destruction of about 700,000 houses.

Earthquakes are measured by the Richter scale, named after the American scientist Charles Richter. Earthquakes are classified as serious quakes (more than 7.5 on the Richter scale), basic quakes (6.5-7), wide quakes (5.5-6), moderate quakes (4.5-5.5), and small quakes (less than 4.5 on the Richter scale).

Source: *Reference for Environmental Education for Formal and Informal Education*. Cairo: Project of Environmental Training and Awareness (DANIDA) and the Egyptian Environmental Affairs Agency (EEAA), 1999; and Gamal, Agha Shaher. *Earthquakes: Their Reality and Impacts*. Kuwait: National Council for Culture and Arts, 1995.

Information

Desertification

Desertification decreases or causes the loss of fertility in productive soils. Desertification is characterized by the total or the partial deterioration of ecosystem elements. This process transforms agriculturally productive land into semidesert regions, and it is aggravated by intensive human abuse and mismanagement of resources, in addition to other unsuitable environmental factors such as dryness.

Desertification In Egypt:

The problem of agricultural land deterioration in Egypt is caused by a number of factors. These factors include excessive irrigation and bad drainage systems, which are the main reasons for salinization that raises the proportion of alkalines in the soil and in the ground water. With time, the farmland becomes barren. The second reason for desertification is the erosion of the topsoil that is rich in organic substances that nourish the soil. This layer requires long years to be renewed. The third reason is the urbanization and establishment of new buildings on the best kinds of farmlands in Egypt, resulting in the loss of those lands as a natural resource. As for farmlands existing in the oases of the Western Desert, they are being threatened by sand dunes. The same holds true for the farmlands of upper Egypt located on the western bank of the Nile adjacent to the desert.

Egyptian Projects For Controlling Desertification:

In Egypt there are now some projects being carried out to reclaim the desert and stop its expansion into more and more farmlands. The most important projects are:

1. The Northwestern Coast projects: These projects have been active since the beginning of the last century. Fig trees are planted on the coastal sand dunes.
2. New Valley project: This project aims at developing water resources in the Western Desert oases.
3. Mudiriat Al Tahreer project: It is designed for the reclamation of barren land and the expansion of the area of farmed land in the Western Delta. There are similar projects in Wady Al Natron, Sahl Al Salehia, Kom Ombo, and Sinai.
4. Toshky project: It aims at the reclamation of the southwestern part of the Egyptian desert and depends on pumped water from Lake Nasser.

Source: *Reference for Environmental Education for Formal and Informal Education.* Cairo: Project of Environmental Training and Awareness (DANIDA) and the Egyptian Environmental Affairs Agency (EEAA), 1999.

Important Information

Information

- Europe is the richest continent in terms of its agricultural soil, as one-third of its area is fertile, while Africa is considered to be the poorest continent in this regard, as only 6 percent of its lands can be farmed.

- Between 1975 and 2000, the world's land share per capita was cut in half. In 1975 it was 0.77 feddan, and by the year 2000 it was 0.39 feddan.

- In Egypt, the per capita share of farmland in 1970 was around 0.16 feddan, and by 1999 it had declined to 0.12 feddan.

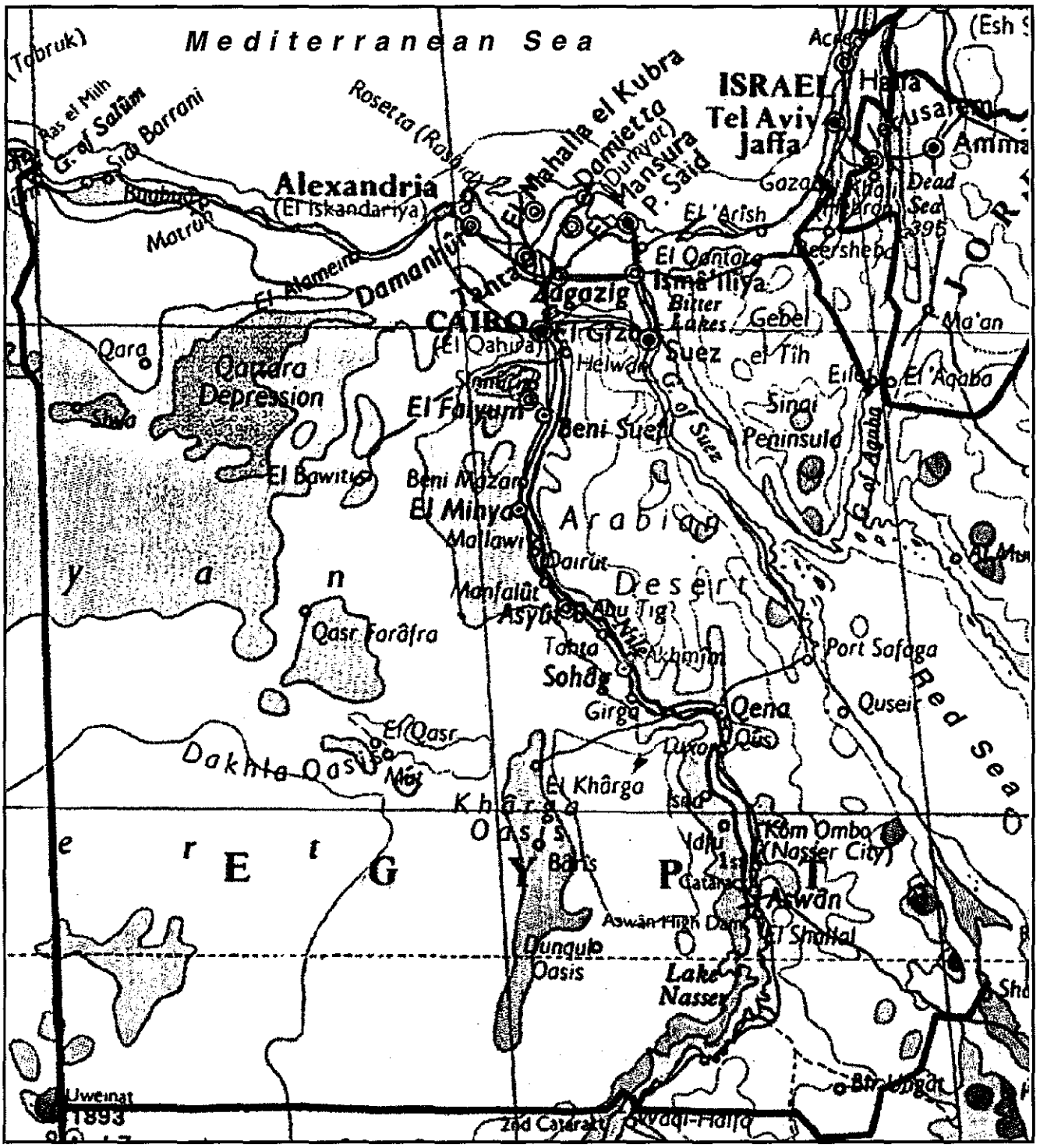
- There are entire villages that have been buried under sand in the western part of the Nile Valley (Al Wady Al Gadeed). The course of the river Nile used to cross this area, but then its direction changed and caused the loss of vast numbers of feddans of agricultural land.

- During the Roman era in Egypt, the district of Mariot was considered a large source of crops such as grapes and olives. This district now has turned into a semi-desert region where bedouins live a difficult life. Some studies indicate that overgrazing and cutting trees for wood are the main reasons for the shrinking of green areas and the erosion of soil in regions like these.

Source: *Reference for Environmental Education for Formal and Informal Education.* Cairo: Project of Environmental Training and Awareness (DANIDA) and the Egyptian Environmental Affairs Agency (EEAA), 1999.

Information

Some Geographical Characteristics Of Egypt



Landscape

Information

Egypt is located in the northeast corner of Africa, and the Sinai Peninsula extends out of it into Asia. Egypt is bordered in the north by the Mediterranean Sea, with its shores extending for 1200 kilometers. It is bordered on the east by the Red Sea. Egypt is part of the North African Desert.

Egypt's total area is about one million square meters (m^2), and it is divided by the Nile Valley into a western and an eastern part. The western part is called the Western Desert, and its area is 681,000 m^2. The eastern part is called the Eastern Desert, and it is much smaller in its area, which is 223,000 m^2. It also includes the Sinai Peninsula, whose area is 61,000 m^2, and the Nile basin in Upper Egypt and the Delta, whose area is 20,000 m^2.

The Western Desert is mostly flat hills, except for some depressions which are located in the oases. It also includes Al Galf Al Kabir hill and the Owinat mountains in its southwest corner. The most important feature of the Western Desert is that it contains parallel ranges of moving sand dunes, and these formations have caused the Western Desert to be known as the "sand sea."

The Eastern Desert is made up of rocky hills whose backbone is the Red Sea mountain chain. It is famous for a large number of valleys whose branches and streams extend from their sources in the Red Sea mountains to the Nile Valley.

The Sinai Peninsula is triangular in shape and is located between the Mediterranean coast in the north, Palestine in the east, the Gulfs of Aqaba and Suez in the south, and the Suez Canal in the west. The southern part of the Sinai Peninsula is a group of rugged summits, including Saint Katherine's mountain, whose height is 2641 meters above sea level, making it the highest mountain in Egypt.

The surface area of the agricultural land in the Nile basin and the Western Desert oases is approximately 7.5 million feddans.

The River Nile is the main source of fresh water in Egypt.

Source: *Reference for Environmental Education for Formal and Informal Education.* Cairo: Project of Environmental Training and Awareness (DANIDA) and the Egyptian Environmental Affairs Agency (EEAA), 1999.

Chapter Three

Air

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Activities In Chapter Three

3.1 Barometers

3.2 Maintaining Equilibrium

3.3 Air Has Weight

3.4 Hot And Cold

3.5 Wind Vane And Anemometer

3.6 A Kite And A Parachute (Types Of Wind)

3.7 Weird Sounds

3.8 Air Music

3.9 Weather In A Microworld

3.10 Ozone Holes

3.11 Measuring Air Pollution

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Barometers

Activity 3.1

Concept:

The atmosphere is a cover of gas particles surrounding the earth. When these particles hit a surface, they accelerate and the result is air pressure.

Objective:

To demonstrate that air pressure has a large influence on weather patterns, may differ from day to day, and can be measured by a simple barometer.

Method:

Making a barometer from simple materials.

Place:

The library or the classroom.

Age:

Boys and girls 9 years or older.

Suggested duration:

30-45 minutes.

Materials:

Barometer:

A jam jar with a wide opening - balloon - scissors - thick rubber band - straw - needle - adhesive tape and glue - cardboard - clay - pen.

Pressure demonstration test:

Two wooden rulers - newspapers.

Air constituents test:

A jar with a wide opening - straws or plastic pipette - tub or bucket containing water.

Make it:

1. The barometer is made by cutting the neck of the balloon and stretching the remaining part tightly over the jar opening. Use the rubber band to fix the balloon in place.
2. Fix the needle to one end of the straw and stick the other end to the stretched surface of the balloon so that the jar edge acts as a support axis.
3. Stick a strip of cardboard into the clay and fix it so that the needle points to the measuring scale that you made on the cardboard strip.
4. The needle will move if the pressure changes. (**Note:** Do not put the barometer outside in the sun because that will lead to the heating of the air in the jar, and accordingly this will expand the balloon).

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Activity 3.1

Use it:

Primary activities:

Start first by demonstrating that air has a weight and that it occupies a space:

Place one half of the ruler on the table as shown in the diagram, and spread a piece of newspaper over it. Hold another ruler and hit it forcefully over the first ruler half which is hanging in the air. This ruler will break because the air pressure on the newspaper has prevented the half of the ruler that is laying on the table from bouncing. Now demonstrate that air consists of "something."

Ask one of the participants to turn a jar upside-down and push it down in a tub filled with water. The participants will see that the jar is not filled with water, which indicates that there is "something" inside the jar that prevented water from getting in. Then, fill a jar completely with water and put it upside-down in the container. Put the end of the straw or the pipette into the jar and ask one of the participants to blow air inside the jar, forcing water out of it. Try to pull the jar partly out of water; note that water does not fall out of it. That is because air pressure over the water surface surrounding the jar pushes down forcefully enough to keep the water inside the jar.

Demonstration of the change in pressure:

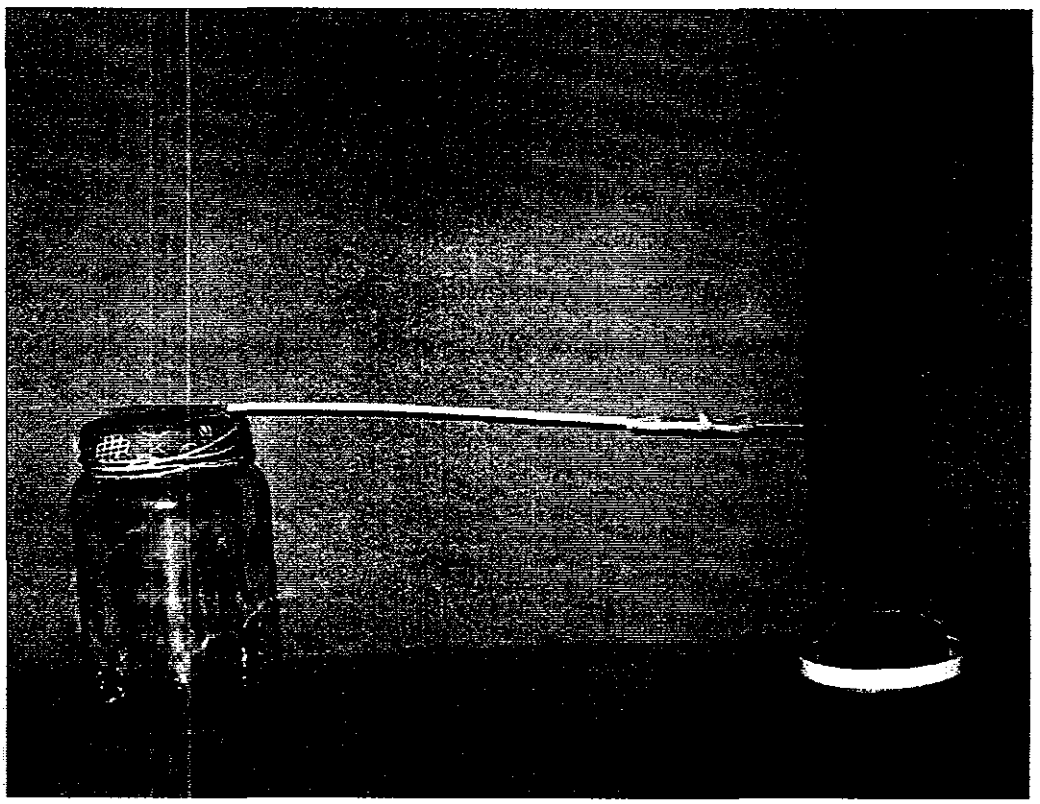
Afterwards, you can show changes in pressure by making measuring marks on a cardboard strip located next to the barometer. If you have a commercially made barometer, you could use it to calibrate the barometer you made yourself. When pressure rises, expect nice weather.

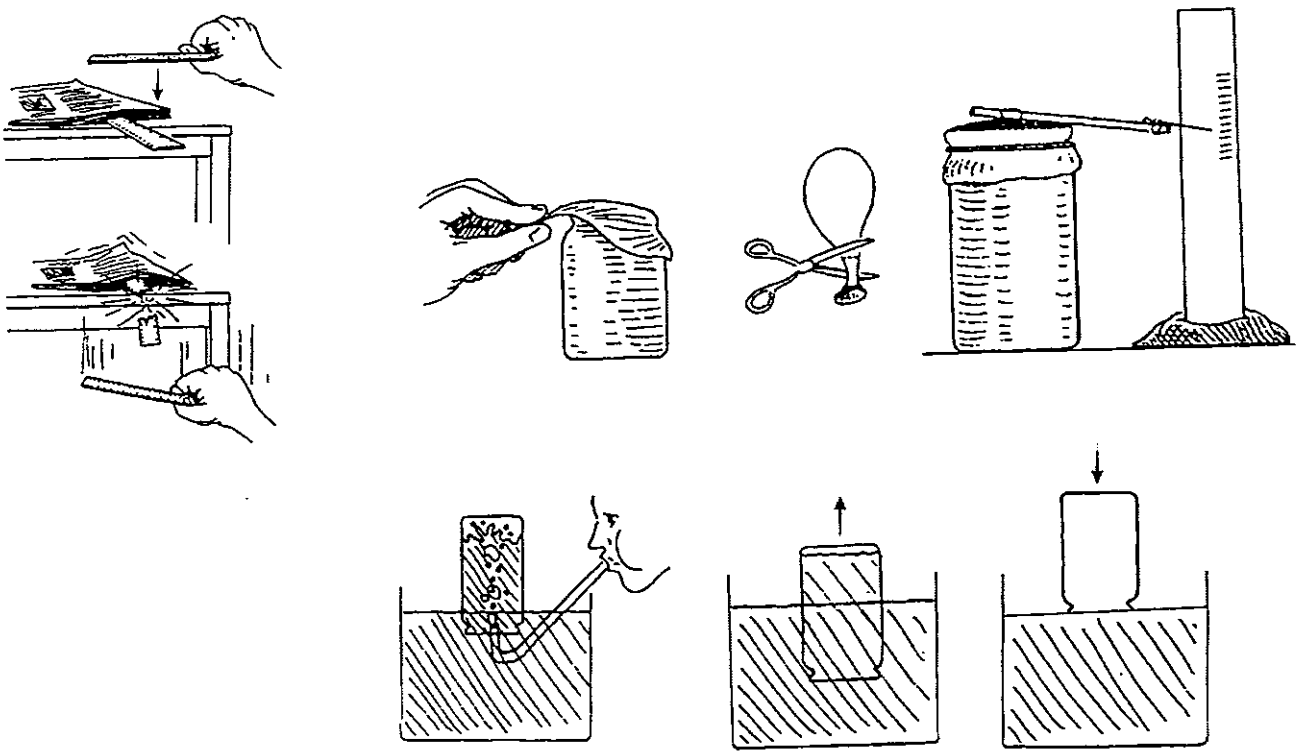
Variations:

You can also make a barometer from a plastic bottle and a bowl. The thinner the bottle, the more effective the barometer is. Fill half of the bottle with water, then place it upside-down in a small bowl filled with water. Make a mark on the side of the bottle with the pen to demonstrate any changes in water level, which indicates changes in pressure.

Source: *Environmental Education Activities for Primary Schools*. Environmental Education Series (21). New York: UNESCO, 1992.

Activity 3.1





Activity 3.2

Maintaining Equilibrium

Concept:

All living organisms use oxygen to produce the energy needed for various activities. This occurs through the process of respiration. This process is similar to the burning of fossil fuels, which produces carbon dioxide and water as by-products. This results in the loss of some energy in the form of heat. Plants also perform photosynthesis using the sun's energy to form nutrients out of carbon dioxide and water. Through this process, oxygen is produced. Maintaining the equilibrium between these gases in the atmosphere is very important.

Objective:

Demonstration of the invisible equilibrium between the two gases, carbon dioxide and oxygen. It is obvious that both gases are very important in supporting life, but carbon dioxide production has recently been increasing faster than the ability of plants to absorb it. The increasing level of carbon dioxide (which is one of the "greenhouse gases") is reported to be among the factors responsible for the elevation of the planet's temperature.

Method:

The use of glass jars and candles to simulate oxygen consumption and carbon dioxide production in the atmosphere by the processes of combustion and respiration.

Place:

Library or classroom.

Age:

Boys and girls 7 years or older under the supervision of adults when lighting the candles.

Suggested duration:

30 minutes.

Materials:

Glass jars of different sizes - candles of different sizes - clay - empty match boxes or small wooden cubes - plastic bottle - vinegar - sodium bicarbonate - a gas lamp or chimney glass - a watch - papers - pens.

Make it:

1. Fix the candle in place on the table using clay.
2. Light the candle and cover it with the glass jar.
3. Record how much time passes before the flame goes out.

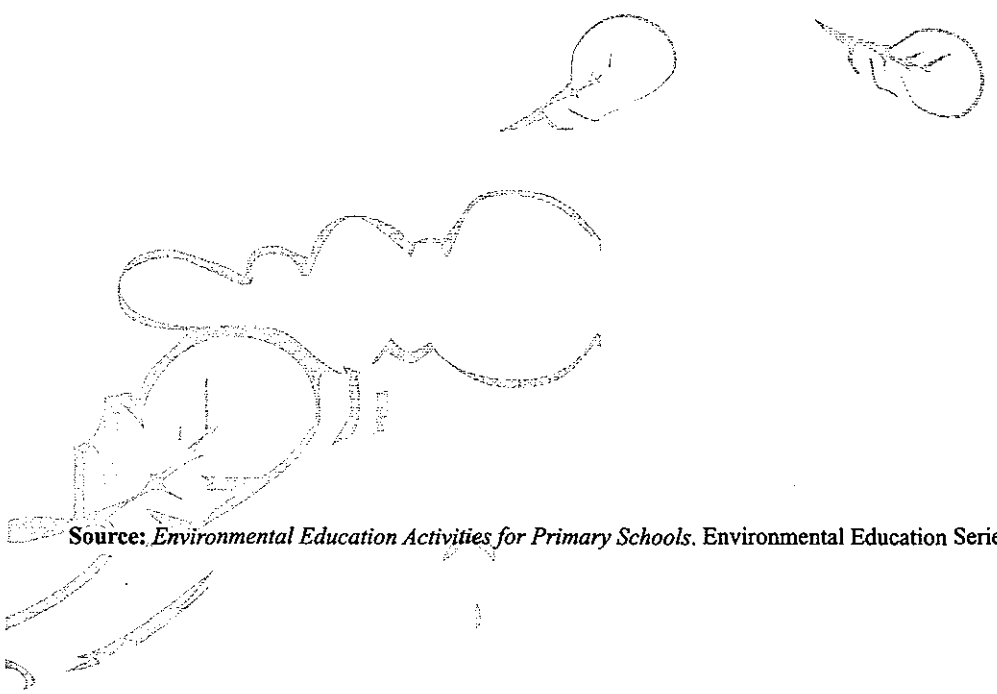
Activity 3.2

Use it:

1. Let your group observe the effects of burning more "fuel" by increasing the number of candles inside the jar.
2. Try to use jars of different sizes (you can measure the mass of air in each jar using graduated cylinders). Fill the jars you are using completely with water. Empty the water in the graduated cylinder and then read the volume of water, which will be equal to the volume of air in each jar.
3. Write down in a table the period during which the candles stay lit in each case.
4. Draw a comparison between what happens to the candles in the different jars and what happens when there is a large number of people in a confined place.
5. Raise the edge of the jar off the table by placing a piece of dry clay, the wooden cubes or match boxes underneath. Does the period in which the candle stay lit differ?
6. Why does the candle stay lit if you place a chimney glass over it?

Variations:

You can simulate respiration by putting a small amount of vinegar inside a plastic bottle, and then adding a little of the sodium bicarbonate. The two substances will react resulting in the appearance of brown colored bubbles, as energy is released as the chemical substances combine (the bubbles are carbon dioxide gas). If you direct the bottle neck near a candle so that the bottle neck is slightly tilted, the escaping gas will put out the flame.



Source: *Environmental Education Activities for Primary Schools*. Environmental Education Series (21). New York: UNESCO, 1992.

Activity 3.3

Air Has Weight

Concept:

We do not see the air but we feel it. And as the air has mass, it also has weight. That is because air is made of substances which are the different gases that constitute it.

Objective:

Demonstrating that the air has a weight which can be measured.

Method:

A simple scale made by the children that demonstrates that air has weight.

Place:

The library or the classroom.

Age:

Boys and girls from 7-9 years old.

Suggested duration:

30 minutes.

Materials:

A ruler or a rectangular piece of thin wood - balloons - thread - a needle or a pin - clay - part of a broom handle - scissors.

Make it:

1. From the middle of the ruler or the wooden piece, hang a string. You can fix it with a pin or a small nail on a wooden stick (e.g. part of a broom handle) that is fixed to the table by a piece of clay. Now you have a scale.
2. Cut the long string into equal lengths (e.g. 20 cm).
3. Tie two balloons that are not filled with air to a different string and hang them at each end of the scale. What do you see?
4. Fill one of the two balloons with air, then rehang it again on the scale. What do you see?
5. Fill the balloons with different amounts of air and compare their weights.
6. Discuss with the group the implications of this phenomenon in our daily lives.

Source: Murphy, B. *Experiment with Air*. Cairo: Egyptian Culture Group, 1999.

Hot And Cold

Activity 3.4

Concept:

Air temperature differs between day and night. It also differs during the different seasons of the year. Air temperature indicates the amount of energy in the atmosphere at a certain time.

Objective:

Measuring and recording of air temperature at different times.

Method:

A simple thermometer the children make and use themselves. This is a new device added to the weather forecasting station they have established.

Place:

The library or classroom, and different places inside and outside the building.

Age:

Boys and girls 9 years or older.

Suggested duration:

Half an hour to make the thermometer, then different times to measure temperatures.

Materials:

A bottle with a screw cap - colored water - straw - clay or wax - cardboard and adhesive tape - thermometer or any other simple tool to measure temperature.

Make it:

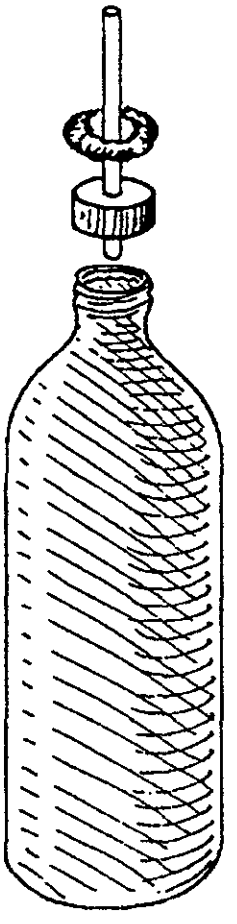
1. Fill the bottle completely with colored water to its rim.
2. Make a hole in the bottle cap big enough to insert a straw.
3. Screw the cap on the bottle and insert the straw through the hole. Fix the straw in place and make a seal around the hole and around the cap with clay or wax.
4. Fix a strip of cardboard to the visible part of the straw and make a scale on the cardboard. Try to calibrate this scale using a commercial thermometer.

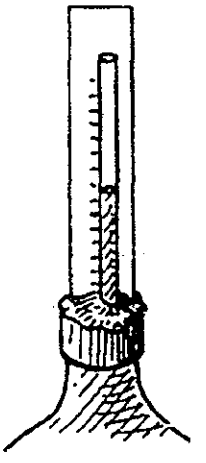
Activity 3.4

Use it:

1. This thermometer will show you - approximately - how hot or cold the air is in the place. You can monitor air temperature daily by putting the thermometer in a shaded place and observing it three times a day.
2. Try also to place the thermometer in a small hole in the earth. Does the earth temperature differ from the air temperature?
3. Put the thermometer in the garden on the grass and under the trees. Record the temperature.
4. Put the thermometer on an asphalt or a cement surface. Record the temperature. Do the grass and trees have an effect on the temperature? What do you conclude from this?

   As with other weather records, this information will be useless unless it is recorded regularly to enable you to compare certain times and different seasons.





Source: *Environmental Education Activities for Primary Schools*. Environmental Education Series (21). New York: UNESCO, 1992.

Wind Vane And Anemometer

Activity 3.5

Concept:

The wind blows due to movements of air in the atmosphere.

Objective:

Measuring the wind direction and intensity at your weather station using a wind vane and an anemometer.

Method:

The vane and the anemometer are two tools which can be made with simple materials.

Place:

Library or school courtyard or garden.

Age:

Boys and girls 12 years or older.

Suggested duration:

Almost an hour to make the measuring devices, then different periods for following up and recording the results.

Materials:

Simple wind vane:

A flat wooden board - a wooden stick (e.g. broom handle) or a cane - a hammer and nails (the size of which depends on the size of the next item) - an empty tube, like a cigar cover or an empty tube of candy - rubber band - scissors - glue - a cardboard box (e.g. an empty milk box) - thick straw or ice cream stick.

Anemometer:

A long pole (a cane or a broom handle) - four identical plastic cups - thick straws or thin parts of bamboo - a hammer and nails - adhesive tape - beads.

Make it:

To make a simple but effective wind vane:

1. Bring the tube and choose the appropriate size nail or suitable piece of wood to be inserted easily inside the tube. In all cases the tube must be able to rotate freely.

Activity 3.5

2. Fix the wooden stick vertically on a hard base of wood, as shown in the diagram. Mark the four directions (north - south, east - west), then place the tube over the stick.
3. Fix a thick straw - or a thin piece of light wood - using the rubber band so that it is perpendicular on the top of the tube, as shown in the diagram.

To make an anemometer:

1. Make holes in the plastic cups so that straws can pass through them. Using adhesive tape, fix the straws so that they are at right angles to each other. Make a hole in the center penetrating the two arms so that the nail can pass through it.
2. Put a nail through a bore, then pass it through the hole made in the center, and then pass it through another bore. Hammer it to the vertical pole. Insert the cups in the arms and make them parallel. Before affixing the cups to the arms using adhesive tape, make sure that all the cup openings are in the same direction. The anemometer should move smoothly.

Use it:

Put both devices in the open air as part of your weather forecasting station. You will have to direct the base of the wind vane so that it points to the direction north/ south before recording any readings. The anemometer can be fixed in the ground. Try first to cover the stick with a short plastic tube so that it is easy for you to pull the anemometer out of the ground after it is used. Can the participants invent a way to count the cycles, especially if the wind is blowing hard and the pointer is moving very fast? Can the participants correlate their observations of the wind to temperature and rain, and the season of the year or any other daily cycles?

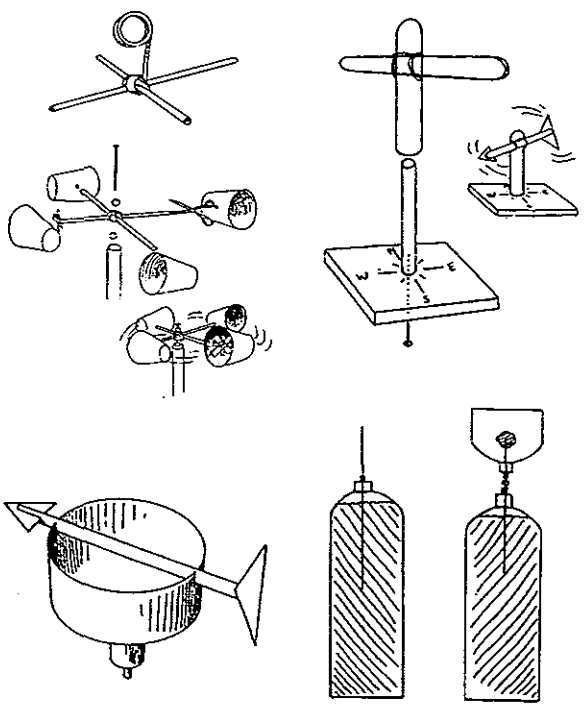
Variations:

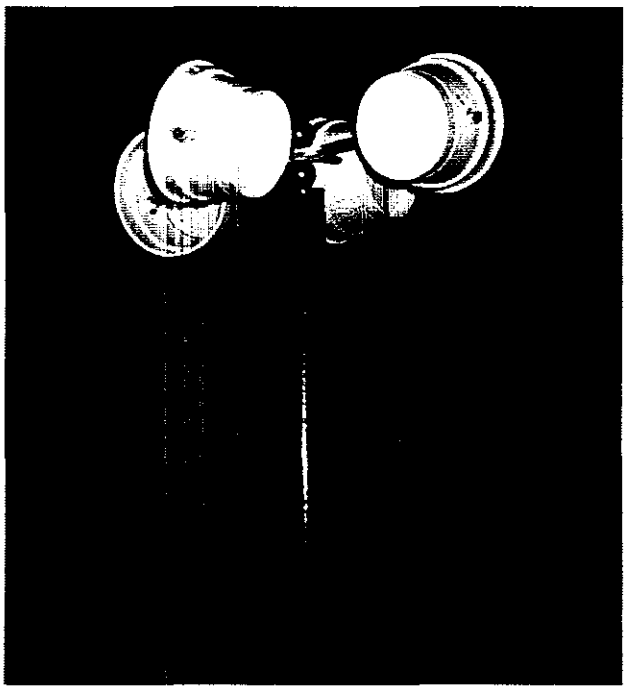
To make a stronger wind vane:

1. Bring an empty bottle of liquid soap (or any other similar bottle) and fill it with water. Cut the cap and insert a long piece of thin wire so that it is tightly fixed, leaving a few centimeters of the wire piece above the bottle.

Activity 3.5

2. Cut another bottle of the same kind just below the top and remove the base part. Make a slot across the diameter of the conical part you have cut and then fix a thin piece of light wood over it (as shown in the diagram).
3. Put a bead through the free part of the wire, then pass the wire through the other bottle, adding another bead if necessary, and then use a piece of clay or anything similar to secure the upper part in place.
4. Fix an arrow head and a fin tail on the arm as shown in the diagram. Make sure that the vane is moving freely. The water will help maintain its stability, but you may prefer to make a hole in the bottom of the bottle and fix its base to a post.





Source: *Environmental Education Activities for Primary Schools*. New York: UNESCO, 1999.

Activity 3.6

A Kite And A Parachute
(Types Of Wind)

Concept:

The wind blows due to air circulation. The wind is a very important part of the weather. The types of weather in an area determine the daily and seasonal changes in wind direction and intensity.

Objective:

Feeling the wind and studying its resistance.

Method:

A simple compass to register wind direction, and a kite and a parachute.

Place:

Library or classroom to make the tools, then an open place to fly the kite and a high place to test the parachute.

Age:

Boys and girls 10 years or older, under the supervision of adults.

Suggested duration:

From 30-60 minutes according to the types of tools that are made.

Materials:

The compass:

A small, rounded cup of transparent plastic with a lid (the lid does not necessarily have to be transparent) - water resistant felt pens - half a cork plug (or a small piece of foam) - sewing needle - a small magnet - ruler - a protractor - water - liquid soap (few drops).

The kite:

A thin sheet of polystyrene or light cardboard - buttons - thread - string.

The parachute:

A sheet of thin plastic (or polyethylene) - thread - a bobbin of cotton thread.

Make it:

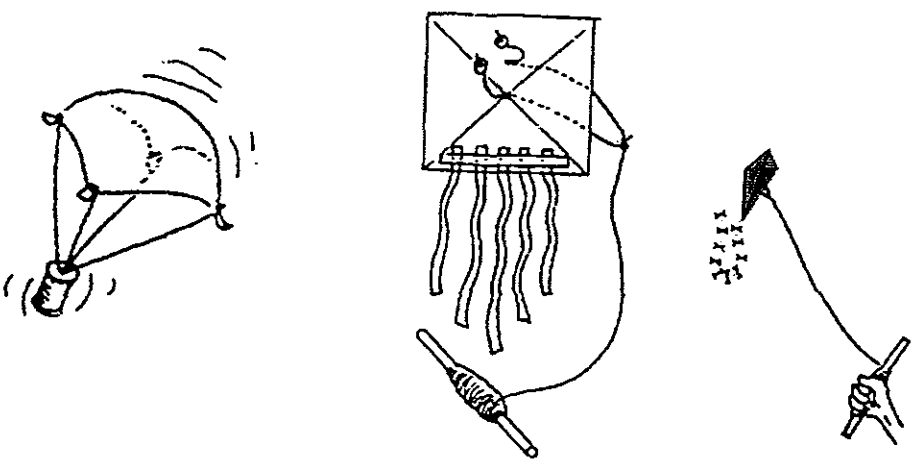
1. To make a compass, cut a small circle of cardboard exactly the same size as the cup lid. Draw lines at the angles 90°, 180°, 270° and 360°. Mark east, west, north and south. Fix the cardboard circle to the lid, and then put the cup over the lid. Make sure that you can now read the positions through the transparent base of the cup.
2. Cut a slot across the cork disc. Magnetize the needle by rubbing it on a magnet in one direction. Place the needle carefully in the slot.

Activity 3.6

3. Put some water in the cup, then add a drop of liquid soap to prevent the cork disc from adhering to the inner wall of the cup. Let the cork disc float on the water.
4. You can make a kite from a thin square sheet of polystyrene, the side length of which is 50 cm (you can use an insulating ceiling tile). First, mark the center; then, mark a point 12 cm from the center, as shown in the diagram. Make a hole at each of these points. Pass the string through each of these holes and fix both ends of the string to two buttons. Tie the tip of the cotton thread, which is around the bobbin, to the string. You can also fix paper strips to the base of the kite.
5. The parachute can be made of a square of thin plastic for the body. Tie a thread to each corner, pass the end of each thread through one of the thread bobbins, and then tie all the ends together.

Use it:

1. To use the compass, place the cup on a flat surface. When the needle becomes stable, move the lid carefully until the needle overlays the North/South line that is seen through the transparent cup base.
2. Try different lengths for the kite tail. Flying the kite is an enjoyable method to determine wind direction.
3. The parachute works when it fills with air that pushes against the bag, making it descend slowly downwards. You can try loading the parachute with different weights and changing the bag size. Notice how these changes affect the velocity of the descent of the parachute.



Source: *Environmental Education Activities for Primary Schools*. New York: UNESCO, 1999.

Activity 3.7

Weird Sounds

Concept:

The world is full of many different sounds transmitted by the air surrounding us. We use these sounds to identify living beings as well as objects.

Objective:

Demonstrating how sounds are transmitted through air and materials, and encouraging the children to differentiate these sounds.

Method:

Listening to "the sound of air" when it passes through containers made of different materials.

Place:

Library or classroom - with complete silence.

Age:

Boys and girls, 7-9 years or older.

Suggested duration:

30 minutes.

Materials:

Mugs - tin cans - plastic cups - cardboard boxes - bottles and jars of different shapes and sizes - plastic pipes of different lengths and diameters - sea shells - inflated balloons.

Try it:

1. Ask each child to take one of the containers available and put it in his or her ear.
2. Let the children exchange the containers and listen to the different sounds arising from each container.
3. Where do these sounds come from?

Variations:

1. Encourage the children to make pipes and cones of cardboard and put them on their ears. Ask them to express what they hear.
2. Ask them to imitate the sounds of familiar birds, animals and machines.
3. Ask them to make a telephone using two empty yoghurt cups connected by a long thread. Let them exchange calls. Change the thread length and try to find out the longest distance through which the sound can be transmitted.

Source: Murphy, B. *Experiment with Air*. Cairo: Egyptian Culture Group, 1999.

Air Music

Activity 3.8

Concept:

The air is a medium for the transmission of sounds in which the air particles vibrate until they reach our ears.

Objective:

Demonstrate the ability of air to transmit sounds, and the changes in these sounds that result from variations in the amount of air they pass through.

Method:

A simple musical instrument the children make out of glass bottles or glasses.

Place:

Library or classroom.

Age:

Boys and girls from 7-9 years or older.

Suggested duration:

30 minutes.

Materials:

Bottles - glasses - water - metal fork - cardboard boxes and cans of different sizes - sheets of brown paper - adhesive tape.

Make it:

1. Bring a group of glass bottles or glasses and put them on the table.
2. Fill the bottles or glasses with gradually increased amounts of water so that the first bottle, for example, is filled to the top and the last bottle contains the least amount of water. Now you have a water instrument.

Use it:

1. Pass the tip of the metal fork on the bottles at different speeds.
2. What do you notice?
3. Do the tones arising from the bottles or glasses differ according to the amount of water?

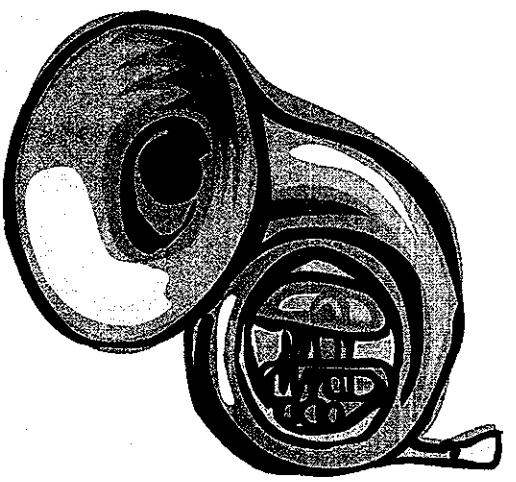
Variations:

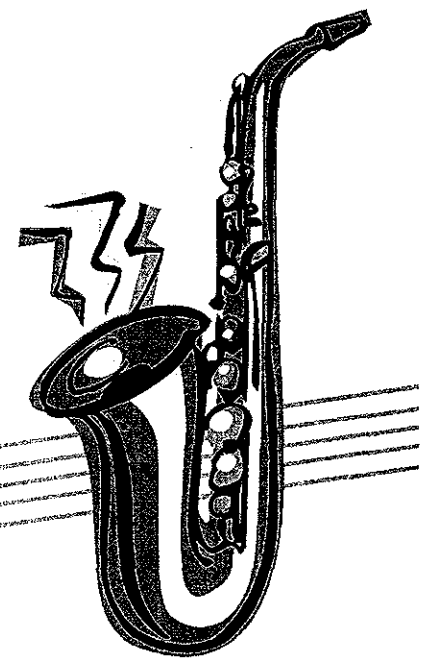
You can make this experiment in another way:

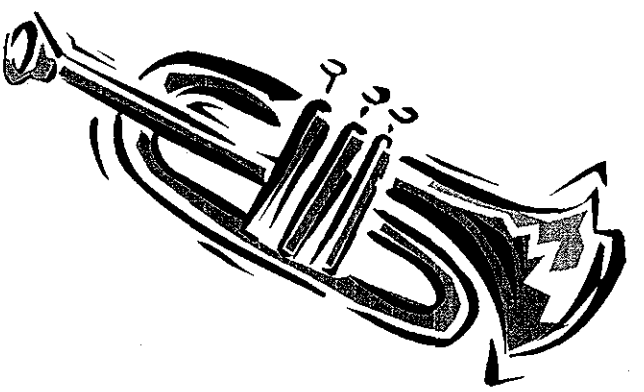
1. Tightly stretch a sheet of brown paper over a cardboard box. Repeat this with a number of boxes and cans of different sizes. Now you have a group of drums.

Activity 3.8

2. Drum on the stretched paper with a ruler, a wooden stick or even with your fingers. What do you hear? Do the sounds change according to the drum size?
3. Discuss with the group:
   - What are the types of musical instruments that they know?
   - How do you think sounds arise from these instruments?
   - Can you make more musical instruments using simple tools and materials? You can if you think a little. If you need some help you will find wonderful information about this subject in the book, *Experiment with Air*, in the Green Corner Series available in your library.







Source: Murphy, B. *Experiment with Air*. Cairo: Egyptian Culture Group, 1999.

Weather In A Microworld

Activity 3.9

Concept:

Changes occur in the local climate because of plants that affect wind and vapor, and because of towns which are much warmer than the adjacent agricultural areas. Buildings slow the wind in some places, while in other places, they accelerate it or create air whirls.

Objective:

Demonstrate that whereas air currents circulate around the globe, local circumstances create differences in local weather. It is easy to study these differences, and often they are interrelated. Examples include the importance of planting lines of trees as protective belts (windbreaks) to protect crops from wind and the importance of trees to reduce soil erosion from storm runoff.

Method:

Modeling the effect of wind breaks and buildings on wind and its direction.

Place:

The library or the classroom to make some of the activity's components, then, the entire activity could be performed indoors or in a courtyard or a garden.

Age:

Boys and girls at least 10 years old, under the supervision of adults when operating the electrical appliances.

Suggested duration:

45-60 minutes.

Materials:

To demonstrate the effect of the windbreak:

Hair dryer or fan - a toy in the shape of a windmill (see Activitiy 1.7) or a wind gauge with ribbons as shown in the diagram - clay or similar material - plants in pots - cardboard or plywood boxes.

Wind gauge with ribbons:

Square wooden board used as a base - a short bar - clay (or hammer and nails) - thin colored ribbons of cloth or paper.

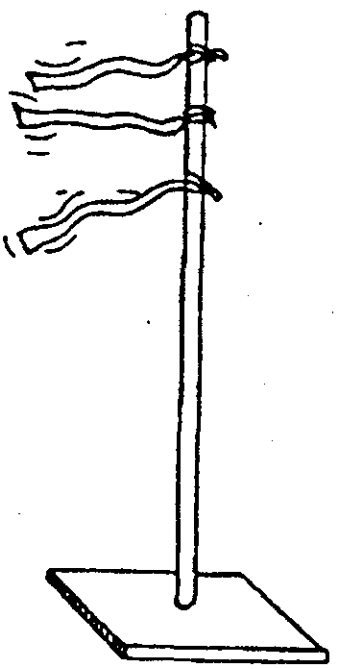
Make it:

To show the effect of buildings and trees on wind:

1. On a level surface in the building in which you work, put the wind gauge with ribbons or insert the windmill into a mass of clay.

Activity 3.9

2. Turn on the hair dryer or the fan and direct it towards the ribbons or the windmill. Move the hairdryer or the fan away from the ribbons. What is the distance you must go so that the ribbon stops fluttering or the windmill stops rotating?
3. Now, put the plants between the wind source and the ribbons. To what extent must you bring the wind closer in order for it to be effective and to shake the ribbons? Do different plants have different effects?
4. Make models of buildings and houses of cardboard or thin plywood boxes and put them between the source of wind and the windmill or the ribbons. What do you notice?
5. Discuss with the group the effect of tree windbreaks on protecting agricultural crops and soil and on reducing the effect of dust storms that blow in Egypt during the spring.



Source: *Environmental Education Activities for Primary Schools*. New York: UNESCO, 1999.

Ozone Holes

Activity 3.10

Concept:

Oxygen molecules consist of two atoms. The sun's energy causes the separation of an oxygen atom from the molecule and drives it to combine with another oxygen molecule. The new molecule which is formed now consists of three oxygen atoms and is ozone. Since the ozone molecule is unstable, it may separate again, releasing the extra oxygen atom to rejoin another free oxygen atom. The normal circulation of ozone formation and disintegration in nature is now out of balance because of the high atmospheric concentration of chlorofluorocarbon (CFC) gases. One molecule of CFC gas can destroy tens of thousands of ozone molecules and can form chlorine monoxide.

Objective:

To demonstrate how ozone is formed in the stratosphere and the effect of CFC compounds on breaking up the ozone molecules.

Method:

Representing the reaction that happens in the upper layers of the atmosphere through a short play to be prepared and acted by the boys and girls.

Place:

The theater hall in the library or school, or the classroom so that the lights can be controlled to represent sunrise and sunset.

Age:

Boys and girls of various ages ranging from 7 to 15 years, with the help of the facilitator to provide the required information.

Suggested duration:

An hour or an hour and a half for the play to be prepared and ten minutes for it to be performed.

Materials:

Straw - cards - colors - felt pens - thick string or rubber bands - empty, clean cans.

Note:

It is important to understand accurately the processes of ozone formation and disintegration, the ozone link with CFC compounds, and the effect of this on the earth. Refer to the information paper on ozone at the end of this chapter.

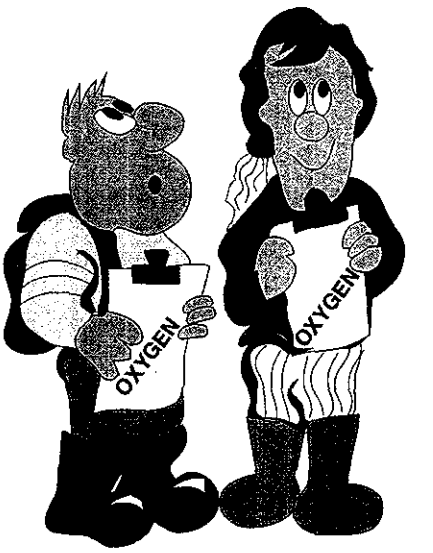
Characters:

Present to the group symbols of the following: the Sun, Oxygen and the wicked CFC. Ask the participants to use the available materials to make clothes and masks to represent the three characters.

Activity 3.10

The Story:

1. Once there was a stable couple of Oxygen who lived in the air above our heads (pairs of participants raise their intertwined hands to represent Oxygen molecules).
2. In the morning at sunrise, they are very excited and every one goes his own way (at this moment, the hands that represent Oxygen separate and form groups of 3 Oxygen atoms). Now they become Ozone molecules working to prevent the Sun's harmful rays from reaching the earth's surface.
3. At night they stop working and rejoin again. This cycle goes on until the arrival of CFC. Now the separate Oxygen atoms are caught and driven way by the CFC molecules. The CFC molecules represent the wicked intruder that snatches the Oxygen atoms away. This will result in a decreased amount of the formed Ozone.
4. The actors depict the impact of the ultraviolet radiation passing through the atmosphere and arriving on the earth.
5. A discussion starts between the actors and the audience on the means of protecting the ozone layer and reducing the use of CFC compounds.



Source: *Environmental Education Activities for Primary Schools.* New York: UNESCO, 1999.

Measuring Air Pollution

Activity 3.11

Concept:

Air in the atmosphere has a nearly fixed composition. It is a mixture of nitrogen (78%), oxygen (21%), inert gases such as helium (1%), and carbon dioxide (0.03%), in addition to different quantities of water vapor. But human activities release into the air other components, some of which are gases and others which take the form of solid particles. Additionally, winds that cross deserts carry quantities of dust that later fall on different surfaces.

Objective:

To demonstrate that there are substances in the air that pollute it and affect its quality. These substances vary from one place to another and from time to time throughout the year.

Method:

Simple devices to monitor the solid particles suspended in the air, in the library or school, and in the surrounding area.

Place:

Different places inside and outside the building - a garden, a place with ornamental plants or an area of small trees in the courtyard.

Age:

Boys and girls 10 years or older, with the help of adults while using a knife or scissors.

Suggested duration:

This is an extended activity that can be performed throughout the year. One session may take 30 minutes to write down the notes of the air monitoring group.

Materials:

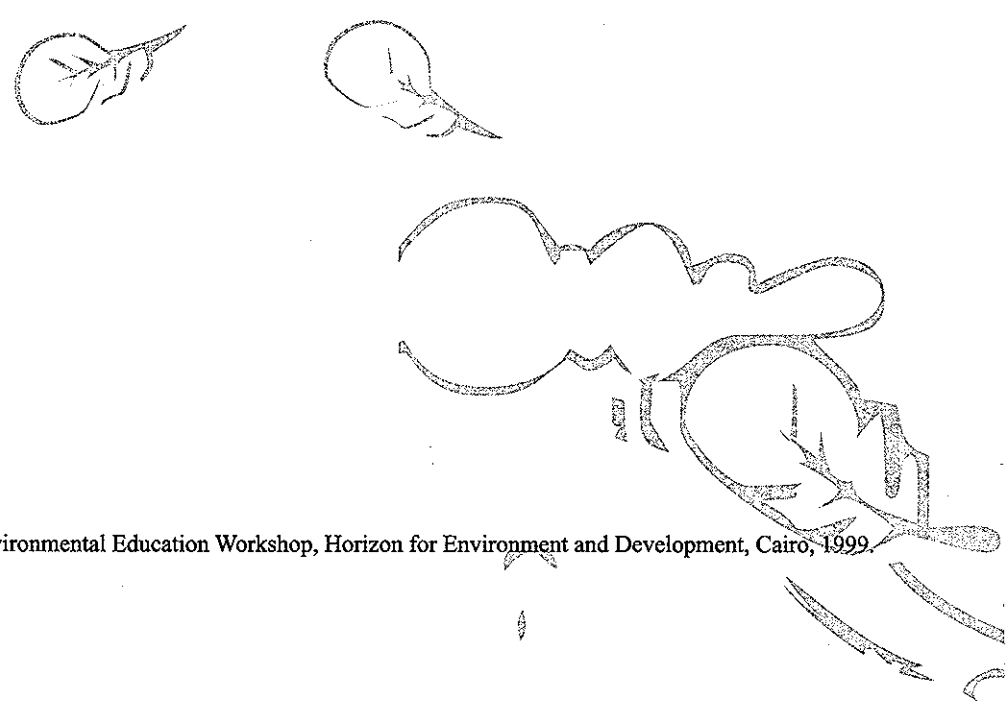
Cotton wool or filter paper - transparent plastic cups - plastic bottles - adhesive tape - plain paper - magnifying lens or a small microscope - a notebook to write notes - pens - knife or scissors - brush.

Use it:

1. Cut the conical ends off some plastic bottles. Remove the bottle caps, overturn the funnels and place them on the remaining parts of the bottles.
2. Put a piece of cotton wool or a disc of filter paper at the bottom of every funnel. Now you have many units to measure air pollution.

Activity 3.11

3. Collect a number of tree or plant leaves from the garden. Put each leaf in a plastic cup and add a little water. Move the brush on the leaf back and forth to remove the dust. Remove the leaves from the cups.
4. Pour the contents of every cup into one of the funnels of the pollution measuring unit. Notice what you collect on the cotton wool or the filter paper in every funnel.
5. Write your notes: Which leaf is the most polluted? Which were taken from new or old branches? Compare the degrees of leaf pollution from different directions and places.
6. Instead of collecting leaves, make simple monitoring units through fixing equal pieces of adhesive tapes on a card of plain paper, with the sticky surface exposed to the air. Put the monitoring units in different places inside and outside the building and affix them in a suitable manner.
7. Collect the cards at certain intervals and examine what settled upon them. You can use a magnifying lens or a microscope to examine the components of these sediments.
8. Discuss with the group the different sources of air pollution and encourage the participants to propose measures to reduce air pollutants.



Source: H. Abou Bakr and H. Adel, Environmental Education Workshop, Horizon for Environment and Development, Cairo, 1999.

Background Information For Chapter Three

- The Atmosphere
- Layers Of The Atmosphere
- The Biosphere
- Weather And Climate
- Air
- Winds And Hurricanes
- Air Pollution
- Ozone
- Montreal Protocol
- Fate Of Pesticides Sprayed By Aircraft
- Participate In Improving The Earth's Air

The Atmosphere

Information

The atmosphere is a thick gas cover that completely surrounds the earth. At a height of about 500 kilometers, its thickness begins to thin into space.

The Importance Of The Atmosphere

The atmosphere is important because it protects the existence of living organisms on earth, plays a basic role in modifying and adapting the earth's climate, provides suitable weather and temperatures for life on earth, and produces different types of winds.

It also protects earth against many harmful components of the sun's rays. These rays are altered as they pass through the different layers of the atmosphere, so that what finally reaches the surface of the earth is not harmful to the environment.

Source: *Environmental Education in Primary Schools: Suggestions for Making and Using Low-Cost Tools.* New York: UNESCO, 1992.

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Information

Layers Of The Atmosphere

1. Troposphere Layer

The first layer of the atmosphere extends from the surface of the earth to a height of about 8-15 kilometers. The temperature decreases as we go upwards through this layer by an average of one degree centigrade for each 150 meters. Most of the daily changes in the weather happen in this layer, such as clouds, rain, lightning and winds. This layer also contains most of the water vapor, oxygen and carbon dioxide. This is the layer that supports life on the surface of the earth. The amount of living organisms in this layer decreases as we go upwards.

2. Stratosphere Layer

This is the second layer of the atmosphere, extending up to a height of 55-80 kilometers. The middle region of this layer is characterized by the stability of its temperature and the presence of ozone gas; the temperature of this middle region reaches about 95°C. The lower area of this layer is, with the help of oxygen equipment, good for aviation.

3. Ionosphere Layer

This is the third layer of the atmosphere. It begins at a height of 90 kilometers and reaches 360 kilometers or more. Hydrogen and helium gases predominate in this layer. The most important characteristic of this layer is its ability to return the sound waves that reach it from the earth.

4. Thermosphere Layer

This is the fourth layer of the atmosphere. Its height stretches from 400 to 1000 kilometers. The temperature of this layer may reach 2000°C during the daytime.

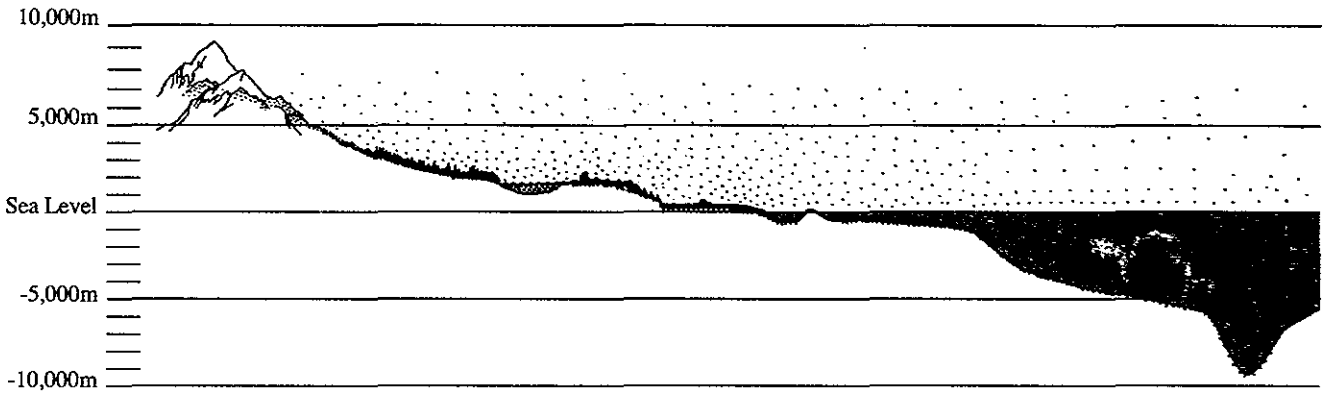
5. Exosphere Layer

This is the last and highest layer of the atmosphere. It begins at 1000 kilometers and mostly consists of oxygen and atomic nitrogen.

Source: *Reference for Environmental Education for Formal and Informal Education*. Cairo: Project of Environment Training & Awareness (DANIDA) and the Egyptian Environmental Affairs Agency (EEAA), 1999.

The Biosphere

Information



The Biosphere

Most living organisms are found in a layer of the atmosphere 10 kilometers thick around the Earth. The histogram shows the density of these organisms at different heights.

Source: Schmidt, T., Nozdling, E., and Larsen, T. *Ecology*. Denmark: Av. Media, 1977.

Information

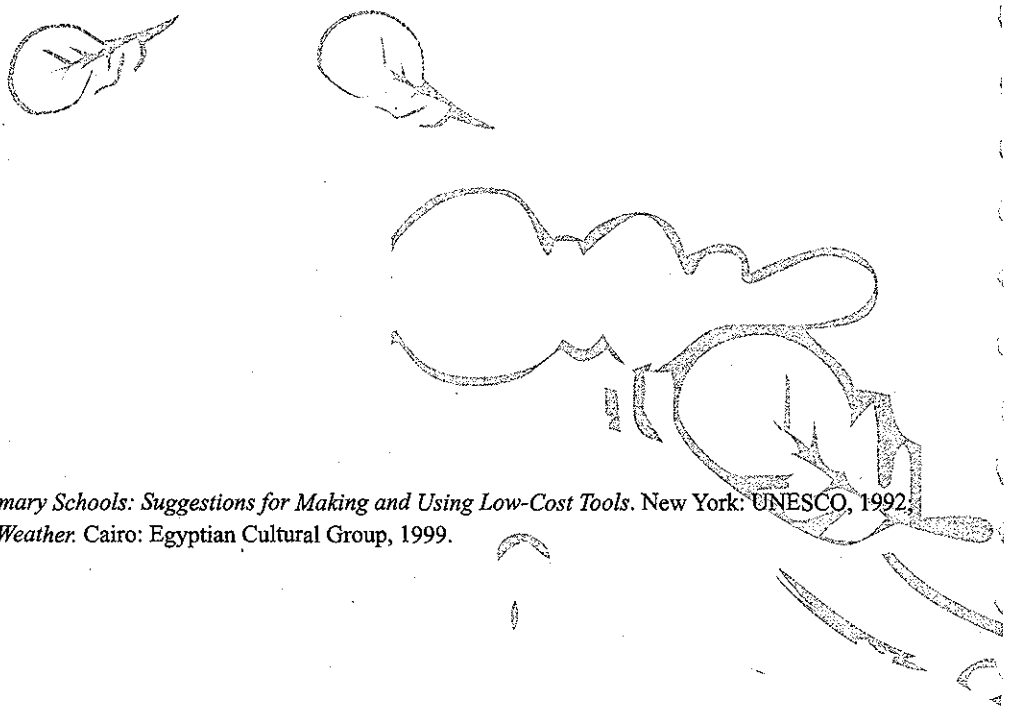
Weather And Climate

Weather

This refers to the conditions of temperature, humidity, pressure, winds and rain in a certain short time period, which could be a day or part of a day, in a certain place. Weather conditions are monitored and reported regularly by weather stations.

Climate

This refers to the average of successive weather conditions in a certain place for a long period of time, which may be a month, a season, a year or many years.



Source: *Environmental Education in Primary Schools: Suggestions for Making and Using Low-Cost Tools*. New York: UNESCO, 1992, and Bauer, M. *Experiment with Weather.* Cairo: Egyptian Cultural Group, 1999.

Air

Information

Air Composition

Air is composed of a group of gases at different concentrations. Pure atmospheric air contains 78 percent nitrogen, 21 percent oxygen, 0.03 percent carbon dioxide, some inert gases, and water vapor. Pure atmospheric air is odorless and colorless, and it is necessary for life on earth. The balance of gases that form the air are in continuous chemical reactions with living organisms through respiration, decomposition after death, photosynthetic processes, and others.

Land And Sea Breezes

Land and sea breezes are clearly noticed on seasides and beaches. During the daytime when the sand at the beach gets hot, the air above it expands and grows lighter, so it ascends, leading to a decrease in its pressure. Colder air is found above the sea water, because water gains and loses its temperature slowly. Thus, during the daytime, sand becomes very hot while the seawater is colder, and that causes the air to move from above the water towards the sand, resulting in a nice or strong breeze, according to the temperature. The opposite occurs when the sun sets. The sand loses its temperature rapidly while the water keeps its temperature for a longer period of time. This makes the air above the water warmer, so that it expands and rises upwards, causing a decrease in the pressure. Air is thus attracted away from the sand and towards the sea, causing what is called a land breeze.

Source: *Environmental Education in Primary Schools: Suggestions for Making and Using Low-Cost Tools.* New York: UNESCO, 1992.

Information

Winds And Hurricanes

Winds

When the temperature rises in a certain area, the air in this area expands so that it grows lighter and rises upwards, and, accordingly, its pressure decreases. The wind blows from areas of high pressure to areas of low pressure. The wind circulates around the different pressure centers under the influence of the earth's movement around its axis from west to east, which affects the wind's direction. The direction of the wind is measured by an apparatus called a wind vane, while the wind speed is measured by an anemometer.

Hurricanes

The hurricane is a very strong wind that forms as a result of temperature and pressure differences between two areas, and the intensity of the hurricane depends on the degree of that difference. The wind velocity may reach up to many hundreds of kilometers per hour. The hurricane is one of the most destructive natural disasters and it causes the uprooting of trees, destruction of houses, and fires. The hurricane's shape is either cylindrical or conical. The head of the hurricane is in the sky while its end at the surface of the earth cannot be clearly pinpointed due to the dust and dirt swirling around it. The sound of the hurricane is like the sound of hundreds of airplane engines.

Source: *Reference for Environmental Education for Formal and Informal Education.* Cairo: Project of Environment Training & Awareness (DANIDA) and the Egyptian Environmental Affairs Agency (EEAA), 1999.

Air Pollution

Information

The pollution of any natural resource means the disturbance of its components. The air is considered polluted if a big change in its structure occurs for one reason or another, or if it is mixed with some impurities or other gases to the extent that it harms the life of living organisms who inhale this air.

Acid Rain

Acid rain is formed from the pollutants that fill the air around us, originating from car exhaust, gases and fumes released from factories and other sources. This leads to the presence of nitrogen, sulfur and carbon oxides in the air. When rain falls, these oxides dissolve in the water, forming diluted acids like nitric, sulfuric and carbonic acids, which fall with the rain to the earth once again. Acid rain is harmful to the environment. It leads to soil pollution by changing the degree of its acidity and by killing its plants. Moreover, it negatively affects buildings and antiquities and leads to their deterioration.

Source: *Environmental Education in Primary Schools: Suggestions for Making and Using Low-Cost Tools.* New York: UNESCO, 1992; and El-Fiqi, Hamad. *Environment.* Cairo: General Egyptian Organization for Books, 1999.

Information

Ozone

Ozone is a gas with a strong odor and a tendency to be blue in color. It consists of three oxygen atoms, but it is completely different from the oxygen molecule in its chemical and physical characteristics. Ninety percent of atmospheric ozone exists in the stratosphere. Ozone plays an important role in protecting the earth from harmful rays coming from the sun. It also regulates temperature on the surface of the earth.

Ozone Layer Depletion:

In 1985, weather scientists working in the British survey centers of Antarctica discovered the presence of a hole or a huge gap in the atmosphere where the ozone layer had declined fifty percent. The main reason for the presence of the depletion in the ozone layer is the pollutants resulting from different human activities, such as:

1. Jet planes with high speeds that exceed the speed of sound, and which release a large amount of chemical pollutants resulting from burning exhausts, like carbon mono- and dioxides, nitrogen and sulfur dioxides, and others. These oxides break down ozone gas.
2. Nuclear explosions that take place in the air, and nitrogen-based fertilizers used in the soil, both of which result in nitrogen oxides that destroy the ozone layer.
3. Chloroflourocarbon compounds (CFCs): These compounds consist of chlorine, fluorine and carbon and are harmless organic compounds. They are used in many products like refrigerators, air conditioners, insecticide sprays, air fresheners and others. The release of these compounds into the air causes harmful effects when ultraviolet rays break them down into their primary elements in the stratosphere layer. This results in the emergence of an active chlorine atom which unites with the ozone and breaks it down, producing chloroxide and oxygen. Subsequently, the ozone disappears gradually from the air. Chlorofluorocarbon compounds have characteristics that make them very dangerous. They remain in the air for a long period of time without degrading, and one chlorine atom has the ability to destroy about 100,000 ozone molecules.

Effects Of Ozone Depletion

The presence of holes in the ozone layer means an increase in the passage of harmful ultraviolet rays to the surface of the earth, and that causes many dangers to humans, animals, plants and the environment in general. These rays cause eye diseases, skin cancer, loss of immunity that increases the incidence of the AIDS disease, fetal anomalies and hereditary diseases.

Source: *Reference for Environmental Education for Formal and Informal Education.* Cairo: Project of Environment Training & Awareness (DANIDA) and the Egyptian Environmental Affairs Agency (EEAA), 1999; and El-Fiqi, Hamad. *Environment.* Cairo: General Egyptian Organization for Books, 1999.

Montreal Protocol

Information

The Montreal Protocol is a multinational environmental agreement. Governments signed the Montreal Protocol in 1987, aiming at reducing the emissions of chlorofluorocarbon compounds (CFCs) by half by the year 1998, and banning them completely by the year 2006.

To accomplish this, taxes have been placed on the use of CFCs, regulating rules and laws have been established, and a number of educational programs have been organized.

It appears that the richer countries cause larger amounts of CFC gas emissions, so they carry a larger burden for solving this problem.

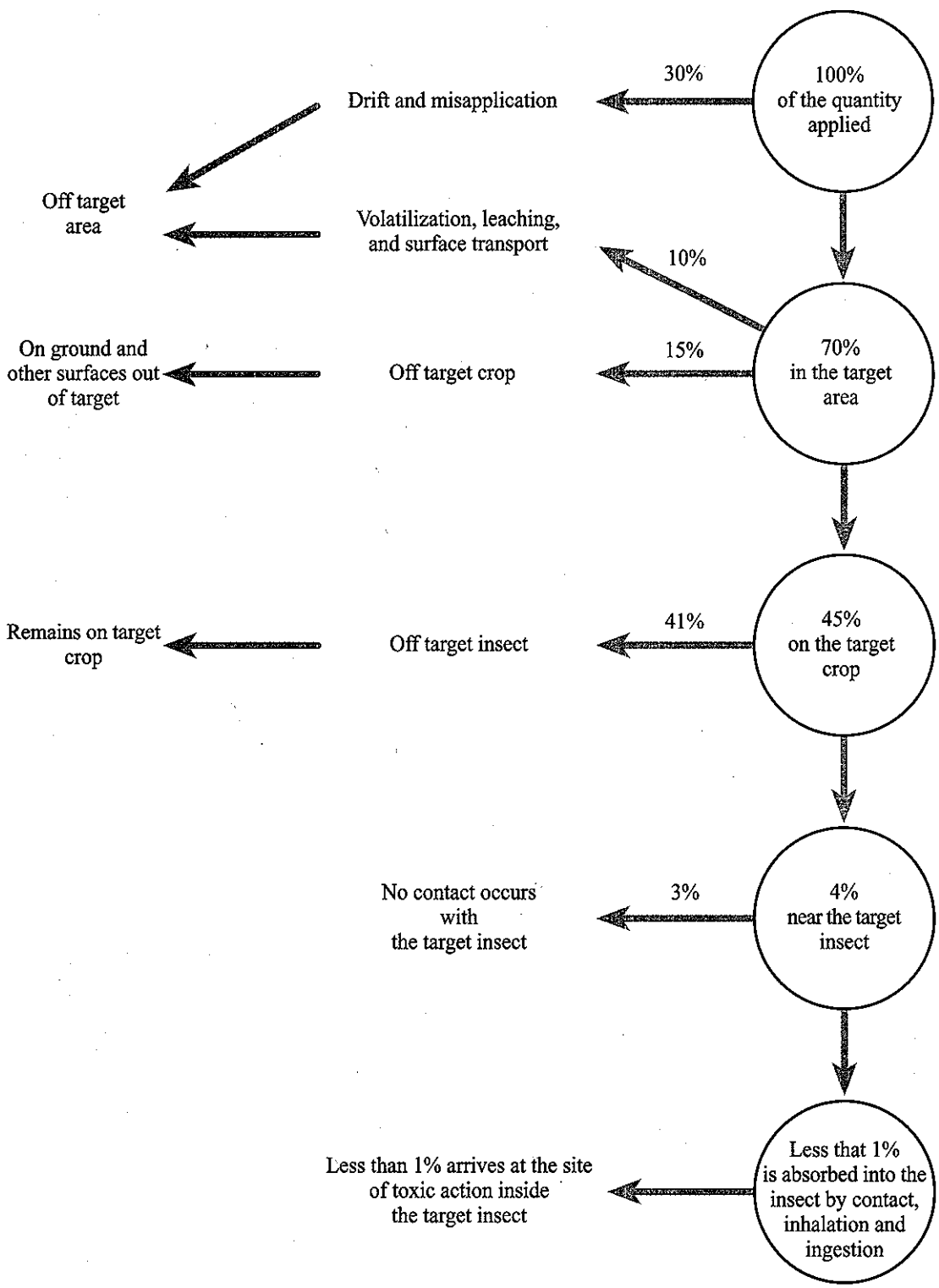
Scientists are carrying out research to find alternative materials for CFC compounds, and money has been provided to help developing countries to change their products and use the new alternatives.

In addition, the Montreal Protocol is considered a successful model for international cooperation in protecting the global environment.

Source: Pachamama. *Our Earth-Our Future, By Young People of the World.* A Joint Project of the United Nations Environment Program and Peace Child International. UK: Evans Brothers Ltd., 2000.

Information

Fate Of Pesticides Sprayed By Aircraft



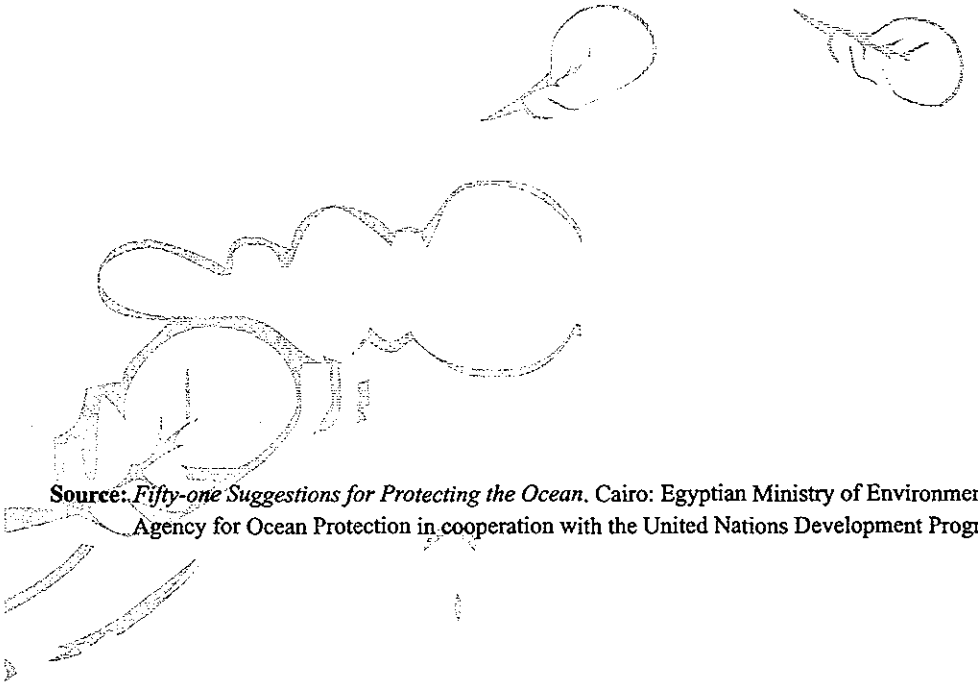
Participate In Improving The Earth's Air

Information

- The more you reduce your use of insecticides, whether for domestic or agricultural purposes, the more you share in protecting the air from pollution.

- Insecticides are very harmful to your health. If you have to use them, follow the instructions written on the container so you do not expose yourself and others to danger.

- Green plants and trees are the earth's lungs, maintaining life on it by providing oxygen and disposing of carbon dioxide.



Source: *Fifty-one Suggestions for Protecting the Ocean*. Cairo: Egyptian Ministry of Environment and Soil Treatment and the National Agency for Ocean Protection in cooperation with the United Nations Development Program (UNDP), 1994.

Chapter Four

Water

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Activities In Chapter 4

■ Safety Rules

4.1 Water Cycle In A Small World

4.2 Role Of Plants In The Water Cycle

4.3 Where Did These Drops Come From?

4.4 Where Does Water Vapor Come From?

4.5 Magnificent Water

4.6 Water Filters

4.7 Paper Basin For Aquatic Organisms

4.8 Fishing Net

4.9 Archimedes' Cry

4.10 Pressure In Deep Water

4.11 Precious Water Drops

4.12 Heavy And Light

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Safety Rules For Field Work Near Water

Safety Rules

In the course of regulating field work activities for any group of participants, priority should be given to the safety of the working conditions and the comfort of participants. This can be achieved through good preparation, adequate supervision, and the provision of information about the location. Water-related activities pose risks of a special nature.

We suggest the following rules:

1. Before going out with the group, the location should be thoroughly checked.
   - Do you have legal permission and easy access to the place?
   - Are the banks of the lake or the river liable to break down?
   - What is the water depth? Decide the limit of the group's contact with the water.
   - If the location is a river, how fast is its current? A shallow river with a rapid stream may pose a threat.
   - If you are working by the sea, find out the times and dates of tides and ask about risky currents.
   - How clean does the water look? If it smells bad or if foam is accumulated on its surface, you need to decide whether the place is really suitable for your purposes.
2. Make sure to provide adequate supervision, and verify that the nature of the activity is suitable for the ages of the participants.
   - Make sure that the participants wear suitable shoes and clothes.
   - Make sure they know the possible risks.
3. Make sure that the group does not leave your sight during the time that you stay in the location.
4. Make sure that no one enters the water without permission and that no one splashes water on his or her classmates or pushes them into it.
5. Cover any scratches or wounds with water proof bandages. If there are any health hazards, be sure to provide rubber gloves for the group.
6. Make sure that the participants do not put water, their fingers, or any tools that touched the water in their mouths, nostrils or eyes. Do not allow eating while working alongside the location of research. Ask the participants to wash their hands with soap and clean water as soon as they finish work and before they eat.

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Activity 4.1

The Water Cycle In A Small World

Concept:

Without the negative interference of human beings, the natural water cycle provides the means for the renewal of fresh water and its transfer from one place to another on Planet Earth.

Objective:

Showing the importance of evaporation from the oceans and studying the reasons for the absence of salt in rainwater.

Method:

Small model imitating the water cycle in nature.

Place:

The activity or study room in the library.

Age:

Boys and girls 10 years or older, with adult supervision while heating water and pouring boiling water into the basin.

Suggested duration:

30 minutes.

Materials:

Hot water (preferably near to the boiling point - be careful) - salt - ice cubes - ink - a weight - a large transparent plastic bag - a small glass jar with a lid - a glass jar with a wide base, or a bowl - a vessel large enough to put the glass jar in its center - a large rope or a rubber band.

Make it:

1. Pour hot water in the vessel so the participants see the vapor rising.
2. Add a large amount of salt so that the water tastes salty. This represents the oceans.
3. Place an empty jar or bowl in the center of the basin (you need to steady it with a weight).
4. Stretch the plastic bag on top of the basin so that it becomes completely covered. Fix it at the edges with the rubber band.

Activity 4.1

5. Put some ice cubes in the other jar. Tilt this jar on its side on the plastic so that it becomes located over the first jar as shown in the diagram.

Use it:

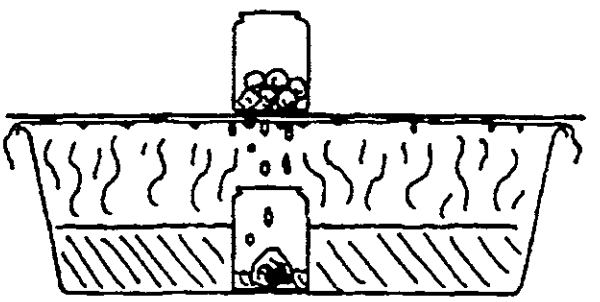
Water will condense on the plastic cover immediately (this represents clouds), and the presence of the cold surface due to the ice (which represents cold air in higher levels of the atmosphere) will hasten this process. Water will start to drip inside the empty jar into the basin.

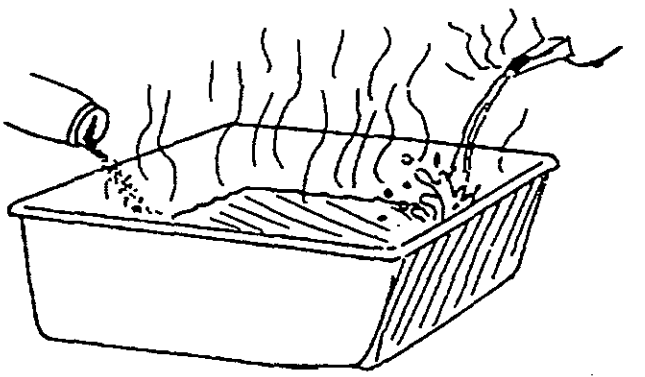
1. Is the water collected in the jar salty? Taste the water in the jar and on the plastic cover.
2. What happens to the water in the jar?
3. Why does water evaporate and then form water drops again?
4. How does this model differ from the universal water cycle?

Variations:

Pupils can think of improving this model. For example, they can suggest the introduction of a river to carry the water back again to the sea.

To clarify how pollution stays in the sea, try adding a color to the water in the jar by adding ink drops. Is the dripping water clear or colored?





Source: *Environmental Education Activities for Primary Schools.* Environmental Education Series (21). New York: UNESCO, 1992.

Activity 4.2

The Role Of Plants In The Water Cycle
(The Water Climbs Upwards)

Concept:

A large amount of rain water and irrigation water leaks into the earth, and then it returns to the atmosphere via the trees and plants that absorb it in their roots. Then it is released into the air through their leaves by a complex process called evaporation.

Objective:

Clarifying how plants absorb water from the soil and how they return it again into the atmosphere.

Method:

Using dyes to show how water moves through plant tissues and making a simple experiment to show how water vapor is released by plant leaves.

Place:

Library room or classroom. A small plant in a vase, or a tree branch or a shrub in the garden or the yard.

Age:

Boys and girls from the age of 10 or older, with supervision while using a scalpel or a knife.

Suggested duration:

This activity needs 3 days of preparation before it begins, but the actual work takes 30 minutes.

Materials:

For explanation:

A small plastic bottle or a jar - dyes (red ink, for example) - a leafy stalk of celery, recently cut (or a green leafy branch of a fast growing plant) - a scalpel or a toothed knife.

Evaporation process:

Large transparent plastic sheets - a rope.

Watch it:

1. Fill the small bottle halfway with colored water. Cut the stalk or branch and leave it in the water for several days. The plant will remain in good shape.
2. The dye will come up through the plant and color the veins in the leaves. You can see this by splitting the stalk lengthwise with the scalpel. If you are using a small tree branch cut it to see the spreading of the dye inside it. In other plants the dye spreads through the vessels. This can be easily seen in celery.

Activity 4.2

Note:

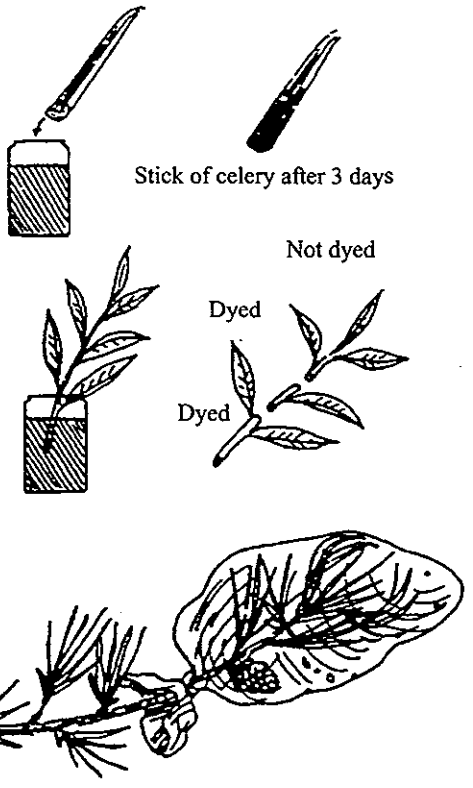
This experiment does not work well with all kinds of plants, so you need to try a number of plant branches until you find the best kind to demonstrate the aim of the experiment.

To to see how evaporation occurs in nature:

Insert some leafy branches (without separating them from the trees) into large transparent plastic bags and tie them with a rope. After some hours, check the bags carefully (note the humidity formed inside), and then pluck the leaves from one of the branches, cover it again with the plastic bag, and repeat the experiment. What happens this time?

Variations:

1. If you can find permanently green trees, as well as trees that shed their leaves, try this experiment in the winter to see how the evaporating humidity, which comes from the surface of the leaves, is responsible for the water drops condensing inside the bag.
2. Try comparing the rate of evaporation under different circumstances by comparing the amount of humidity inside the bag.



Source: *Environmental Education Activities for Primary Schools.* Environmental Education Series (21). New York: UNESCO, 1992.

Activity 4.4

3. Put a mirror (or a piece of glass) near to your face, and breathe onto it. What do you see on the mirror?
4. You can replace the mirror by blowing into a bag of transparent plastic. What do you see inside the bag?
5. Discuss with the group the importance of these phenomena in our daily life.
   - How does soaked laundry become dry?
   - How can we retain the moisture in irrigated soil so that it does not lose much water?
   - Why do people in tropical regions try to save irrigation water by transferring it in pipes instead of open channels?
   - How can we use the sun's heat to dry fruits, vegetables and seeds?

Source: H. Abou Bakr and H. Adel, Environmental Education Workshop, Horizon for Environment and Development, Cairo, 1999.

PREVIOUS PAGE BLANK pgs 128, 129

Magnificent Water

Activity 4.5

Concept:

Water has a number of unique natural characteristics. For example, due to a change in its molecular configuration, water's density is highest at 4°C, and that is why ice floats. Water, especially salt water, forms a support for plants and animals through flotation. Water density = 1, which means that the weight of $1cm^3$ of water = 1 gram (gm), and that makes it lighter than some fluids and heavier than others.

Objective:

Showing the phenomenon of surface tension, and the effect similar to "skin" it causes, and studying the difference between the capacity of salty and fresh water to carry objects.

Method:

A simple, practical experiment which can be easily done.

Location:

Library or study room.

Age:

Boys and girls 9 years or older.

Suggested duration:

30 minutes.

Materials:

Surface tension:

A wide basin full of water - tissue paper - a pin or a small paper clip - a small amount of washing powder or liquid detergent.

Flotation:

A large glass cup - 2 basins full of water - salt - 2 fresh eggs - a small amount of oil - a small amount of honey - a few green peas or pieces of carrot - a piece of cork - any other small objects made of different materials.

Use it:

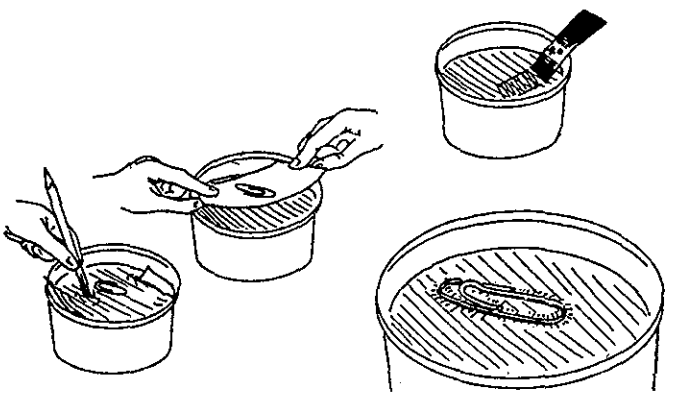
Surface tension:

Put a piece of tissue paper on the water, then carefully put a pin on the tissue. Gently allow the paper to sink and notice what happens. Look carefully around the pin - you can see the "skin." With the tip of the bent needle, you can lift the water surface layer a little

Activity 4.5

Flotation:

1. Take two basins full of water. Add some salt to one of them and stir it well. Put an egg in each, and observe what happens. Turn each egg in its place to make sure that the water is responsible for what you see.
2. Take a large cup of water. Fill it one-third full of water, then add some oil. What happens? Now add some honey. What happens? Honey will sink to the bottom of the cup, oil will float, and 3 layers of different fluids will be formed. How do you explain this?
3. Put different things in the cup: A piece of cork, an ice cube, a piece of carrot, peas, or grapes. Where will each of them settle?



Source: *Environmental Education Activities for Primary Schools*. New York: UNESCO, 2000.

Activity 4.6

Water Filters

Concept:

Running water has the ability to clean itself through a natural biological process and through the filtering effect of the river's bottom. Filtering is also used as a stage in treating water polluted with sewage.

Objective:

Showing the effect of filters in cleaning dirty water.

Method:

Modeling the structure of the river's bottom and forming a filter with its different layers, then watching the effect of this on a sample of turbid water passed through it. The water turbidity can also be measured. Light passing through the water is absorbed with the increase in the depth of the water. Light vanishes rapidly if the water contains a large amount of suspended particles.

Place:

Activity room in the library or study room.

Age:

Boys and girls from the age of the 10 or older, with adult supervision.

Suggested duration:

30-40 minutes.

Materials:

Filtration:

2 empty plastic bottles - sharp knife or scissors - flow pen - a group of small washed stones - washed gravel - sand - muddy water.

Turbidity:

Transparent plastic cups or transparent glass jars - cardboard - pencils and black pens.

Make it:

1. Put a mark on one of the bottles 1/4 of the distance from the top and then cut the bottle in two at the mark.
2. Cut the conical part of the other bottle and throw it away.
3. Remove the lid and turn over the upper part of the first bottle, which now should fit in the lower part of the second bottle.
4. To prepare for measuring turbidity or opacity, cut a small piece of cardboard which fits perfectly under the bottom of the cup. Write the numbers 1,2,3 and

Activity 4.6

so on on a paper so that the sizes of the numbers are equal, but with gradually increasing shading. Start by writing the number 1 lightly, then increase the shading gradually and regularly with each succeeding number.

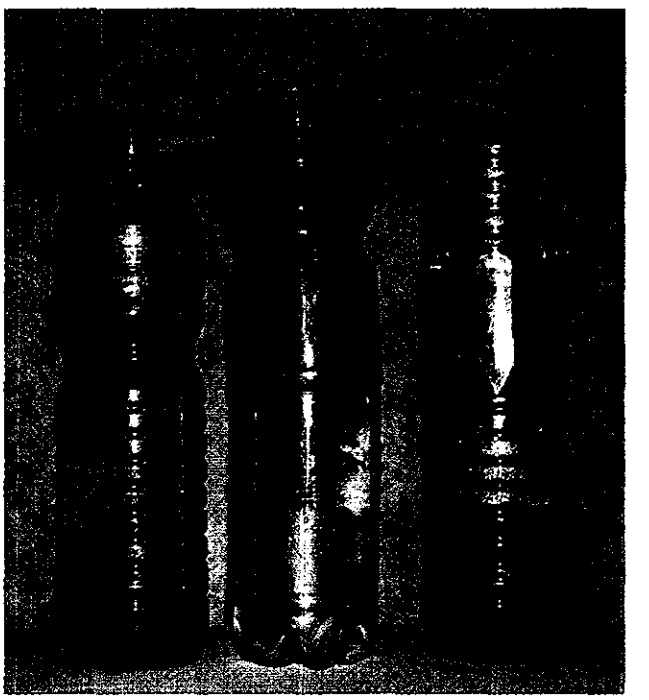
Use it:

To model the effect of a filtering bed or the natural cleaning effect of the bottom of a river:

1. Put the little stones in the bottom of the inverted top of the cut bottle so that they cover the opening, but do not block it.
2. Place the gravel over the stones, add the sand and then put a small stone on the sand's surface.
3. Pour turbid water on the small stone so that it flows down through the bottle. Keep some of the turbid water for comparison. Water will gather in the lower part, which can be opened and emptied.
4. Compare the filtered water to the turbid water. What do you notice?
5. What is the effect of the filter on the water? Do the stones or the gravel do the job by themselves?
6. Try to repeat the experiment with a larger filtering column using larger quantities of sand and gravel. Compare the filtered water each time. Does the length of the filtering column increase the water purity?

To measure water turbidity or opacity:

1. Put the cardboard piece below the cup.
2. Add the filtered water up to a certain level and let it settle for 10 minutes. Now look down into the cup and watch for any numbers you can see. As the water turbidity increases, you will only be able to see a few numbers.



Source: *Environmental Education Activities for Primary Schools*. New York: UNESCO, 2000.

Activity 4.7

A Paper Basin For Aquatic Organisms

Concept:

Small aquatic animals possess structural and behavioral adaptations that allow them to live in fresh water.

Objective:

Participants should not be encouraged to transfer samples of aquatic animals and plants away from their habitats, but it is necessary to closely observe and record their behavior and any changes that may occur in it.

Method:

Watching and observing the behavior of small animals in a basin made of cardboard and plastic.

Place:

Library room or classroom to make the paper basin. A small lake or canal to collect aquatic animals.

Age:

Boys and girls 10 years or older, with close adult supervision.

Suggested duration:

30 minutes to make the basin, then part of a day for an outdoor picnic to collect the samples (review the rules for water safety mentioned in the beginning of this chapter).

Materials:

A cardboard box (the box for A4 size paper is ideal) - a large, intact bag of transparent plastic bag to fit into the box to fill its internal space - a sharp knife or scissors - a flow pen - glue or adhesive tape.

Make it:

1. Make sure the bottom of the box is intact and safe - use the adhesive tape to support the bottom.
2. Cut the lid on the top of the box.
3. Draw two large windows on both sides of the box, leaving a broad frame between them as a support. Leave also an adequate distance from the sides so that the box remains strong, especially at the top.
4. If the cardboard is not thick enough, it may need to be strengthened with other pieces of cardboard or thin wood placed around the box.
5. Insert the big bag in the box. Secure the bag using the adhesive tape.

Activity 4.7

6. Add water carefully to the aquarium to make sure that it can bear weight and that there are no leaks.

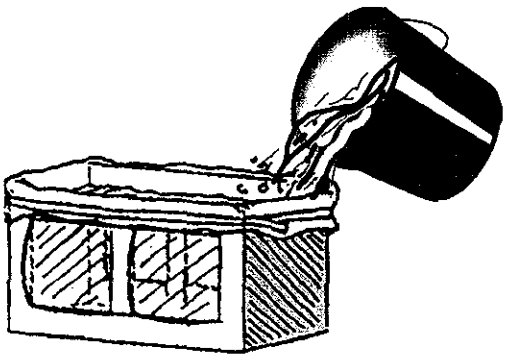
Use it:

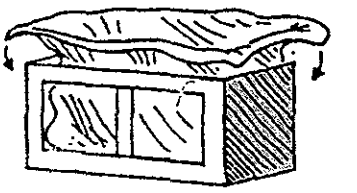
Next to a freshwater lake or a river, or while studying a rocky tidepool near the shore, fill the basin with as much clear water as possible - the sides of the box will swell and bulge out of the windows. Smooth any wrinkles you find so that the view is clear through the bay. You can add some plants or rocks if you wish.

1. Put all the aquatic animals you can find inside the basin and observe the interactions between them.
2. Put a few animals of the same species inside and watch them carefully. Do you see how they move and how they hover? How do they obtain oxygen? How do they eat and what do they eat? Can you observe any adaptations that enable them to thrive in this habitat?
3. You can use the basin to keep the animals for a longer time, but it is hard to keep a balanced, accurate ecosystem. It may be better to keep a few carnivores, such as dragonfly nymphs, as they are easily reared and interesting to watch. Make sure some gravel or dry branches are present in case they start molting.

Variations:

A large transparent plastic bottle can be used instead of the cardboard basin, but a large, glass candy jar would be even better. A suitable bottom of gravel, rough sand and aquatic plants can be prepared.





Source: *Environmental Education Activities for Primary Schools*. New York: UNESCO, 2000.

Fishing Net

Activity 4.8

Concept:

Life began in sea water, where dissolved salts led to a balance in the components of the internal fluids of living organisms. Fresh water constitutes 2.5 percent of the water existing in the world and it lacks this high concentration of salts. Animals and plants living in fresh water face harder circumstances than those living in salt water. They need to prevent the concentration of their internal fluids from leaking into the surrounding environment. This is the concept of osmosis, which is overcome only by a limited number of animals.

Objective:

Observing the diversity in small animals, in fresh and salt water habitats.

Method:

Simple, easily made tools to collect samples.

Place:

Activity room in the library or the study room to make the net. An outdoor location next to a water canal, lake or sea.

Age:

Boys and girls from 12-15 years, with close adult supervision when going out to collect samples and with respect for the safety rules mentioned before.

Suggested duration:

45-60 minutes to make the net, and a few hours outside to collect the samples and observe them (review the previous paper basin activity).

Materials:

A small hand net:

Plastic cooking filter or an aquarium net.

A long hand net:

Long wooden stick - strong metal wire or clips - a metal wire filter which is relatively big.

A homemade river net:

Clothes hanger - an old net curtain - a needle and thread - screw driver - wire cutter - strong wire pincer - a wide and deep white dish.

Make it:

1. If you are going to collect your samples from a shallow or rocky tidepool, it is adequate to use a strong plastic filter or an aquarium net. Filters always have two frames (to lean on the bowl), but it is easy to remove them with a knife or sharp scissors or bend them downwards.
2. To increase the length of the handle, tie the filter or the net to a broom handle. Use a water proof felt

Activity 4.8

pen to mark the handle every 5 or 10 cm so that you can use it to measure the water depth as well. You can fix the net permanently to the handle by tying a strong metal wire around it, or by using several clips every few centimeters.

3. To collect the samples from a water canal or a river it is preferable to make a net shaped like a sack with a wide bottom, which can be made from an old curtain. Cut the circumference of a metal clothes hanger and add a few centimeters. Cut the same width from the curtain, then sew the two sides together. Next, sew one of the two ends and sew the tips of the other end to the wire of the clothes hanger. Cut or stretch the bent part of the handle, and then you can tie the net to the handle of a broom, as shown in the drawing.

Use it:

You can use the net to show the participants life under water and to demonstrate the diversity of animals that live in different habitats. It can also help with a number of different investigations and studies. What you can do with it also depends on the locations that you can access.

1. Transfer what you have caught into the white dish full of water and classify the contents of the net. Carry what you have fished to the water basin and make sure you transfer all the animals carefully back to the water before leaving the location.
2. In shallow or still water, approach slowly and calmly and smoothly sweep your net through the open water and across the submerged plants. Quickly lift the net out of the water and transfer its contents. Thoroughly wash out the net and confirm there is nothing attached inside it.
3. In flowing, shallow water you might be able to stand in the water. Check the depth carefully first using the handle of the net (here you need a net with a long handle). Try to sweep different areas with the net. Try to stir the bottom with your foot and collect what enters the net. Put the wide opening of the net on the river bottom and stand facing the stream so that the water passes through the net's opening. Another student will kick the bottom with one foot, turning over the stones and causing small animals to be carried by the water stream into the net.
4. Tidepools: At the seashore, samples can be collected in the same way as at lakes. Usually the water is still and clear and animals can be caught as they come out of the seaweed, so it is not necessary to do a random sweeping and many animals that cling to the rocks can be collected manually. However, after you have found the animals and studied them you can test different ideas.
   a. Do animals living in fresh water differ from those living in salt water? Which are more diversified? Are some animals more prevalent than others? Do they differ throughout the seasons of the year? Do they spend all of their lives under water or did you catch only a phase of their life cycles?
   b. Try in a lake or pond to collect samples from different specific locations. For example, are there any differences between animals living at the

Activity 4.8

water's surface and those living in open water or among plants?

c. Do animals living in canals differ from those living in fresh, still water? Can you see how they have adapted to life in warmer water?

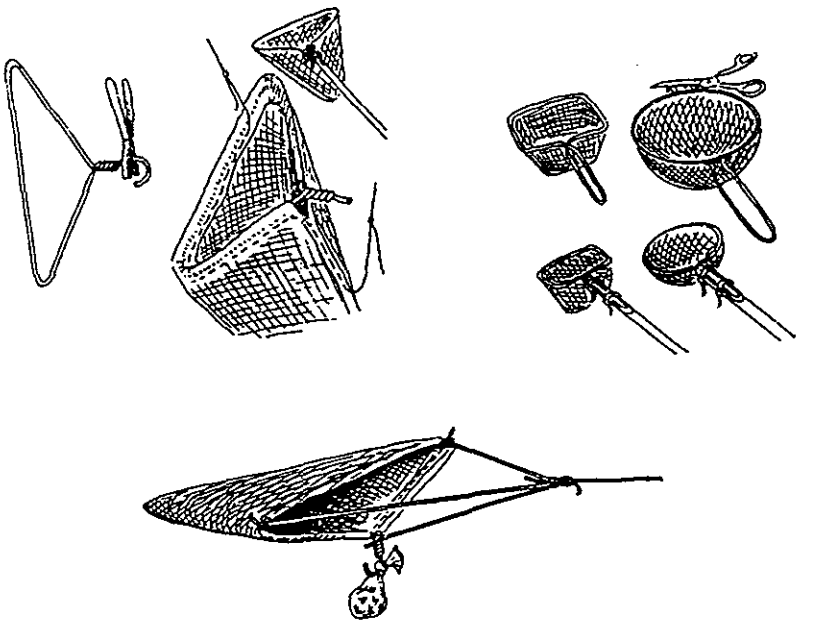
d. Are there any differences between animals living in large rocky tidepools and those living in smaller ones? Do the inhabitants differ between different parts of the beach?

Note:

It is not necessary to know the names of all the animals you find but it is necessary to see the differences between them and describe them accurately. The accurateness of the identification depends on the age of participants, on the aim of the study, and on the abundance of other sources of information. Since it is expected that students will find some of the same kinds of animals in different locations, it would be easy to collect samples for the more common organisms and place them on a transparent plastic sheet in order to take them with you.

Variations:

In regions of deep water or when you work in a big lake or pond it may be useful to use a dragging net. Bring the river net and remove the handle. Tie it with a strong rope, as in the figure, so that the net bag opens when it is dragged. To submerge it in the water, hang from it a bag of small stones. Throw the dragging net and let it sink, and then drag it towards the beach or shore. You can collect samples from different depths by making the net sink to greater depths or by dragging it at different speeds.



Source: *Environmental Education Activities for Primary Schools.* Environmental Education Series (21). New York: UNESCO, 1992.

Activity 4.9

Archimedes' Cry: "I Found It"

Concept:

When a body sinks in the water it will displace an amount of water equal to its size.

Objective:

Showing how we can measure different sizes by measuring the amount of water displaced when we submerge an object in a known amount of water.

Method:

A simple experiment to simulate what Archimedes did.

Place:

Activity hall in the library or study room.

Age:

Boys and girls from 12-15 years.

Suggested duration:

30 - 45 minutes.

Materials:

Large plastic bottles - big knife - flow pen - pens and paper - different objects with irregular sizes (pieces of stone - potatoes - spoons and forks) - titrated burette - large plastic basin - plastic cups - large, strong rope.

Make it:

1. Cut the conical end of the plastic bottle. Put the lower part of the bottle in the big plastic basin and fill the bottle completely with water.
2. Put the object to be measured into the bottle. What happens? Water will overflow into the large basin.
3. Lift the bottle carefully - transfer the water from the basin to a plastic cup.
4. Repeat the experiment by putting different objects each time in the bottle. Collect the overflowing water in the plastic cups, and write the name of the object measured on each cup. Does the amount of water differ in the cups?

Variations:

You can do this experiment in a different way.

1. Fill the bottle two-thirds with water. Mark the level of water with a flow pen.
2. Put the object to be measured in the water - what do you see? The level of the water rises. Mark the new level and give it a number.

Activity 4.9

3. Remove the object carefully. You can tie it with a long thread to lift it out of the water without immersing your hand.
4. Repeat the experiment with different objects.
5. Compare the different marks. With a titrated burette you can titrate the measuring device you have made and hence calculate accurately the volume of the objects you have already used, or any other objects. The size of the object equals the difference between the level of water in the bottle with the object inside and the original level.

Source: H. Abou Bakr and H. Adel, Environmental Education Workshop, Horizon for Environment and Development, Cairo, 1999.

Activity 4.10

Pressure In Deep Water

Concept:

Water pressure increases on submerged objects with increasing depth, and thus the number of living organisms is decreased in the more extreme depths of the seas and oceans.

Objective:

Showing some of the reasons, such as high pressure, for the small number of organisms living in the deep seas and oceans.

Method:

Modeling different depths of the seas or oceans by using a simple tool.

Place:

Activity hall in the library or study room.

Age:

Boys and girls from 7-9 years.

Suggested duration:

30 minutes.

Materials:

Large plastic bottles (1.5-2L) - large plastic dish - big nail - water - flow pen.

Make it:

1. Take a large plastic bottle and draw a longitudinal line on its side. Put three marks on the line spaced at equal intervals along the length of the bottle (i.e. one near the upper third of the bottle, one near the lower third and another in the middle).
2. Make a hole with a nail at each mark.
3. Put your fingers over the holes to block them (you can use the aid of a partner) and fill the bottle completely with water.
4. Put the bottle in the large dish and lift your fingers off the holes.
5. What do you see? Which hole had a stronger flow of water? What do you deduce?
6. Discuss with the group how people make use of this phenomenon in designing submarines and diving suits.

Source: Murphy, B. *Experiment with Water*. Cairo: Egyptian Culture Group, 1999.

Activity 4.11

Precious Water Drops

Concept:

Although more than 70 percent of our planet is covered with water, most of this water is not fit for drinking because it is salty or is frozen in the polar regions. Many people do not have water that is suitable for drinking or irrigation.

Objective:

Supporting positive approaches for conserving water.

Method:

Measuring the total amount of water drops that might leak from a tap.

Place:

Activity room in a library, and a tap in the bathroom or the laboratory.

Age:

Boys and girls from the age of 7-9 years; this may be suitable for older people too.

Suggested duration:

This activity can be started in the beginning of the day, and participants can come back for the result at the end of the day or the next day.

Materials:

Big dish (plastic basin, for example) - watch - big plastic bottles - funnel - cup - burette.

Observe it:

1. Put a big dish under the tap - open it so that water comes down drop by drop.
2. Record the time at the start of the experiment.
3. Decide, with the group, the time to return for the results.
4. Record the return time in order to measure the time passed to gather this amount of water.
5. Note the amount of water collected in the dish, and calculate it using the burette. How many bottles were filled? Use the cup and funnel to fill them.
6. Discuss with the group:
   - How many people can drink this water?
   - How many plants can be watered with it?
   - How many dishes can be washed with it?

Note:

After the experiment is finished, do not pour the water in the drain. Use it in other experiments or for irrigating plants. Encourage the participants to give suggestions about the conservation of drinking water in the school, library and home. Provide some facts about the situation of freshwater resources in Egypt, their sources, and people's need for them in different activities.

Source: H. Abou Bakr and H. Adel, Environmental Education Workshop, Horizon for Environment and Development, Cairo, 1999.

Activity 4.12

Heavy And Light

Concept:

Rivers, seas and oceans have played an important role in human history, as people have used them as a way to travel, trade, and transfer goods.

Objective:

Demonstrating the ability of water to carry heavy objects on board ships and boats.

Method:

Making small ships and boats using materials heavier than water.

Place:

Activity room in the library or study room.

Age:

Boys and girls 7 years or older.

Suggested duration:

30-45 minutes.

Materials:

Big plastic basin full of water - clay - boxes or plates of thin aluminum - different small, heavy objects such as stones, batteries, and nails - wooden ruler, strong rope - glass jars with tight lids.

Make it:

1. Mold a piece of clay into a sphere between your hands and put it in the water. What happens? Does it float or sink? How do you explain this?
2. Take the same piece of clay, dry it, and shape it in a thin layer on a flat table. Bind the edges of the clay upwards to make a small boat shape. Put the clay boat in the water again. What happens now?
3. Take a few small metal objects like a small spoon, nails or paper clips and throw them in the water. What happens?
4. Pick them up again and put them in the boat. What do you notice? How many nails or weights can your boat carry?
5. You can make small boats from aluminum sheets, although they will sink if they are shaped as balls.

Activity 4.12

Variations:

Compare the weight of an empty jar tightly sealed and a metal paper clip.

You can make a simple balance from a ruler and a rope. Which is heavier? You will discover that the jar is heavier; however, put both of them in the water. Which one will float and which one will sink? You will find that it is not a matter of which is heavier or lighter! What might be the reason?

Source: H. Abou Bakr and H. Adel, Environmental Education Workshop, Horizon for Environment and Development, Cairo, 1999.

Background Information For Chapter Four

- Water
- Planet Earth
- Water Cycle In Nature
- The River Nile
- Egyptian Projects Along The River Nile
- Important Information
- Participate In Water Conservation

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Water

Information

Water Is Everywhere

From the beginning of creation, life started and will remain connected to water forever. Water is the main element of life and the most important of its constituents. It has been noted since ancient times that water is the essential element for human settlement and the flourishing of civilization. Wherever there is water, there are signs of life. In Egypt, the pharaonic civilization flourished on the Nile banks. In Iraq the Babylonian civilization started on the banks of two rivers, the Tigris and the Euphrates. In the desert, bedouins gather around water sources.

Water is indispensable for life, and without water, life is impossible. Water is one of the renewable natural resources on earth. The most important characteristic of it is the constancy of its amount. The amount found on the earth's surface has been the same for hundreds of years. This is due to the water cycle in nature. Water covers 70.8 percent of the Earth's surface, which is the reason some scientists refer to the earth as "the water planet." The total mass of water is estimated to be 1400 million cubic kilometers (10^{18} tons), 97 percent of which is salt water found in seas and oceans, and 3 percent of which is fresh water found in rivers, lakes, the atmosphere, ground water and water frozen in the two poles.

Characteristics Of Water

- Water is a colorless, tasteless, odorless liquid. It consists of a wonderful union between hydrogen and oxygen and its chemical formula is H_2O.
- Water is considered the best solvent, as many chemical compounds dissolve in it, and it catalyzes chemical reactions.
- Water gains heat very slowly and loses it very slowly, which protects the living cell from sudden rises in temperature.
- One of the amazing characteristics of water is that its density is highest at 4°C, and that prevents deep layers of fresh water from freezing, even in the coldest places in the world.

Forms Of Water In Nature

Water in nature is found in three forms:

1. The gaseous state: in the form of water vapor spreading in the air and between the soil pores.
2. The liquid state: in the form of water in the seas, oceans, rivers, lakes and underground.
3. The solid state: in the form of ice in the two poles and on mountain tops.

Source: *Environmental Education for Primary Schools: Suggestions for Making and Using Low-Cost Tools*. New York: UNESCO, 1992.

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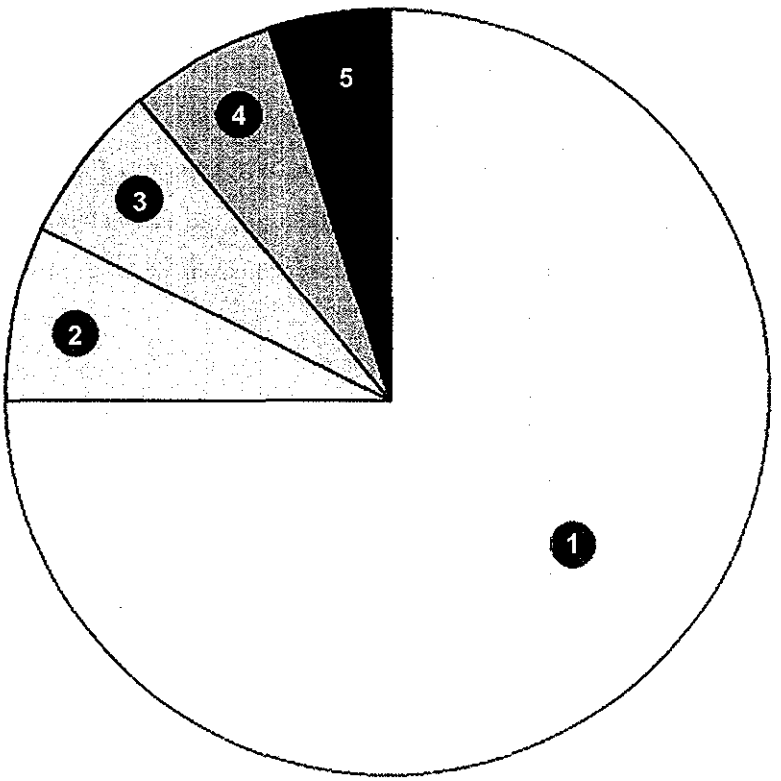
Information

Planet Earth



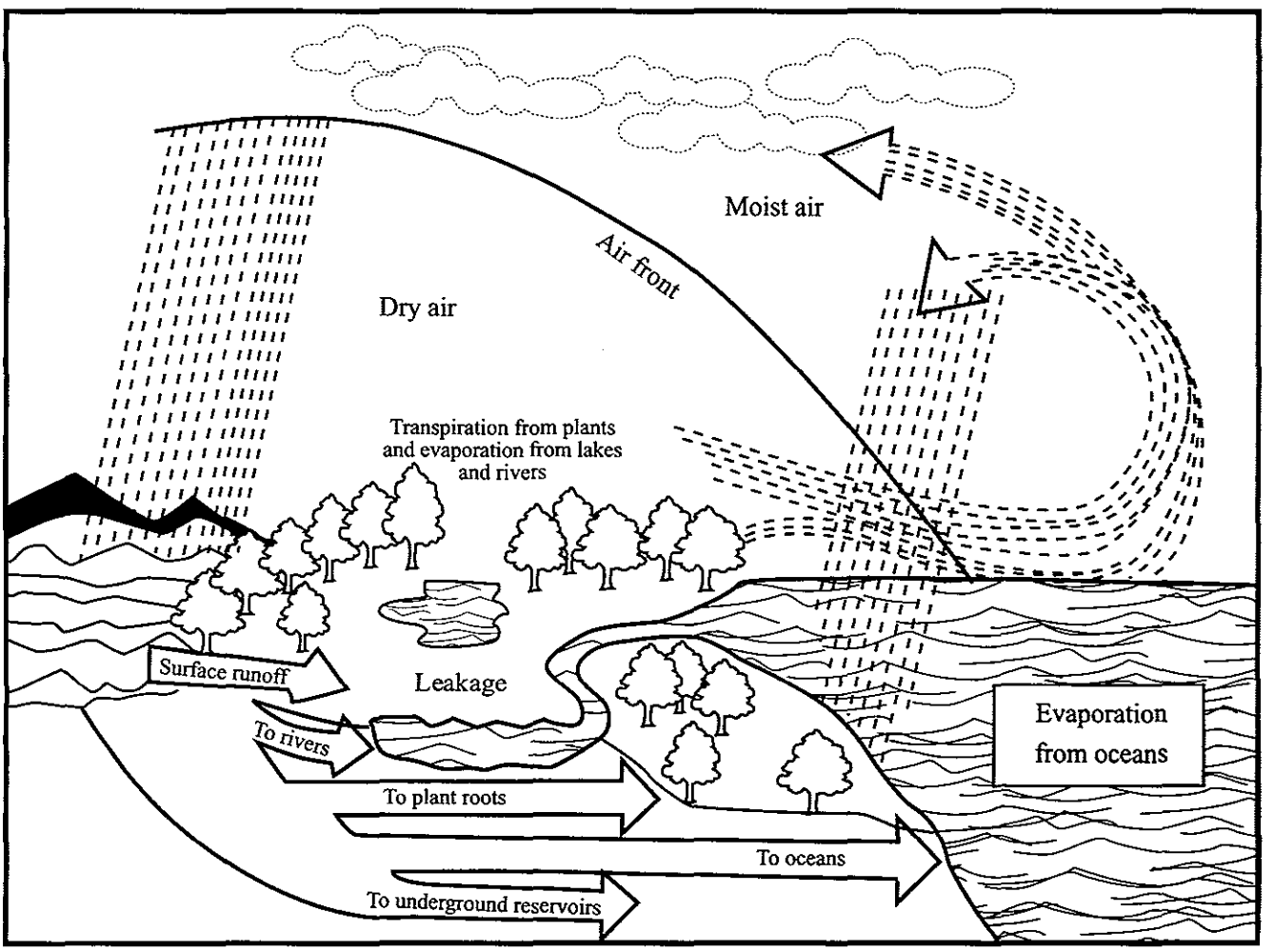
The diagram shows the relative proportion of different ecosystem zones on the surface of the earth.

1. Seas and oceans
2. Deserts
3. Forests
4. Grasslands and pastures
5. Cultivated lands

Source: Schmidt, T., Nordling, E., and Larsen, T. *Ecology*. Denmark: Av. Media, 1977.

Water Cycle In Nature

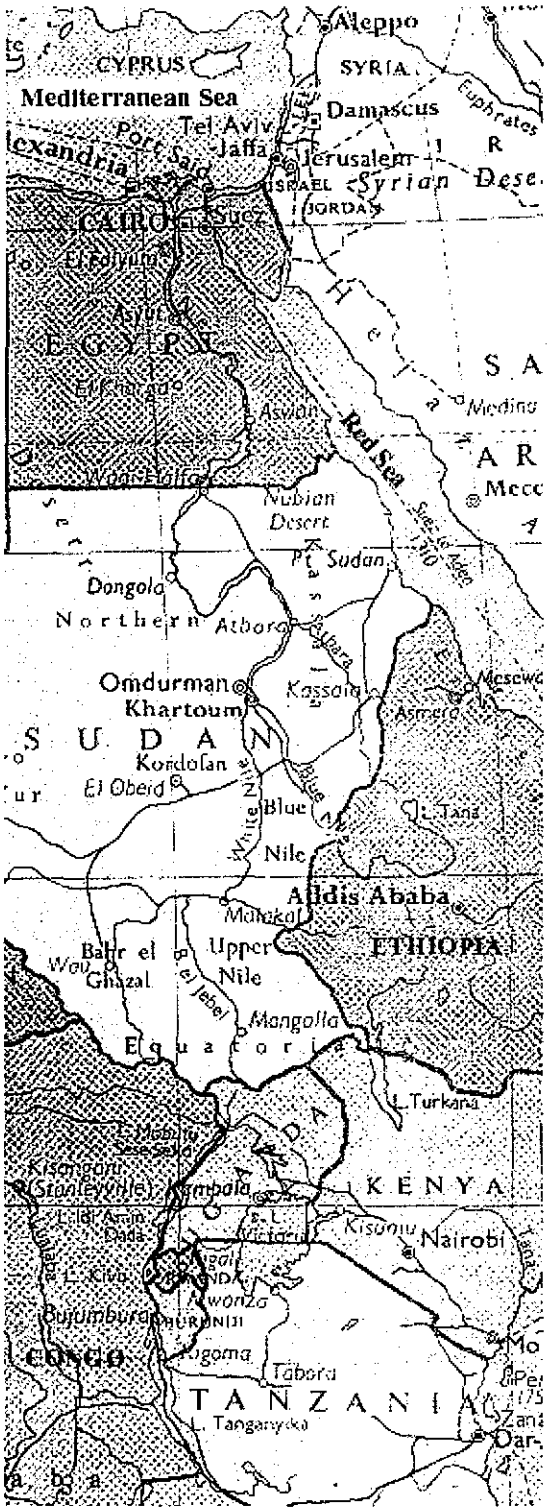
Information



Source: *Environmental Education for Primary Schools: Suggestions for Making and Using Low-Cost Tools.* New York: UNESCO, 1992.

Information

The River Nile



The River Nile is considered the longest river in the world, followed by the Amazon River and then the Mississippi. The length of the River Nile reaches 8650 kilometers, while the Amazon's length is 6265 kilometers and the Mississippi's length is 6176 kilometers. The area of the River Nile basin and its tributaries is about 3 million km^2.

The River Nile springs from the Great Lakes Falls. The flood water comes in summer due to the rains that fall on Eritrean Falls. The river ends in "the reception province," or the mouth state, which is Egypt, where the water of the River Nile flows into the Mediterranean Sea through its two branches, Rosetta and Damietta.

Nine countries share the Nile basin. They are Tanzania, Rwanda, Burundi, Kenya, the Congo, Uganda, Ethiopia, the Sudan and Egypt.

Egypt's share of the Nile water is about 55.5 billion cubic meters yearly. The River Nile supplies about 95 percent of Egypt's water needs, and the remaining 5 percent comes from rains and groundwater.

Source: *Reference for Environmental Education for Formal and Informal Education.* Cairo: Project of Environmental Training and Awareness (DANIDA) and the Egyptian Environmental Affairs Agency (EEAA), 1999.

Egyptian Projects Along The River Nile

Information

Egypt has established many projects on the Nile to store its water, raise its level, prevent flooding, irrigate crops and generate electricity. The following are the most important projects.

1. **The Barrages** were established by Mohammed Ali in the nineteenth century north of Cairo at the bifurcation of the Nile into its two branches (Rosetta and Damietta). This project, which was considered at that time the most important project in the world to regulate irrigation, has improved irrigation in the Delta area and expanded the area of cultivated land.

2. **The Aswan Dam,** established in 1902, is a chain of aqueducts - Esna, Zifta and Naga Hammadi. The dam has been extended vertically twice to increase its storage capacity.

3. **The High Dam's construction** started in 1960 and ended in 1970. The High Dam is considered one of the biggest dams in the world. Its construction took ten years and its height reaches 111 meters above the river bottom. Its length at the top is 3600 meters and its width at the base is 980 meters. Water is stored behind it up to 183 meters above sea level. Behind the High Dam, an artificial lake, Lake Nasser, was established to store flood waters. It is considered one of the biggest artificial lakes in the world. Its length is 500 kilometers, and its width varies between 5 and 35 kilometers. Its total area is approximately 5000 km^2. A huge station to generate electricity from water flowing out of the dam has also been established. It has helped in providing Egypt with a main source of electrical power. It is considered the eighth biggest power station in the world in terms of capacity.

Source: *Reference for Environmental Education for Formal and Informal Education.* Cairo: Project of Environmental Training and Awareness (DANIDA) and the Egyptian Environmental Affairs Agency (EEAA), 1999.

Information

Important Information

- Nature's wisdom in the fact that most of the water on Planet Earth is salty is that it ensures the purity of these waters. Fresh water easily harbors bacteria and aqueous microorganisms, and thus becomes prone to fetidness, especially at high temperatures. This is why a fresh water supply is the result of a continuous water cycle in nature.

- 190 liters of water are needed to grow one corn plant, 1700 liters to produce one kilogram of rice, 22,000 liters to produce one kilogram of meat, 2200 liters to produce a ton of bricks, and 165,000 liters to produce a ton of iron.

- **Some estimates indicate that:**

  The washing machine consumes 150 liters of water per cycle

  The dishwasher consumes 200 liters of water per cycle

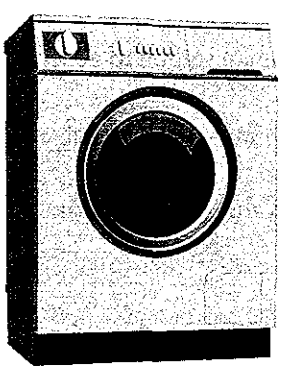
  The toilet consumes 12 liters of water per flush

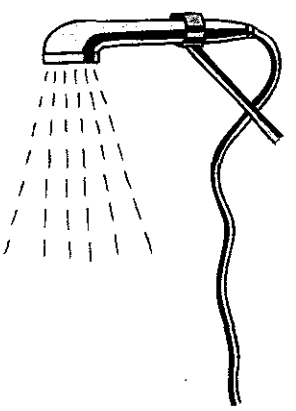
  The tap or the bathroom faucet releases 9 liters of water per minute

  The tap or kitchen sink faucet releases 12 liters of water per minute

  The bathroom shower releases 20 liters of water per minute

- Irrigation of cultivated lands consumes 70-80 percent of the total human consumption of fresh water, while industry consumes 20 percent or less, and household consumption of fresh water is only 6 percent.





Source: *Reference for Environmental Education for Formal and Informal Education.* Cairo: Project of Environmental Training and Awareness (DANIDA) and the Egyptian Environmental Affairs Agency (EEAA), 1999; and Suzan Mubarak Children's Museum, personal contact.

Participate In Water Conservation

Information

Water is the soul of life and its conservation is everybody's responsibility, including yours. The question is how do we conserve water? Here are some instructions to help you do your share in water conservation:

- Close the water tap tightly after use. Falling drops should not be wasted.

- The water you use in washing vegetables and fruits can be reused in watering your plants in the garden or balcony.

- Do not let water run from the tap until it becomes cold or hot. Collect that water and reuse it in something useful, like watering your plants or washing your vegetables, for example.

- Do not leave the water running while you are washing your face or teeth. When you do not need the water, turn off the tap and reopen it whenever you need it. That is a simple and easy action which conserves water.

- Never throw poisonous materials and used oils in washing sinks and toilets. These materials harm the environment and limit the effectiveness of wastewater treatment facilities.

- Do not throw wastewater in front of your house or in the street. Standing water pollutes the environment, and it is an uncivilized action that annoys your neighbors and friends. The water can also become a breeding ground for harmful insects.

- Do not water your plants in the garden or on the balcony unless it is necessary, and only give them a suitable amount. Watering should be done in the early morning or in the evening to avoid water loss from evaporation.

Source: *Fifty-one Suggestions for Protecting the Oceans*. Cairo: Egyptian Ministry of Environment and Soil Treatment and the National Agency for Ocean Protection in cooperation with the United Nations Development Program (UNDP), 1994.

Chapter Five

Ecosystems

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Activities In Chapter Five

5.1 Hide And Seek (1): Looking For Colors

5.2 Hide And Seek (2): Comparing Habitats

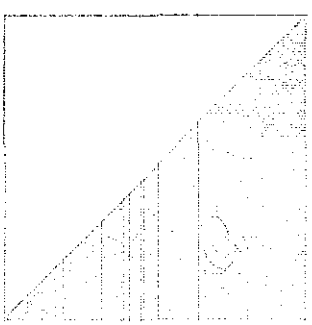
5.3 Hole Traps

5.4 The Food Web

5.5 Pictures And Statues From Plants

5.6 Dyes From Plants

5.7 Atlas Of Environments



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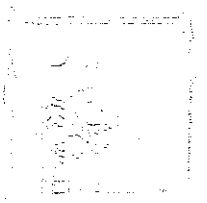

Activity 5.1

Hide And Seek (1): Looking For Colors

Concept:

Animal colors are important to their adaptation for survival. Many creatures have colors similar to their surrounding environments.

Objective:

By looking for colors, participants will know the importance of close observation and that disguising and hiding are survival strategies for small animals.

Method:

Work in groups to imitate a flock of birds looking for food.

Place:

A garden containing trees, bushes and grass.

Age:

Boys and girls from 7-10 years old.

Suggested duration:

30 minutes.

Materials:

Pieces of colored wool (alternatively, use colored plastic straws or any other objects we use daily and dispose of that are of different colors and shapes).

Make it:

1. Examine a small trail passing through some bushes or trees.
2. Tie pieces of the colored wool to the branches.
3. Hang wool pieces on either side of the trail, bearing in mind that it should be easy to reach. Match the colors or shapes of the wool with the branches, if possible, so that finding some of the marks will be more difficult. For instance, put the brown wool on the brown bark.

Use it:

Divide the group into small flocks of birds looking for food. The participants can imitate birds they have actually seen in the area.

1. Every "flock" walks around individually and quietly and writes which colors of wool it sees, but without removing the wool.

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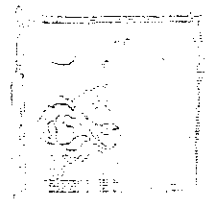
Activity 5.1

2. Now, point out the missed colors. How did the participants perform? Was it easier to trace some colors than others? Were some groups better than others in finding the colors?

3. Remove all the wool before leaving the area.
4. After returning from the search, show the participants some of the books available in the library which contain pictures of animals, insects and birds with colors and shapes that help them hide and protect themselves against their enemies.

Source: *Environmental Education Activities for Primary Schools*. Environmental Education Series (21). New York: UNESCO, 1992.



Activity 5.2

Hide And Seek (2): Comparing Habitats

Concept:

The study of small animals in their habitats demonstrates the great diversity in the lives of animals. The colors of small animals are related to their habitats, which helps protect them against their enemies.

Objective:

Testing ideas resulting from the activity of finding colors (see Activity 5.1) by preparing tools for searching in different animals' habitats and recording the colors found there. Participants will find out that their original ideas require some amendments. The protective colors may be attempts at concealment but the clear and bright colors are warnings that say, "I sting" or "My taste is bitter." Some small animals protect themselves by imitation, such as taking the shape of inedible animals. In some insect species with bright colors, such as butterflies, the females recognize the males by their bright colors.

Method:

Observing small animals and insects in their habitats.

Place:

The library garden, Children's Museum garden or any other public garden such as the aquarium, Al Orman garden, the zoo garden, and the International Gardens. Make sure that the required contacts with officials are made.

Age:

Boys and girls 10 years or older, under the supervision of adults.

Suggested duration:

A free day during an outdoor trip to the garden.

Materials:

Sweeping net:

Big plastic bag - adhesive tape - wire clothes hanger.

A strong sweeping net:

Broom stick or a strong stick - wire clothes hanger or long and strong wire - 2 clasps - an old pillow case or something similar - a needle and string or a stapler.

A tray or swatter:

Umbrella or a white sheet - a small mirror.

Data chart:

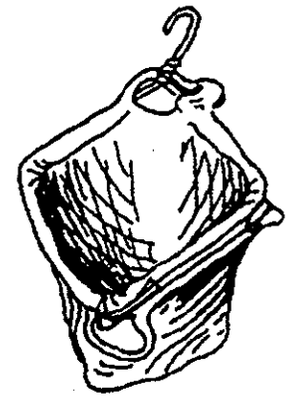
Piece of paper divided into small quarters (It may be plain or divided into columns with the names of the animal groups at the top.) - pencils or pens.

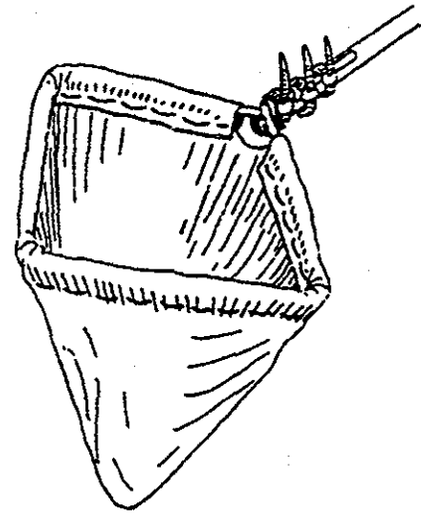
Activity 5.2

Make it:

The tools needed depend on the nature of the habitat which will be visited by the group. Visit some places within a forest ecosystem or garden, or do the activity in any place that contains trees, bushes or long grass.

1. To make a simple net, open the clothes hanger so that it takes the shape of a square. Put the plastic bag in it and fix them together with the adhesive tape.
2. To make a long net, make a frame of steel wire and attach it to the broom stick with a clasp. Cut the pillow case from the middle and sew or fix it into the wire frame with pins.
3. Collect the remaining tools: The swatter, the small mirror, the straws and the small pots.

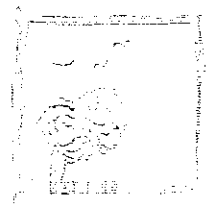




Use it:

What are the colors that the hidden small animals (invertebrates) use in their different habitats? Ask the participants what they expect to find. Try the previous activity, Looking for Colors, first.

1. The net is used to collect small animals from the grass and short plants so they can be examined accurately. Keep the net bag moving to prevent the prey from escaping. Do not use the net if the weather is wet or moist, since in this case animals will stick to the net, especially if it is made of plastic.
2. Look for small animals hidden under leaves by using a small mirror.
3. Come closer and look for animals hidden in the branches and the leaves of the trees using the swatter. Spread the white sheet under the branch, and shake or beat on the branches several times. Be ready to collect animals quickly before they jump or fly. In all these actions do not forget that an important part of this activity is to return all these animals to their habitats without being harmed. Discuss with the participants why they should do so. This procedure is important to apply, especially with the swatting method as most of the organisms collected in this way are unable to fly.



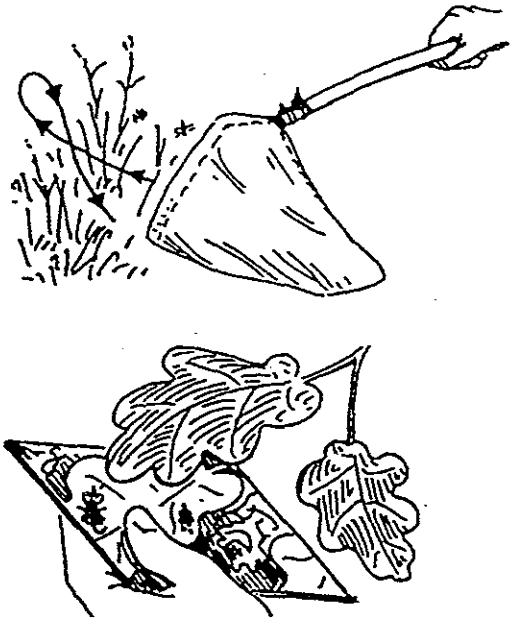
Activity 5.2

4. Use a registration form for every area or habitat you study. It is not necessary to write the animal names accurately. The participants can classify what they collect in large taxonomic groups or depend on their special descriptions of these organisms.
5. Choose one dominant color to register each animal, and then you will have, as a result, charts with colors indicating the common colors in every habitat. Were these results expected?

Variations:

Of course you can use these tools to answer many questions not related to color.

- For example, you can compare the habitat in different times of the year or compare animals that live in different types of trees.
- Try to collect animals with the aim of studying their population size. For example, count one kind in one place and compare it to the number of the same kind found in another place. This is done by comparing the number of animals in the collection net using the same number of sweepings from both places.
- Classify the animals you have collected into groups according to their way of feeding in order to use this information as an introduction to the study of food webs.
- The umbrella is usually divided by rods and sticks into triangles. You can make use of this in counting the captured animals. Count the animals that exist in one triangle, for example. This is more practical and feasible than counting the entire collection of captured animals.



Source: *Environmental Education Activities for Primary Schools.* Environmental Education Series (21). New York: UNESCO, 1992.

Activity 5.3

Hole Traps

Concept:

Mobile small animals which live on the surface of the earth can be found in many different places.

Objective:

Demonstrating that plants and animals are found in different places inside the ecological system.

Method:

By digging hole traps you can catch small animals that wander on the surface of the earth, and then they can be studied. Usually the study demonstrates that most living organisms are active in the night rather than the daytime.

Place:

A big garden such as the Children's Museum garden, for example, or a nearby nursery. You should make the necessary arrangements with the personnel in charge.

Age:

Boys and girls 12 years or older, especially those who seem interested in wildlife.

Suggested duration:

Almost an hour to set the traps, then an hour daily to check the catch.

Materials:

The main hole trap:

Used plastic containers (from tea, coffee or yoghurt, for example) - spade - small pieces of stone - small pieces of wood.

The wall net:

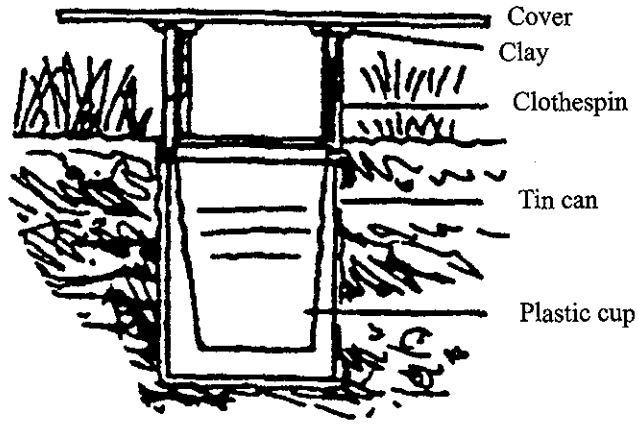
Stiff plastic strips with a height of about 15 cm and a length of many meters - adhesive tape - small pieces of bamboo or small sticks.

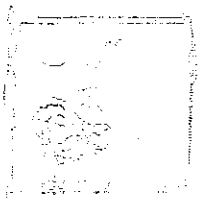
Make it:

Hole trap:

The simplest form of a hole trap is a hole dug in the earth where a container is placed so that the animal falls in it while walking.

1. Dig a small hole in the grass or under a tree. Make the hole big enough to place a jar or plastic container





inside it. Fill up the earth around the container so that the surface of the earth is at the same level as the container's edge.

2. If you are using plastic coffee cups, put another cup inside the original cup. This way you can remove the catch while the trap is kept in place.
3. Place some small stones around the edge so that they can support a "roof" that protects the trap from rain water or dew.

Wall Net:

Using the wall net increases the number of animals caught by a relatively small number of hole traps.

1. Dig a hole in the center of the area, and dig four other holes on two perpendicular lines that cross at the center.
2. Set two "walls" of plastic along the two diagonal lines passing through all the five holes. Make the two walls vertical using the short sticks and the adhesive tapes. You can prevent small animals from passing under the two walls by filling in soil around the plastic band base.

Use it:

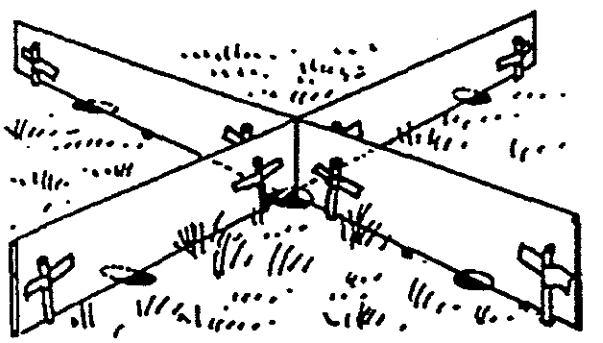
Making hole traps is very easy, and you can make a lot of them to increase the catch. Each participant should be responsible for one of them. Animals that may fall in it include beetles, millipedes, spiders, and worms. Check the traps regularly, as some small mammals may fall in it too.

1. Make a comparison between the catch during the night and during the daytime. Do the animals differ in different seasons as well? You can leave the inner container in the hole, and close it with the "roof" putting a piece of stone on it, and reopen it again later.
2. Compare the different ecological systems. Are the small ground animals in open areas similar to those found under the trees?

The wall net catches the animals that cannot easily fly or climb. When they hit the plastic wall, they turn and walk along it, and soon they fall into the hole trap that stands in their way.

Variations:

There are many modifications that could make the hole trap more durable and easier to use. Try using an old tin can equal in size to the plastic glass, removing its top completely. Place the can in the hole, and then put a clean plastic cup in it. By using small clothespins and clay, you can seal the cover.



Source: *Environmental Education Activities for Primary Schools*. Environmental Education Series (21). New York: UNESCO, 1992.

Activity 5.4

The Food Web

Concept:

There are connections between plants and animals through links in food chains that form a web of interrelationships.

Objective:

The study of a certain ecosystem, or a small habitat in it, so that the participants become aware of some of the plants and animals, and learn what each of those plants and animals eats. If we consider the role of each of these important components, we will find that each of them is connected to food chains that form a complex food web. The final pattern may resemble the effects of the changes that befall the ecological system, and how these changes may affect plants and animals that live in it.

Method:

The study of a small habitat inside an ecological system. This may be done by repeated visits and examinations, or by mixing field observations with reading and research in the library. The activity can be carried out in many ways, such as drawing pictures, collecting photos and role playing.

Place:

The library or classroom, with field visits, if possible, to a big garden or agricultural field area.

Age:

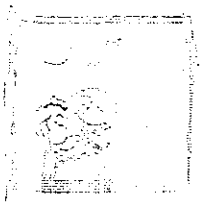
This activity can be carried out with boys and girls of different age groups, taking into consideration the degree of simplicity or complexity according to the age of the participants. Young children can understand that rabbits eat clover and that is a part of the food chain. Older boys and girls can do more research to get further information.

Materials:

Short strings, about 0.5 meter each - cards with names and pictures of animals and plants found in an ecosystem or a habitat (attach them with pins or tie them with strings so that they can be hung around the participant's neck) - big flipcharts - felt pens - glue - colored cards.

Play it:

The participants will be able to understand the idea of interconnected relations between animals and plants in a better way if they are first given the chance to study an ecosystem, or, to be more precise, one of the habitats inside that ecosystem. For example, after



Activity 5.4

studying a single tree, they will know the names of some of the algae that live on that tree and the grasses that live below it, as well as the names of some of the small animals and other organisms that live on the tree or visit it. They could already have an idea about the relative abundance of these organisms. For example, for a certain tree, aphids may be very prevalent on the leaves, but spiders are less prevalent, and only a few birds visit it.

1. Choose cards for animals or plants that have been seen before. It is preferable to give a different card to each pupil, although common plants and animals may be represented twice.

2. The participants write a sign on each card representing what this organism eats and thus specifying its role in the food chain. It is helpful to provide pupils with this information. It may be in the form of a simple list of all plants and animals so that the participants can then choose what they need. You can suggest the following letters:

   G = Green plant (gets energy from the sun).

   H = Herbivore (feeds on plants).

   D = Decomposer (feeds on dead and decaying materials). For simplicity, you can incorporate this category with grass eaters.

   P = Predator (feeds on other animals).

   SP = Secondary predator (feeds on other animals, including other predators).

3. Divide the group so that each participant takes a card from an animal or a plant carrying a different letter. Ask the participants to think in which order they should arrange these cards. Ask them to model the food web. This can be done by the participants standing and holding hands. Or, they can put the different cards on a big board on the table or on the ground and think about how to arrange these cards. After they decide on a certain arrangement, they can pin the cards and connect lines between them that identify the relationships between the organisms in the web.

4. Ask the participants to look for the "missing link," i.e. the first source of energy, which is the sun, that needs to be linked into the food web.

5. Give the participants red cards with phrases written on them such as:

   "A huge volcanic eruption obscures the sunlight."

   " A herbicide that kills green plants."

   "A hunter kills some of the predatory animals."

   "A fishing fleet catches large amounts of fish."

   "A wood manufacturing company cuts the forest trees."

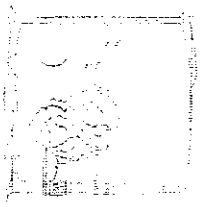
Activity 5.4

6. Ask them to think where to put these cards, and then let them discuss the effect of these red cards on specific food chains and on the food web as a whole.

Variations:

You can make models of the food chains and the food web by using cardboard and clay. Preserved insects or embalmed small animals can also be added. This requires training on how to conserve insects and embalm small animals, so you need to seek the help of experts in that field. You can also visit the Children's Museum to become familiar with methods of preservation and embalmment.

Sources: H. Abou Bakr and H. Adel, Environmental Education Workshop, Horizon for Environment and Development, Cairo, 1999; and *Environmental Education Activities for Primary Schools.* Environmental Education Series (21). New York: UNESCO, 1992.



Activity 5.5

Pictures And Statues From Plants

Concept:

Plants show a large diversity in shapes, and that is made clear by the differences between their leaves, flowers, fruits and seeds.

Objective:

Explaining the importance of variation and diversity in nature and in people's lives.

Method:

Using a collection of natural things taken from one habitat to show differences in diversity, color and structure within habitats. These things, that are collected without destroying or harming the plants, can be used later in a creative way to produce pictures that record these features.

Place:

Library or classroom, and a garden, field or nursery.

Age:

Boys and girls 9 years or older.

Suggested duration:

This is an extended activity, but a single session may take 30-45 minutes.

Materials:

Habitat cards:

Small pieces of white cards - glue - small bags of transparent plastic - stapler - a big board.

Pictures of what the wind blows:

Blotting paper, or any absorbent paper - old newspapers - weights such as books.

Make it:

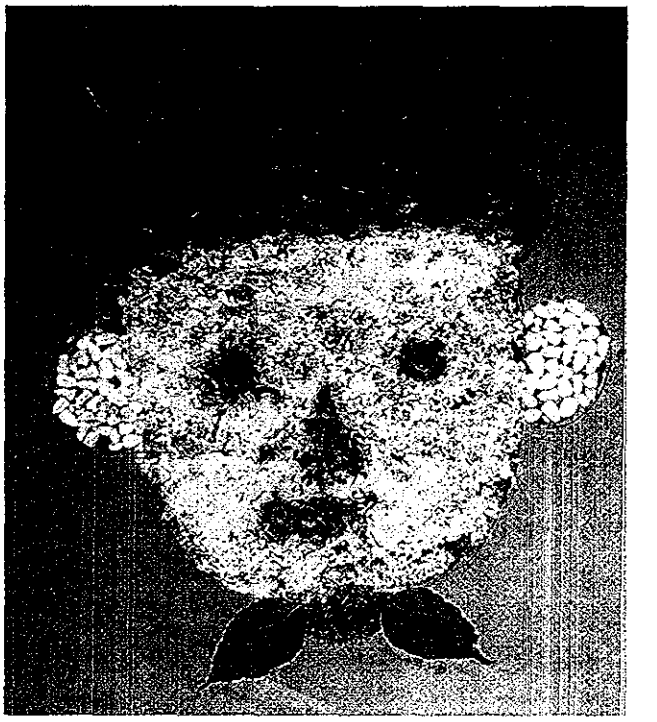
The small parts of the plant - a leaf for example - will stick easily to the card. The participants may use this idea to:

1. Make a record of the different colors or shades inside a habitat. It is interesting to see how many shades of green there are, for example.
2. Collect samples of all the shapes of plant leaves and glue them on the cards. Use this as a reference list to compare areas. It is not necessary to put down the right name for each plant, but it is important to understand that plants are different. They can be given numbers or names by the facilitator. This idea can be developed by collecting plant items to form pictures into shapes such as people or animals.

Activity 5.5

Again, it is best to use materials that show variations in the habitat.

3. Collect only small amounts of materials blown by the wind, or common wild flowers and grasses, around the school. Make sure that everything you collect is as dry as possible.
4. Remove the heads of the flowers and put them on the blotting paper. Put them between the pages of an old newspaper, put weights on them, and leave them for a couple of weeks.
5. You can make a plant collection of dry seeds, leaves and flowers by putting each kind in a small, transparent plastic bag and closing it with the stapler. Fix the bags on a big board and write the necessary information below each bag.
6. To make a picture, of a person for example, use the glue again. You can use the leaves to make the shape of the body, and the stalks to make the arms and legs. Use the small flowers and the seeds to make the facial features. The shining colored petals can be used as clothes, and the background can be made of grass or fronds.
7. You can also make statues using a mold of mud or dry clay to make the body, with the use of dry grass to make the hair, branches to make the arms and legs, seeds to make the facial features, leaves to make the clothes, and so on.



Source: *Environmental Education Activities for Primary Schools*. Environmental Education Series (21). New York: UNESCO, 1992.

Dyes From Plants

Activity 5.6

Concept:

Plants are essential for the environment and humans. The diversity of plants is a valuable treasure that we should preserve.

Objective:

Emphasizing the importance of plant diversity for humans and being aware of the danger of losing this diversity due to overcollecting, habitat destruction, or elimination of wild plants caused by urban expansion and monocrop agriculture.

Method:

Making dyes from different plants.

Place:

Library, classroom, or laboratory.

Age:

Boys and girls 10 years or older, under adult supervision when using the oven or boiling the dyes.

Suggested duration:

45-60 minutes.

Materials:

Oven - small aluminum or tin containers - blotting papers - white sheets - clothespins - thin clothesline - small screen - paint brushes - plastic cups.

Different plant materials:

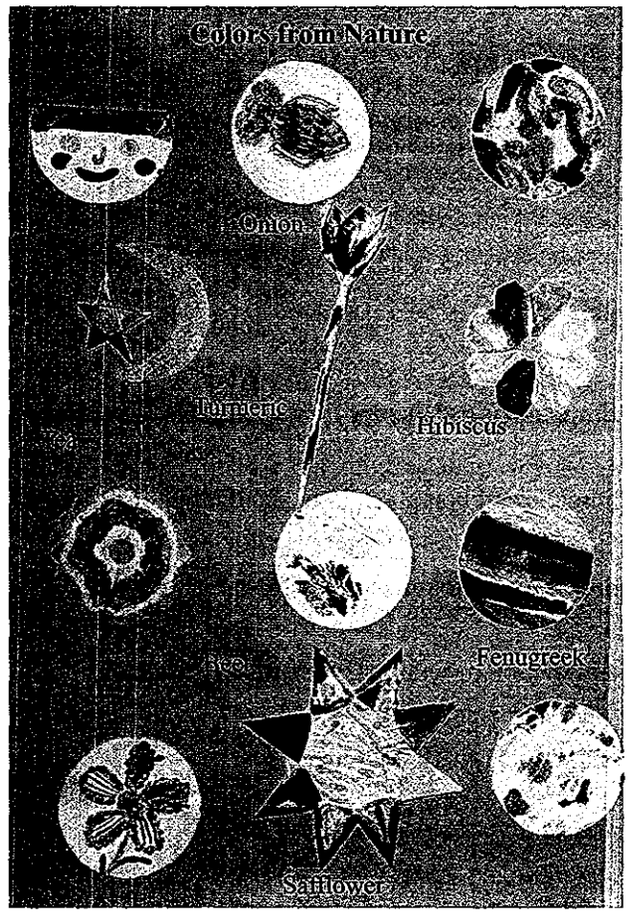
Hibiscus - onionskin - carrot - beet - dried tea leaves - green spinach - fenugreek - safflower.

Make it:

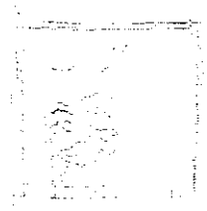
1. Put a small quantity of the plant material into the metal container. You may need to cut the beet and the carrot into cubes.
2. Add a small glass of water to each container.
3. Boil the containers for 5-10 minutes. Be careful.

Activity 5.6

4. Let the containers cool off and then filter each container to obtain the dye.
5. Dip a ribbon of blotting paper (10 cm long) into each kind of dye.
6. Hang the ribbon on a clothesline with a small clothespin until it dries.
7. How many colors did you make? What happens if you mix more than one color together?
8. Try to use these colors in a landscape painting of your surrounding environment.
9. Are there additional sources in nature from which you can make more dyes? Think about it, and use books to find more information.



Sources: H. Abou Bakr and H. Adel, Environmental Education Workshop, Horizon for Environment and Development, Cairo, 1999; and Bailes, M. *Experiment with Plants*. Cairo: Egyptian Culture Group, 1999.



Activity 5.7

Atlas Of Environments

Concept:

Plant and animal populations live in communities in places like meadows, forests, seas and lakes. These places are called habitats. Each community can live in equilibrium with its environment, forming together a characteristic ecosystem. Organisms in each ecosystem possess adaptations in structure and behavior in order to acclimatize to their environmental circumstances.

Objective:

Encouraging research to identify different ecosystems and to understand that living organisms in these systems acclimatize to their environmental circumstances and the dangers they are exposed to, as well as encouraging a sense of responsibility towards the environment in general.

Place:

Library or classroom.

Age:

Boys and girls from 12-15 years.

Suggested duration:

This is an extended and open activity. The participating group may need to meet for an hour every two weeks, for example, to exchange information and add it to the album.

Materials and sources of information:

Books, video tapes and CDs available in the library are the basic sources of information. Clippings from newspapers and magazines - traveling cards and photographs - notebooks and pens - big notebooks to make the albums.

Implement it:

1. The supervisor makes an introduction about the different ecosystems in the world, such as deserts, fresh water lakes, tropical forests, seas and oceans, and the polar regions. You may want to ask for the help of a specialist or an ecological scientist.
2. The group discusses which of these ecosystems are similar to the Egyptian environment. The group may decide, for example, the importance of making an album of the ecological systems in:

   The Egyptian Western Desert.

   The Egyptian Eastern Desert.

   The Mediterranean Sea.

   The Red Sea - Gulf of Suez - Gulf of Aqaba.

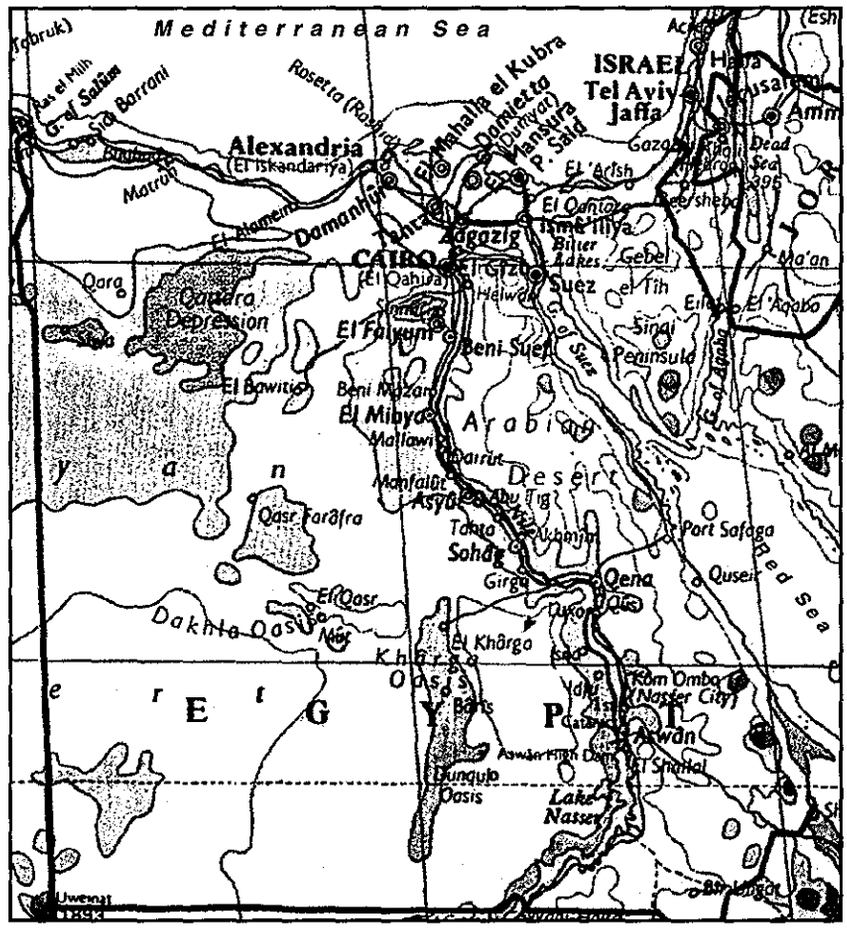
   The River Nile.

Activity 5.7

The north lakes (Al Bardaweel - Al Manzala - Al Burollos - Edko & Maryott).

The inner lakes (Al Temsah - Al Murra - Quaroon and Nasser).

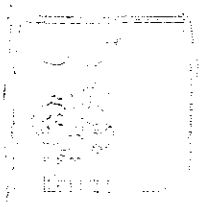
3. The group can be divided, according to its wishes, into small groups and each group can collect information about an ecosystem.
4. The collected information will include photographs, drawings, statistics and descriptions of the subject of research. It will also include the natural and economic importance of that system and how to manage it, in addition to the dangers threatening it and how to confront them.
5. This research may lead to a number of more detailed investigations. For example, some participants could gather information about a certain organism, a natural reservation or a rare resource in that ecological system.



Source: H. Abou Bakr and H. Adel, Environmental Education Workshop, Horizon for Environment and Development, Cairo, 1999.

Background Information For Chapter Five

- The Study Of Ecosystems
- Some Important Definitions
- Food Chain
- Food Web
- Biological Accumulation Of Pollutants
- Help Maintain Ecological Balance
- Biodiversity Crisis
- Consequences Of The Disruption Of Equilibrium Among Species (1)
- Consequences Of The Disruption Of Equilibrium Among Species (2)
- Natural Reserves
- Guidelines In Preserving Our Natural Reserves
- Do Not Take Anything With You, Do Not Leave Anything Behind
- Enjoy The Sea And Preserve Its Beauty
- Important Information



Information

The Study Of Ecosystems

Evolution over the ages has produced an amazing diversity of living organisms. There are microorganisms that cannot be seen by the naked eye, and there are very huge organisms. There are organisms that live in the depths of the oceans and others that live on the heights of mountain tops. This biological diversity, which includes all types of plants, animals and microorganisms, represents the basis of life on the surface of the earth.

The Five Kingdoms Of Organisms

Living organisms on planet Earth have been classified into five groups called kingdoms. They are:

1. Prokaryotes:

The first living organisms, their cells lack true membranous nuclei and some other structural characteristics. The most important example is bacteria.

2. Protists:

These are basic monocellular living organisms. They include algae, protozoa and slime molds.

3. Plant Kingdom:

It includes autotrophic living beings that perform photosynthesis.

4. Fungi:

They are living organisms that grow directly from spores, are non-autotrophic and have mutual relations with other living organisms that take the form of parasitism, saprophytism or commensalism.

5. Animal Kingdom:

These are non-autotrophic organisms, 59 percent of which belong to invertebrate groups such as insects and mollusks; the vertebrates include fish, quadrapeds, amphibians, birds, reptiles and mammals.

Source: *Reference for Environmental Education for Formal and Informal Education.* Cairo: Project of Environmental Training & Awareness, (DANIDA) and the Egyptian Environmental Affairs Agency (EEAA), 1999.

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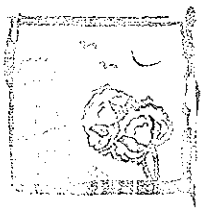


Information

Some Important Definitions

Habitat

It is the place where organisms live, each according to its species, such as seas, forests, soil depths, and mountain tops.

Ecosystem

It is a group of components that work together as one unit. The ecosystem is comprised of all the living organisms gathered in a community, and the surrounding organic and inorganic elements that interact with each other in one way or another. The ecological system can range from an aquarium for fish to a large body of water such as the Red Sea.

Food Chain

This is a pathway through which food passes from one level to another, starting with productive living beings (autotrophs) that perform photosynthesis and including all the rest of the living organisms in the ecosystem which are consumers. The length of a food chain depends on the amount of energy that passes from one level to the other. In nature, there are only a few ecological systems or simple, one-way, non-branching food chains. Food chains usually intersect and their paths thus form "food webs."

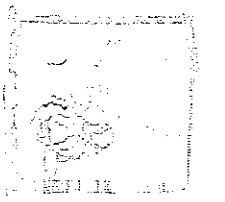
Community

This refers to all the different populations of species that live together in a certain habitat.

Adaptation

It is a transformation, either in shape, structure or behavior, that a living organism undergoes so that it can live in harmony inside its environment.

Source: *Environmental Education for Primary Schools: Suggestions for Making and Using Low-Cost Tools.* New York: UNESCO, 1992.



Information

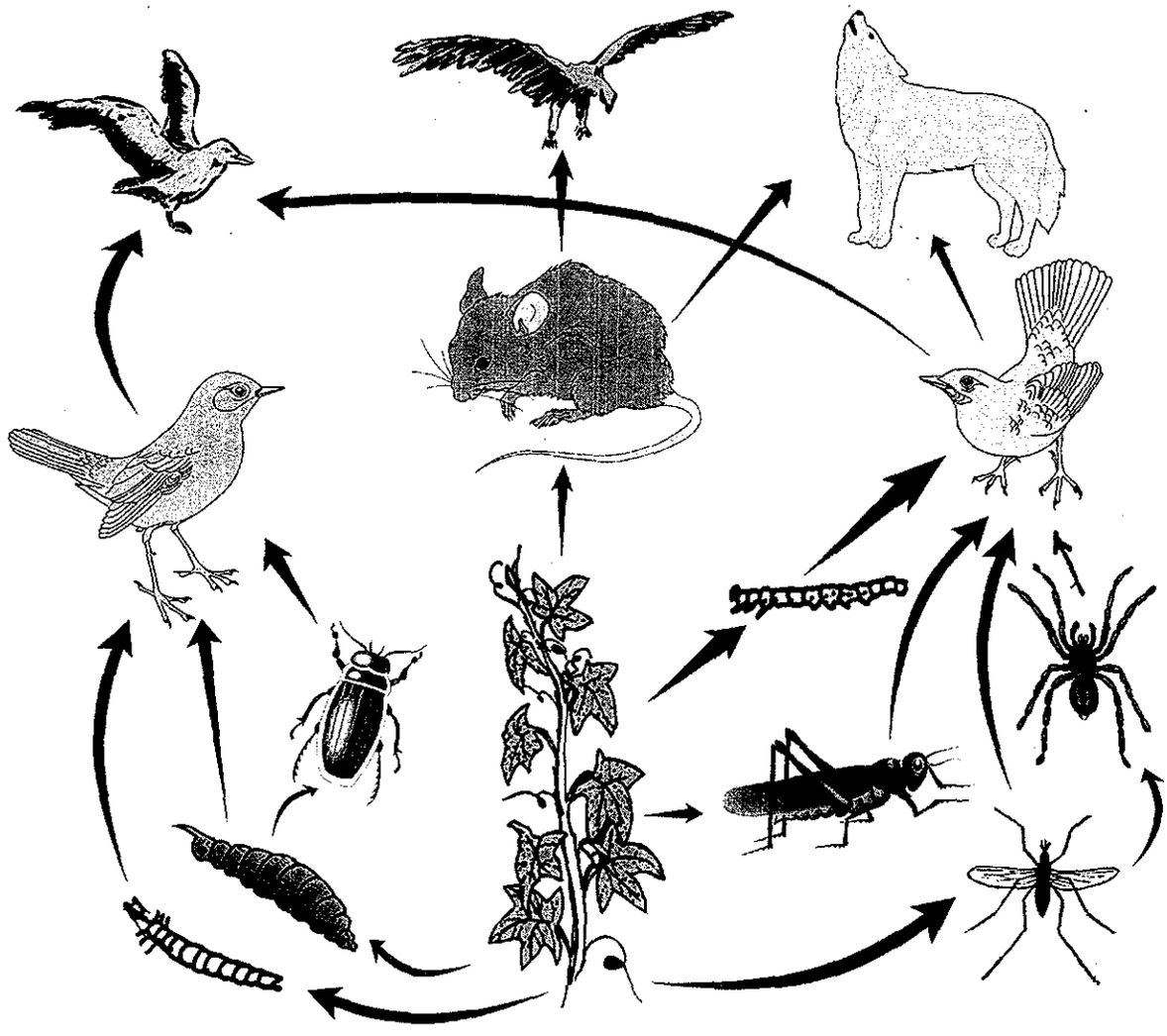
Food Chain

Energy passes through the food chain. Energy comes from the sun, and plants retain it through performing the process of photosynthesis and transforming it into chemical energy.

Source: Schmidt, T., Nordling, E., and Larsen, T. *Ecology*. Denmark: Av. Media, 1977.

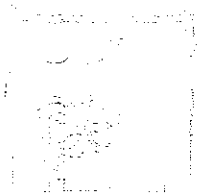
Information

Food Web



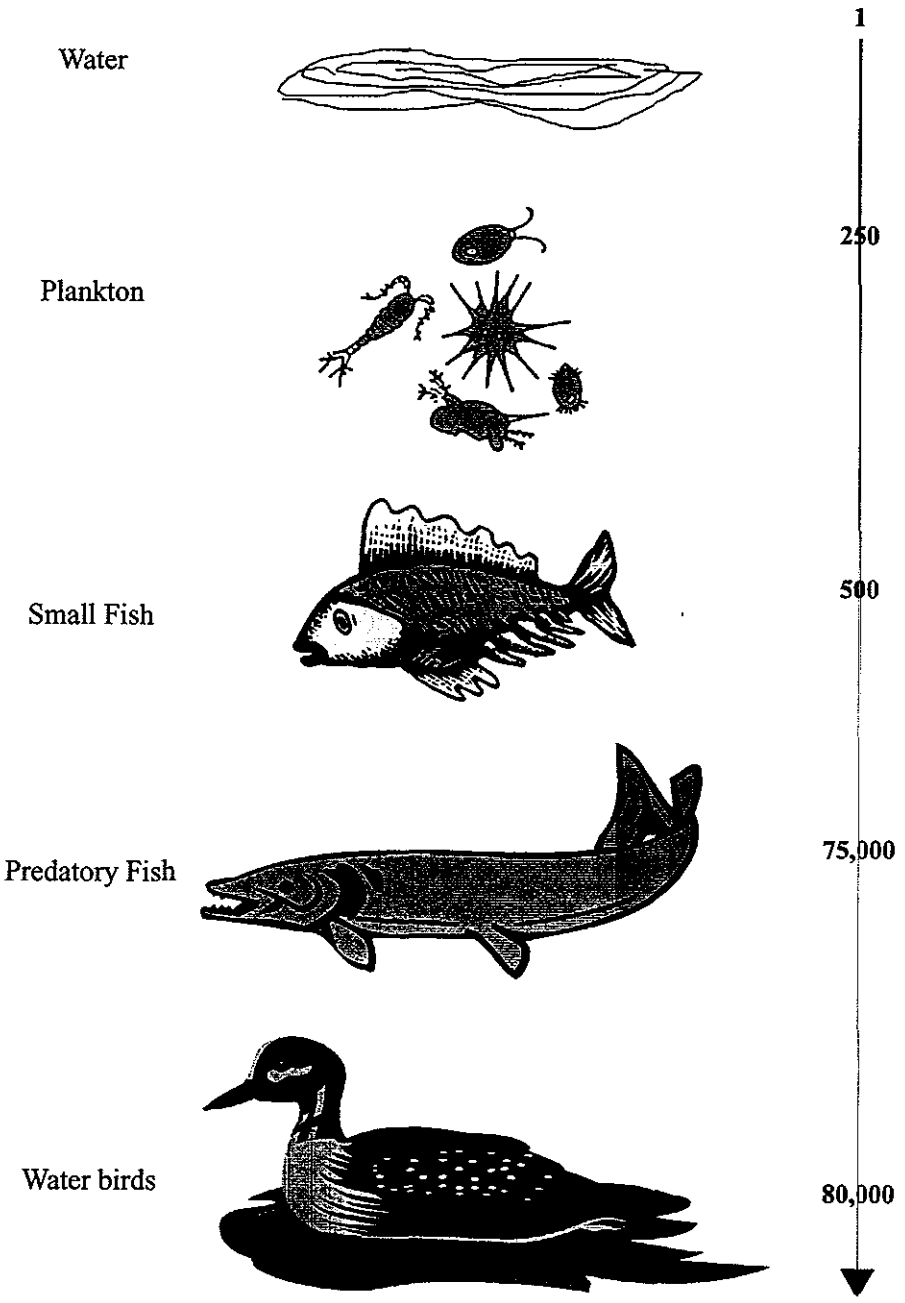
In nature, food chains combine together,
forming the food web.

Source: Schmidt, T., Nordling, E., and Larsen, T. *Ecology*. Denmark: Av. Media, 1977.



Information

Biological Accumulation Of Pollutants



Increasing concentrations of chemical pesticides in the food chain.

Source: Bottrell, D.R. *Integrated Pest Management.* Washington. D.C.: Superintendent of Documents, U.S. Government Printing Office, 1979.

Information

Help Maintain Ecological Balance

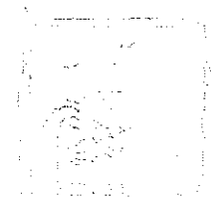
- Avoid plucking plants, picking flowers, breaking tree trunks, and catching butterflies and other insects. All these organisms represent elements of the ecological balance on our planet, which we are obliged to preserve.

- Do not annoy animals in nature or in the zoo, as you are a guest in their homes.

- Preserve the animals in your environment by not catching them or destroying their houses and breeding places, as each organism has an important role in nature.

- When you are on a trip or picnic, take care not to step on little plants and new grass so you do not kill them.

Source: *Fifty-one Suggestions for Protecting the Ocean.* Cairo: Egyptian Ministry of Environment and Soil Treatment and the National Agency for Ocean Protection in cooperation with the United Nations Development Program (UNDP), 1994.



Information

Biodiversity Crisis

The crisis of biological diversity occurs when the number of a single species decreases to the extent that the reproductive rate of that species cannot compensate for the death rate. Thus, the members fail in preserving their species and are therefore lost forever. This is called extinction. There are two types of extinction.

Natural Extinction

It is a part of the theory of natural evolution, which includes the principle of "survival of the fittest." It is a slow and gradual process that results from alterations such as sudden changes of climate, alternating rain and drought periods, and the occurrence of natural disasters such as volcanoes, earthquakes, floods and deluges. These events led to the disappearance of many living organisms from the Planet Earth.

Extinction After The Appearance Of Humans

Human beings are considered one of the factors in species extinction. The activities that can lead to extinction include overfishing, overharvesting and overhunting for commercial reasons or for sport; the destruction and alteration of original habitats, such as removing forests to cultivate land for farming or development; or the generation of environmental pollution.

Source: *Reference for Environmental Education for Formal and Informal Education*. Cairo: Project of Environmental Training & Awareness, (DANIDA) and the Egyptian Environmental Affairs Agency (EEAA), 1999.

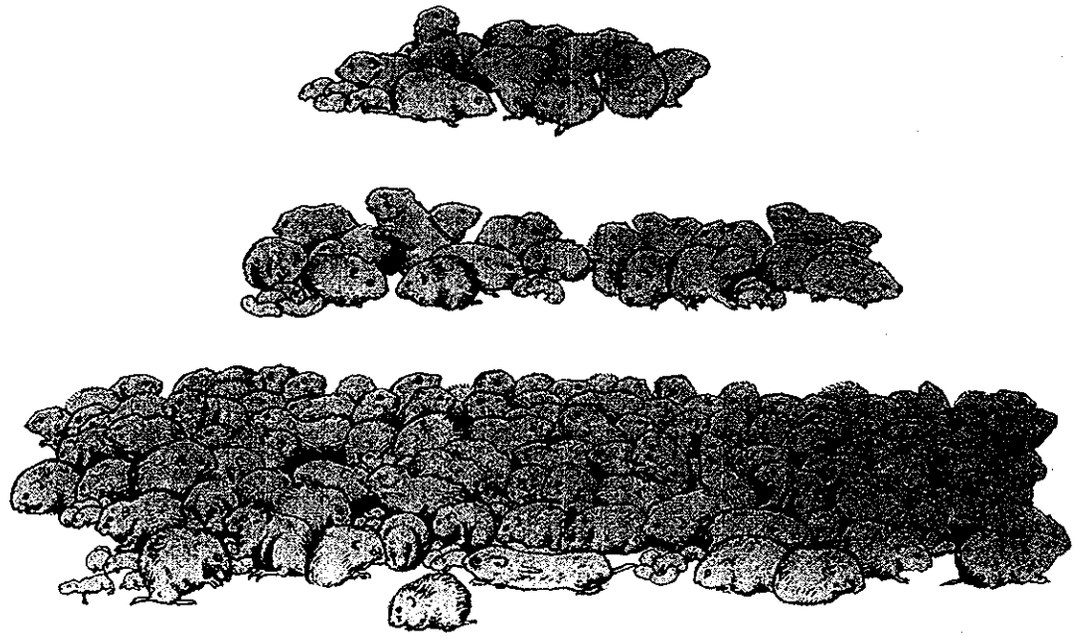
Information

Consequences Of The Disruption Of Equilibrium Among Species (1)

After 2 Months

After 4 Months

After 6 Months

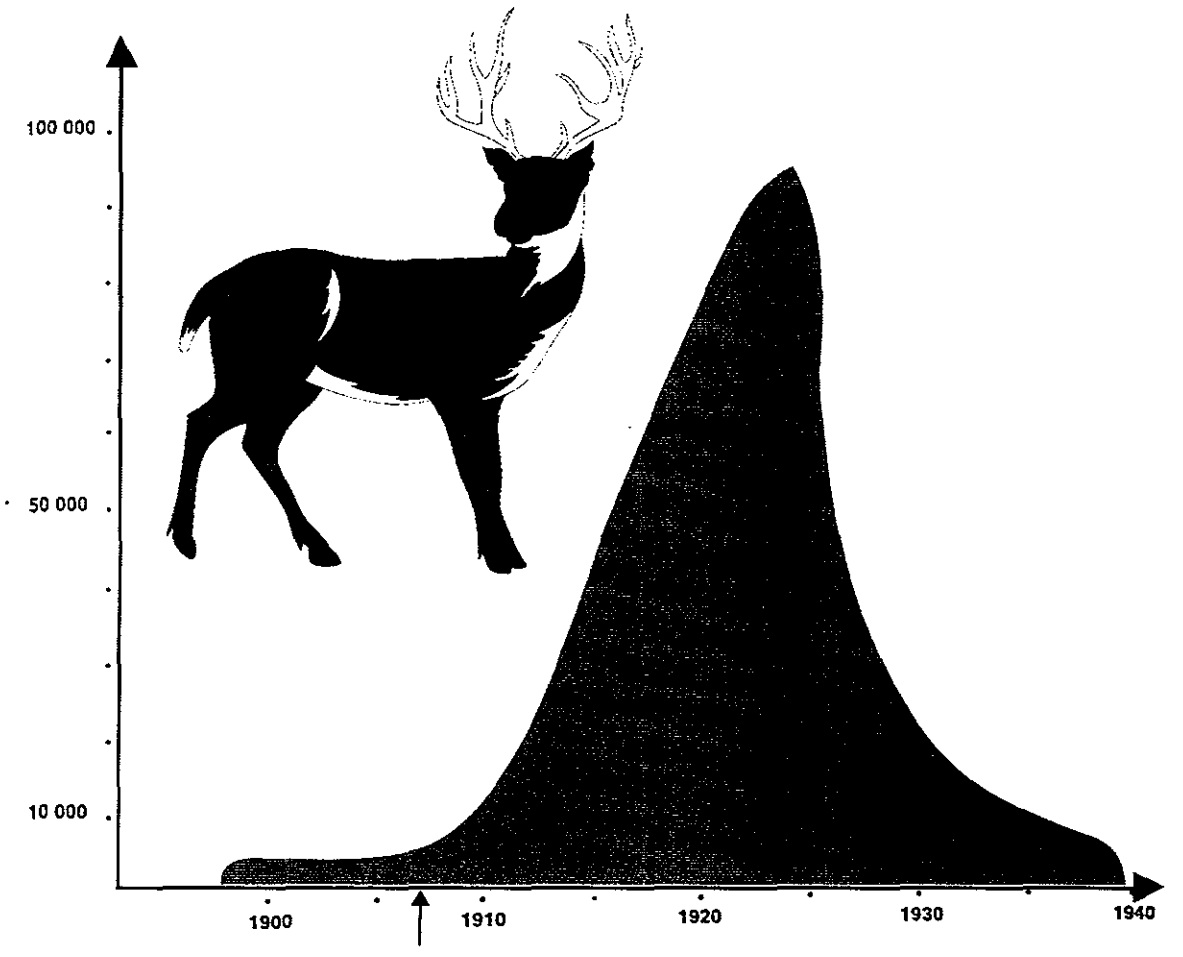


If nothing kills the field rats, their numbers will increase very rapidly. The picture shows the increase that may occur when a male and female mate in the reproductive season after two, four and six months from the start of mating.

Source: Schmidt, T., Nordling, E., and Larsen, T. *Ecology*. Denmark: Av. Media, 1977.

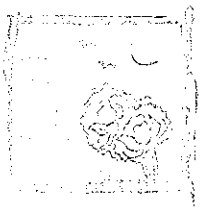
Consequences Of The Disruption Of Equilibrium Among Species (2)

Information



This picture shows the story of the deer in the American state of Arizona, which is considered a clear example of the natural imbalance that can result from human activities. In 1907, the number of deer was about 4000. Within the following 15-20 years, people killed about 8000 wolves and wild cats, the natural predators to these deer. The arrow in the picture shows the time at which hunting these animals began. From the curve it appears that in the absence of their predators, the deer at first reproduced in very large numbers. They over-populated and started to die of hunger due to a shortage of resources to provide for the increased population.

Source: Schmidt, T., Nordling, E., and Larsen, T. *Ecology*. Denmark: Av. Media, 1977.



Information

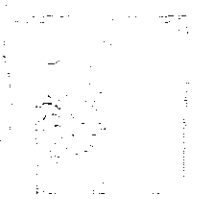
Natural Reserves

These are areas of land or water characterized by the presence of plant or animal organisms or natural phenomena of cultural, scientific, touristic or aesthetic value. A natural reserve is established to protect the natural living resources, maintain the integrity of the ecological processes in their ecosystem, and conserve biological diversity.

Natural Reserves In Egypt

In Egypt there are about sixteen natural reserves, covering a large number of Egypt's different governorates. These reserves are characterized by rare ecological, natural and aesthetic characteristics, the presence of rare wild birds and animals, or the presence of important geological features. These reserves are:

1. Ras Mohammed Reserve and Tyran and Sanafeer Islands in South Sinai Governorate.
2. Saint Katherine's Reserve in South Sinai Governorate.
3. Abu-Galloum Reserve in South Sinai Governorate.
4. Nabq Reserve in South Sinai Governorate.
5. Al Zaranique and Sabkhat Al Bardaweel Reserve in North Sinai Governorate.
6. Elba Mount Natural Reserve in Red Sea Governorate.
7. Al Ameed Natural Reserve in Matrouh Governorate.
8. Salouga and Gazal Islands Reserve in Aswan Governorate.
9. Al Alaky Valley Reserve in Aswan Governorate.
10. Ashtoum Al Jameel & Tenneess Island Reserve in Port Said Governorate.
11. The Petrified Forest Reserve in Maadi in Cairo Governorate.
12. The Asyotti Valley Reserve in Asyut Governorate.
13. Al Rayyan Valley Reserve in Al Fayyoum Governorate.
14. Quaroun Pool Reserve in Al Fayyoum Governorate.
15. Quabba Al Hasana Reserve in Giza Governorate.
16. Sannour Valley's Cave Reserve in Beni-Suef Governorate.



Guidelines In Preserving Our Natural Reserves

If you visit a natural reserve, there are some important instructions that help you preserve this reserve and, at the same time, enjoy the beauty around you.

Do not feed the fish so you do not destroy the natural balance in the reserve.

Do not fish in the reserve.

It is preferable that you leave the reserve before sunset unless you are staying in the camps designated for overnight visitors.

Use specified areas for entering dive sites in the coral reef.

Please follow the rules that are designated by the reserves.

Violators are dealt with according to the rules of Law 102, 1983.

Do not collect, transfer, nor destroy any living or dead materials such as corals, shells, or fossils in the reserve area you are visiting.

Do not drive your car except in the areas where vehicles are allowed.

Do not pitch your tent except in the designated locations.

Do not throw garbage away except in designated places, or carry it with you to the nearest rubbish bin.

Do not go into closed and prohibited areas.

Do not drop anchor in the coral reef areas, and do not touch, trample, or stand on them.

Do Not Take Anything With You, Do Not Leave Anything Behind.

Parking area

Nature walk

Plants

Nature reserves

Photo spot

Disposal of garbage prohibited

Information

Beach

Visitor's center

Restrooms

Underwater swimming

Wildlife

Observation point

Swimming area

Source: *The Natural Reserves in Egypt: South Sinai Reserves Sector*. Cairo: Egyptian Environmental Affairs Agency (EEAA), 1999.

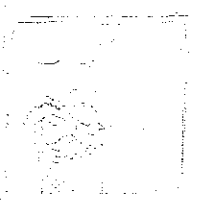
Information

Enjoy The Sea And Preserve Its Beauty

The sea is an ecosystem and an important resource that we should preserve, so when you are at the beach:

- Do not throw any wastes on the beach or in the sea water, because that will pollute the place and disfigure its beautiful scenery. Collect your wastes in a bag and put it in the waste bin on the beach or take it home with you.
- Do not try to bury any wastes in the sand, because the movement of the sea waves will uncover it.
- It is your right to enjoy the place, but do not infringe on the rights of others to enjoy it too.

Source: *Fifty-one Suggestions for Protecting the Ocean*. Cairo: Egyptian Ministry of Environment and Soil Treatment and the National Agency for Ocean Protection in cooperation with the United Nations Development Program (UNDP), 1994.



Information

Important Information

- There are 10 million kinds of living organisms on the surface of the earth, of which only 1.4 million species are identified; the rest of these millions have not yet been described.

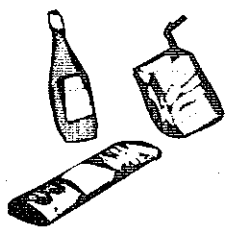
- There are 21,700 species of fish; 800,000 species of insects; 8600 species of birds; 4000 species of mammals and 250,000 species of plants. The rest are species of invertebrates, fungi, algae and microorganisms.

- Of the 250,000 species of plants, there are only 3000 species of agricultural crops, 300 of which are used as food for humans. About 100 species are widely used, but most of the world depends on only 20 of them, such as rice and wheat.

Source: *Reference for Environmental Education for Formal and Informal Education.* Cairo: Project of Environmental Training & Awareness, (DANIDA) and the Egyptian Environmental Affairs Agency (EEAA), 1999.

Chapter Six

Positive Actions



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Activities In Chapter Six

6.1 Useful Things From Garbage

6.2 Paper Recycling

6.3 Planting Trees

6.4 Designing An Area For Wildlife

6.5 Aquatic Garden

6.6 Environmental Auditing

6.7 Environmental Impact Assessment

6.8 You Are Not Alone

6.9 Press File

6.10 Propose A Solution

6.11 The Game Of Hazelnuts

6.12 Green Ideas

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Activity 6.1

Useful Things From Garbage

Concept:

Empty cans and other wastes we throw away have become an increasing problem in many places around the world.

Objective:

To draw attention to three general principles for dealing with wastes:

1. Reducing.
2. Reusing.
3. Recycling.

Method:

Monitoring objects - wastes - we dispose of during a certain period and thinking creatively about ways to make use of them.

Place:

The library, the courtyard or the garden.

Age:

Boys and girls 10 years or older.

Suggested duration:

30-45 minutes.

Materials:

Large cardboard boxes - big plastic bags - gloves - scales, if possible - a notebook or a large sheet of paper - pens.

Use it:

1. Start the activity by bringing a box full of garbage, weighing its different contents, classifying them, and making a record of the different components.
2. Ask the participants to collect their wastes and garbage for a week and classify them into categories such as paper, cardboard, metal, plastic, and organic materials.
3. Identify the components that can be recycled or reused. Separate these components and classify them into closely related groups. Then decide how these things can be used to make organic fertilizers, bottle holders, etc.

Variations:

1. Examine the packaging of one of the articles purchased from a nearby shop - a chocolate bar for instance. How many layers are there in the package? Are all of them necessary? What are the parts of this package that can be recycled?

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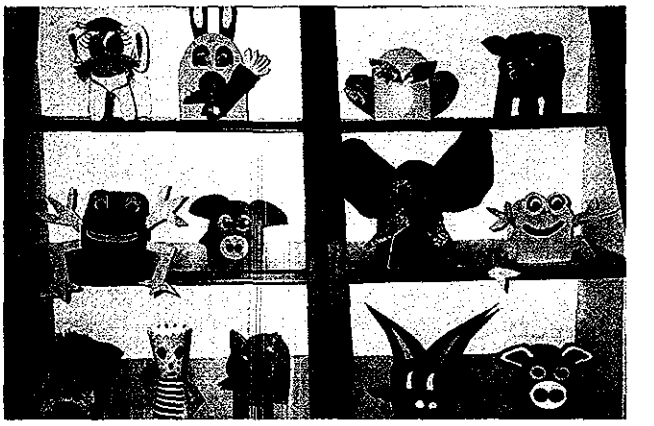
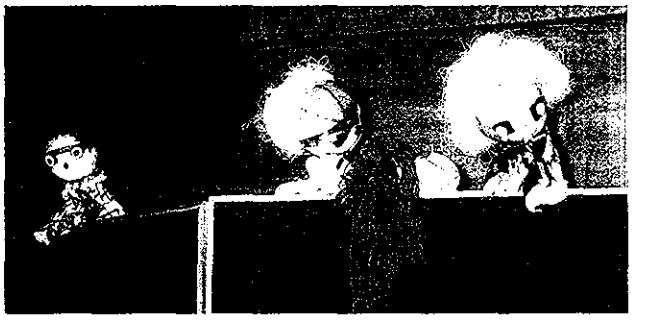
Activity 6.1

2. Write to the companies that you think are using excessive containers and packaging. Tell them that you consider this practice environmentally unacceptable or that you are thinking of not buying goods with such containers and packaging.
3. Encourage boys and girls to think in a creative and unusual way. Ask them to make artistic forms, tools, or containers from the different components of the garbage. Ask them also to think of new ideas that enable us to achieve the three general principles for dealing with wastes. Write these ideas on a board and suggest that the students write a paper on this topic to be published on a wall magazine or a library bulletin.





Source: *Environmental Education Activities for Primary Schools*. Environmental Education Series (21). New York: UNESCO, 1992.

Paper Recycling

Activity 6.2

Concept:

Everyone produces annually an amount of garbage equal to his/her weight. This garbage has to be disposed of somewhere, and in Egypt this is usually done by burying this rubbish underground, burning it, or leaving it in a remote area away from people's homes. Today, we cannot always provide suitable places to get rid of these wastes. We can help mitigate this problem by reusing or recycling materials we are disposing of as much as possible.

Objective:

This activity aims at clarifying the principle of recycling wastes. This reminds us that we can support the local recycling of materials such as glass, tin cans, plastic and paper.

Method:

Collecting used paper and recycling it for reuse.

Place:

This activity requires a place that is allowed to get wet, as making paper needs a lot of water.

Age:

Boys and girls from the ages of 12-15.

Suggested duration:

One hour the first day to prepare the tools and materials, and one hour the second day to make the paper.

Materials:

Used paper, or any paper wastes from schools or offices - a very fine sieve made of wire or plastic - absorbent cloth, felt for example - buckets or plastic basins - wooden spoon - dye - plastic bags - weights.

Make it:

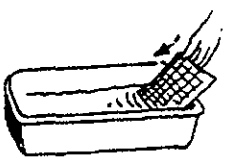
1. Shred the papers, put them into a bucket full of water and leave them to soak until the next day.
2. Stir the paper with a wooden spoon until it becomes a doughy pulp, and get rid of the extra water. If you have an electric blender you can use it to turn the paper into pulp in a short time. During this step you can add dyes if you want.

Activity 6.2

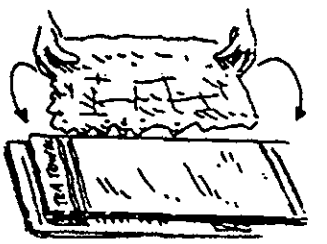
3. Put the pulp in the plastic basin - a rectangular shape is preferable - and add a quantity of water that equals the paper's size. Mix well.

4. Cut the sieve to the size of the paper sheet you want or make it one piece that can be easily put in the basin.

5. Insert the sieve in the basin in a sloping and sliding way and lift it up. Now the sieve's surface is covered with a layer of the pulp.



6. Put a sheet of paper on a clean surface, and place a wet piece of absorbent cloth on top of it. Put the sieve on the cloth so that the side with the pulp is facing downwards. This requires a delicate and swift movement in which the wet sheet of pulp is transferred completely to the cloth.
7. Press the sieve downwards firmly and peel it carefully from the pulp. Put another layer of the wet and absorbent cloth on the sheet of pulp. Repeat this process 6 or 7 times until no more pulp remains in the basin. Note: The pieces of cloth that alternate with the sheets of pulp should always be wet.
8. Cover the pile of pulp and cloth with newspaper and put a heavy object on it - clean bricks, for example.
9. Many hours later, separate the layers of cloth and paper and spread the sheets of paper to dry.
   - You can be guided by the information paper, "Making Paper Manually," found at the end of this chapter. How different is the paper you made from the kind you buy from shops?



Variations:

1. Put small plant leaves between two layers of the sheets of pulp to make impressions on the paper.
2. Make colored paper by adding liquid dye made of plant materials such as bark, fruits, or petals.
3. Make perfumed paper by adding some scents or natural perfumes such as lavender or mint.

Source: *Environmental Education Activities for Primary Schools*. Environmental Education Series (21). New York: UNESCO, 1992.

Planting Trees

Activity 6.3

Concept:

Trees are considered the lungs of the earth, and their green leaves purify the air by absorbing carbon dioxide and releasing oxygen during the process of photosynthesis. Trees are also natural pumps, and their roots absorb water that filters into the land and then is returned back to the atmosphere to complete the cycle. The decrease in the number of trees, especially in towns, aggravates the problem of air pollution.

Objective:

Although planting trees in school playgrounds and other local places is not an alternative to the vast areas of lost forests in the world, it draws the participants' attention to the importance of established forests and trees, and the new trees will attract various kinds of wildlife.

Method:

Propagating new trees from seeds and grafts. Then the participants can plant them in the ground and take care of them.

Place:

The garden of the library, school or Children's Museum.

Age:

Boys and girls 9 years or older, with the help of an expert.

Suggested duration:

This is an extended activity, and the growing plants can be cared for with an agreed upon schedule of responsibilities.

Materials:

Bags for planting seeds - plastic bottles or cardboard containers - scissors for pruning plants - a sharp knife - fine sieve - sand - dustpan - sticks of reeds.

Use it:

There are many different ways to propagate trees. Make sure that you use local, wild species and locally planted trees that grow near your place and in the adjacent areas. Consult a field guide or ask the advice of an agricultural engineer or an expert from the botanical garden, Al Orman. Most of the trees you see are imported, not indigenous.

1. In collecting seeds, make sure that you choose the ripe seeds only and that you pick them from the

Activity 6.3

land or the lower branches. Make sure also that your seeds were selected from different samples of trees in order to avoid homogeneity. Remember that seed production varies greatly from year to year. When storing seeds, keep them in a cold place in perforated or permeable bags.

2. If you collect samples of winged seeds, plant them with their wings. Seeds with covers require removal of the covers before being planted. We can select the seeds of the mulberry tree by putting the fruits into water. Use only the seeds that sink and not the ones that float.
3. Some seeds have the ability to germinate immediately, while other seeds need a latency period. Some seeds need to be subjected to frost in winter, others to drought, and so on. Many of the seeds of tropical fruits should be planted immediately after the removal of their outer fleshy covers. There are other seeds that should be scratched before being planted, and this is done by rubbing seeds on a harsh surface until small holes appear.
4. A layer-burying approach may help bring the seeds of some species of climate sensitive trees out of dormancy more quickly.
   - Make a hole for drainage at the bottom of a yoghurt can or a similar container.
   - During the autumn and winter, mix seeds with sand and put them into the container.
   - Cover the container with a piece of gauze or sieve to protect the seeds against any animal attacks.
   - Bury the container with its contents at a depth of 10 cm in sand.
   - Examine the container's contents in the spring. If some seeds start germinating, plant them immediately.
5. Some seeds can be planted in an open field used as a nursery; seeds of other species can be planted in plastic bottles as a very small greenhouse kept in a cold place inside. Drainage for the soil should be provided. It is preferable to mix the soil with some decayed leaves. The nursery should be protected against fungi and undesirable plants.
6. Some trees can be propagated from grafts that are taken shortly before the end of the growing season. Choose a healthy and strong branch from the branches that grew during the current year. Cut a section with a length of 25 cm directly above a bud at the top and below a bud at the bottom, and bury two-thirds of the cut piece in soil or sand with good drainage. Water it regularly.
7. Scrutinize the place around you. You may find large numbers of small plants that grow near a main tree or under the bushes. These plants came from the root rhizomes or seeds and grow naturally. Many of these plants will die while struggling to get food,

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light and space. If you get the permission of the land owner, you can make a seed bed for some of these plants. It is better to do so early while the small seedlings have not yet deepened their roots. If you use rhizomes, you will have to separate them from the roots of the main plant under the soil.

8. When you are ready to plant the trees in their permanent places, make sure that you have a natural mixture of species, and that the trees are not too close together. You have a better chance of succeeding if the height of the transferred seedlings is less than 1.5 meters.
   - Prepare the soil, and remove any undesirable plants. Be careful that the naked roots remain wet while being planted. Make the hole as big as possible to contain the roots in addition to some fertilizer. While planting, straighten the roots and fix them firmly in the soil or in a mixture of soil and fertilizer. Press down the soil around the roots, but do not bury the seedling's roots under a large amount of soil.
   - Insert a stick of reeds or a dry branch beside the seedling in the direction of the wind and tie it to the seedling with a piece of rubber. You can use the inner frame of a bicycle or old belts, for example. It is very important to allow the top of the seedling to move freely with the wind, because this helps build a strong tree that can resist violent winds later.
   - Use cut grass, tree leaves, or sawdust as a cover to keep the moisture of the soil around the seedling and to reduce the growth of grass around it. You can use pieces of black polyethylene for this purpose. Secure them by a suitable means such as putting pieces of stone on them or burying their tips in the soil. Also, you can use old felt after cutting it into squares and making a rift around the tree as shown in the diagram.
   - If you do not have any barriers to protect the trees, you can use plastic bottles to protect the small seedlings against the attack of small reptiles and the trampling of large mammals.

Source: *Environmental Education Activities for Primary Schools*. Environmental Education Series (21). New York: UNESCO, 1992.

Activity 6.4

Designing An Area For Wildlife

Concept:

Wildlife and biological diversity are subjected to endangerment and extinction because of monoculture agriculture, excessive hunting, overgrazing and urbanization. It is essential to make pupils realize the importance of biodiversity.

Objective:

Stimulating awareness of boys and girls towards the dangerous effects of losing areas of wildlife and biological diversity.

Method:

Designing a small area for wildlife, and then recording notes and impressions about it.

Location:

A corner in the library or school garden.

Age:

Boys and girls 12 years or older.

Suggested duration:

Open and extended activity.

Materials:

Long rope - wooden pegs - measuring tape - pens and papers - agricultural tools.

Make it:

1. Pick a corner of the garden, and surround the selected area with a long rope fixed with wooden pegs stuck in the ground. The area should preferably be isolated and between trees, if there are any.
2. Dig the ground out along the borders of the "preserve" area to distinguish it from the rest of the garden. It can be surrounded by stone blocks or bricks.
3. Designate some squares of the ground to represent different habitats. Remove weeds, and a layer of the surface of the soil. Sprinkle seeds of various plants or plant some seedlings, and then irrigate them adequately.

Activity 6.4

4. Everyone in the group can cultivate and take care of a certain area.
5. With the growth and flourishing of the plants, its seeds will spread, new plants will grow in the next season, and habitats will intermingle.
6. Observe which species will flourish and which will not grow well.
7. Be careful not to cut plants or weeds inside the wild area, but do remove the weeds surrounding it to make it easier to distinguish the reserve from the rest of the garden.
8. Note which birds and insects are attracted to the wild area during different seasons.
9. Take notes and return to the library to read about different reserves and the interactions between species in wild areas.

Sources: H. Abou Bakr and H. Adel, Environmental Education Workshop, Horizon for Environment and Development, Cairo, 1999; and *Environmental Education Activities for Primary Schools*. Environmental Education Series (21). New York: UNESCO, 1992.

Activity 6.5

Aquatic Garden

Concept:

Lakes and ponds are at risk all over the world due to pollution, landfilling, demolition, reconstruction, and building of dams or projects for irrigation and drainage. A small pond, which forms the centerpiece of a comprehensive habitat, can be a sanctuary for many forms of wildlife.

Objective:

Making a water garden to become familiar with plants which live in fresh water, to observe its organisms and inorganic features and to note the interactions between them.

Method:

Choosing a suitable place and lining it with simple materials to make a small fresh water pond with water plants.

Place:

A corner in the garden of the library or school.

Age:

Boys and girls 10 years or older, with adult supervision.

Suggested duration:

2-3 hours to make the water garden (can be divided into 2 or 3 different sessions), then separate times for observing and taking notes.

Materials:

Rope - straight piece of wood - water balance - other tools and materials depending on the type of lining material.

Make it:

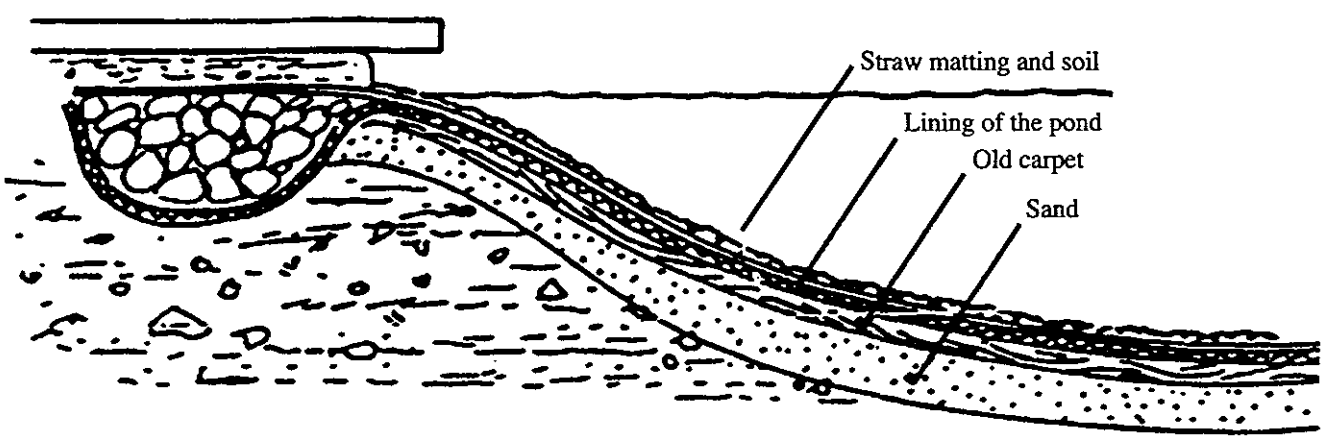
Making a small pond is one of the most useful activities one can do for developing locations to attract wildlife, but the small pond requires a good design, proper construction, and a permanent commitment to consistent management.

1. Search the area around you to choose the proper location - you may find a natural area that is already humid. You can give scores to possible locations, and record details concerning the following considerations.
   - Are there water sources in the ground? Is this location the best for collecting water? Note: The best place is not necessarily the bottom of a cliff, as it may be flooded with rain water.

Activity 6.5

- Do the sun's rays fall on this place all day long? Remember that too much light may cause the overgrowth of algae.
- Does it have a covering? An open place will have more evaporation.
- Is it out of sight and can it be easily watched and protected from any possible act of sabotage? Are there any trees shading the area and dropping leaves on it? Decomposing leaves inside the pond will decrease the available oxygen supply in the water. Is it close to the water source that will fill it when needed?
- Can the place be used for another purpose (locating a building, for example, in the near future)?
- Are service facilities (electricity cables and pipes) located away from the digging site?

2. There are many ways to make a pond with mud, fiber glass or concrete. The easiest way is to line the pond with a flexible plastic material like PCV or polyethylene, but butyl rubber is the best. You can find used pieces of thick polyethylene, but the problem is that it decomposes quickly and is disintegrated by sunlight.
3. There are some points to be considered when digging the pond. To calculate the size of the lining material, add together the amount of the largest depth, length and width, and double the sum. Make sure a part of the pond is 75-100 cm deep so that the temperature does not change much. This guarantees open water in freezing conditions or cold water during very hot weather. Make sure there are gradual slopes with gentle curves to avoid sliding or collapse. This will make the pond construction easier and it will also be safer. The activity should include planting local plants around the pond as a part of its design, but be careful that root growth does not weaken the lining material. Limit access to the pond to two sides only, and make a solid stone pathway around it.



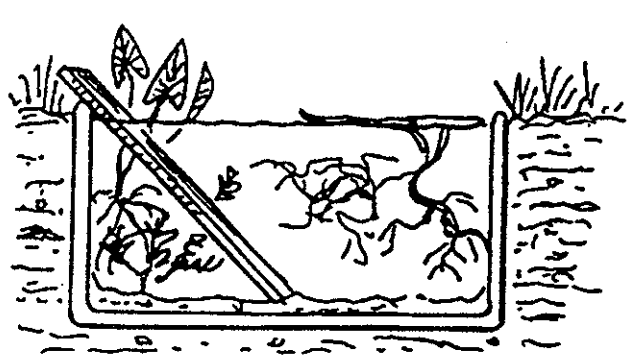
Activity 6.5

4. When you fix the lining material remember these instructions:
   - Before starting to dig, make sure of the evenness of the location using a straight, long piece of wood and a water balance. Fix wooden pegs to the ground to set the outer limits of the location.
   - If you are going to use tools to dig, you might need to remove rocks by hand and complete the final sweeping and shaping of the location using a shovel.
   - If you are using a flexible lining material, dig a shallow trench around the pond and fix the edges of the lining in it.
   - Make long clefts in the soil in several spots to insert the folds of the lining.
   - Cover the bottom with sand or old rugs first before spreading the lining to decrease the risk of rocks perforating it. Then spread straw matting over the lining before putting in the soil.
   - Fill the pond with water, but first wait for a few weeks to clean out any algae which may appear before planting local aquatic plants. You may add a bucket full of mud from another pond to add some invertebrates and microorganisms. Do not add any kinds of fish if you want invertebrates and amphibians to flourish, as fish usually eat eggs and larvae.
5. You can make swamp areas on the edges of the pond by putting polyethylene sheets in shallow trenches dug around the pond and then covering them with soil. Small, ready-made ponds can be made by putting old barrels, basins, tanks and washing vessels in holes in the ground. Do not use copper or lead as they are poisonous. You may also put blocks of stone, concrete or boulders to make shelves for putting plant baskets at different depths.

Use it:

It is very important to take care of the pond because it might be subject to natural clogging due to products of plant decay and invasion by secondary plants. You need to do the following:

- Reduce the plants if they overgrow (you may limit their growth by putting them in submerged baskets).
- Remove falling leaves, but leave them beside the pond to give water animals an entry back into the water.



Activity 6.5

- Wind thready water weeds on a stick and remove them.
- Fill the pond with water on a clean and calm day. Make sure that enough oxygen-producing aquatic plants are submerged beneath the surface. This might help to minimize the growth of algae, which is encouraged by the presence of nutrients in tap water.

Try to keep records of all new organisms that appear in the pond. It is preferable to examine the water closely using a lens or microscope to see the microscopic animals and plants present. Look for insects which breed in the pond or around it. Are there any animals that come to the pond to drink or bathe? How can you attract a large number of different animals?

As for undesirable creatures, mosquito larva can be controlled by adding special kinds of fish, such as guppy, which will not feed on invertebrates and other amphibians.

Note:

In warmer areas, be careful of the risk of water-born diseases, especially bilharzia.

Source: *Environmental Education Activities for Primary Schools*. Environmental Education Series (21). New York: UNESCO, 1992.

Activity 6.6

Environmental Auditing

Concept:

There is much debate about the significant environmental problems that face our planet. This planet is the sum of all the localities that form the world, and global universal problems originate from local ones. If every locality, person or school was aware of global problems, and started to reduce their local effect on the environment, many global environmental problems would decrease.

Objective:

Teaching participants how to do environmental auditing of their school, center or house, using the knowledge they have gained about the environment. Then, they will be able to discuss their results in order to reduce negative impacts on their environment, based on global thinking and local acting.

Method:

Making an assessment or audit of the environment in a library or school building or the surrounding area.

Place:

Library or school building and surrounding area.

Age:

Boys and girls 10 years or older.

Suggested duration:

One hour.

Materials:

Notebook or papers - ink pens or pencils - rulers.

Plan it:

1. Every participant in the group should make a long table in a notebook and draw columns for these six categories: very good, good, neutral, bad, very bad, and I don't know. On the right side of the page add a seventh column for the name of the activity to be assessed. In this column, write topics such as using water in latrines, disposal of food remains, use of heat and light, paper use, and transportation according to the areas you are asked to assess.

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Implement it:

Every member can be assigned to examine and audit one of the activities of the center or school.

- The group assigned to check water use, for example, will record the water usage in latrines, laboratories, the kitchen, and gardens, and then write their assessment of uses that lead to water loss.
- The group assigned to check paper use will check if the paper stock is reused, if the paper discards are recycled, how the paper is used or if there is much paper loss.
- The group assigned to check uses of energy will check the times when electrical devices are used for lighting and heating, for example, and if there is energy loss.
- How do people come to school and how do they leave? This subject is also worth investigating. Does this occur by means of public transportation, carpooling, walking, using bicycles, or driving individual private vehicles?

If a large amount of losses or abuses are observed, the mark "very bad" must be placed in the column next to the activity. If there is no loss, or if safety procedures are applied, put a mark in the column "very good." If there is no clear positive or negative aspect of the practice put a mark in the column, "I don't know" or "neutral." By examining the results, the group can discuss how the library, school or local community can decrease its negative environmental impacts by using resources carefully.

The results should be published on a wide scale with suggestions on how to implement improvements. This can lead to positive environmental changes, and even economic ones.

Variations:

The group may decide to examine each subject separately - for example, energy, water, paper, and transportation - and create databases, and then seek solutions for any problem it discovers about wasting these resources. The link can be found between this local activity and global problems before or after the

Activity 6.6

project. For example, a clear relation can be found between electricity, fuel use, acid rain and the rise in the earth's temperature. The relationship between the use of paper, the removal of forests, and the planting of trees from other habitats can also be highlighted. Lessons to be learned and suggested solutions have to be practiced at home and in the local community. This activity can be repeated after a suitable period to find out if there have been any improvements.

Environmental Auditing Chart

Objective:

Teach participants how to do environmental auditing.

Subject	Very Good	Good	Neutral	Bad	Very Bad	I Don't Know	Remarks
Ventilation							
Paper Consumption							
Water Use							
Energy Consumption							
Safety Precautions							
Cleanliness							

Source: *Environmental Education Activities for Primary Schools.* Environmental Education Series (21). New York: UNESCO, 1992.

Activity 6.7

Environmental Impact Assessment

Concept:

Ignoring environmental considerations results in the failure of many developmental projects, as well as damage to the environment. Thus, it is necessary to conduct studies in order to evaluate the environmental impacts of projects before they are implemented.

Objective:

Introducing the concept of environmental impact assessment and the pupils themselves conducting one as an example of the application of environmental law.

Method:

Discussing and analyzing case studies of projects to be implemented and evaluating their possible impacts on the environment.

Place:

Library hall or classroom.

Age:

Boys and girls from 13-15 years, supported by supervisors.

Suggested duration:

One hour.

Materials:

Big paper pads on a stand - markers - notebooks - pencils.

Implement it:

Using a case study given to the group, the group discusses the expected impacts of such a project and the different phases of planning, preparation, imple-mentation, and operation. Six parameters to consider are:

1. Air.
2. Ground water and surface water canals.
3. Cultivated land.
4. Biodiversity (living organisms in the region).
5. Noise.
6. Project impact on neighborhood residents' quality of life, public health, and job and economic opportunities such as agriculture, fishing or transportation.

- The group may find that it is necessary to identify the different affecting and affected parties concerned with the project, as well as to determine the project's negative or positive effects.

Activity 6.7

- They may also find that it is necessary to ask for the help of specialists in activities related to the project when studying its environmental effects.
- The group can record their results in the form of a table, recording their remarks on the project impact in its various phases on the six parameters.
- The group can propose certain procedures in order to avoid or ease some of the negative impacts, or they may refuse the entire project if they find that it seriously endangers the environment.
- In the following section, you will find examples of case studies whose environmental effects were evaluated in previous workshops.

Case Study (1)

A tourism company intends to build a hotel overlooking the Nile river in Cairo. It will include swimming pools, a yacht harbor, a private shore, parks and playgrounds. Due to the importance of the environment of the river, local authorities asked the applicant company to hire an independent contractor to carry out an environmental impact assessment of this project, in accordance with the articles of Law 4, 1994 concerning environmental protection. Participate with your group in discussing the expected effects of this project, from the beginning of construction until its operating phase, taking into consideration the previously mentioned guidelines.

Case Study (2)

A company specialized in oil drilling submitted an application to the authorities for a project to drill for oil and natural gas on a 250 km^2 area in the Gulf of Suez. The project also includes establishing a floating platform, tunnels, and pipelines for transmitting oil and gas. Local authorities asked the applicant company to hire an independent body to assess the environmental impacts of this project, in accordance with the articles of Law 4, 1994 concerning environmental protection. Participate with your group in discussing the expected effects of this project from the beginning of construction to its operating phase, taking into consideration the previously mentioned guidelines.

Source: H. Abou Bakr and H. Adel, Environmental Education Workshop, Horizon for Environment and Development, Cairo, 1999.

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Case Study (3)

A primary and preparatory school was built in a modern housing area for low-income people (i. e. public housing). The school overlooks a highway separating the school and the housing area. It has two doors: one is towards the road, while the other faces an empty piece of land upon which a bakery will be built. The educational department of the region decided to use the school as a commercial secondary evening school for girls which will be attended by female students from many neighborhoods.

-What are the questions that should be asked in order to review the environmental status of the school and the environmental impacts of the neighborhood activities and its effects on the students?

-What might be some proposed interventions to avoid any negative impacts?

Case Study (4)

There is a piece of land which contains the remains of a governmental building destroyed during the earthquake of October 1992. This land is located in the middle of a crowded housing block. Now, this land has become a dump for the garbage from neighboring houses, wastes from some metal workshops in the area, and wastes from a small fruit and vegetable market located in one of the neighboring lanes. A group of young members of the library in the district has raised the problem of this dump. Participate with them in discussing this problem and proposing methods to deal with it.

Case Study (5)

The ministry of transportation decided to build a road three kilometers long and two meters wide, linking the city and an extended industrial zone. This road is built on cultivated land that crosses a number of small villages. Discuss the possible social and environmental impacts of this project.

Source: H. Abou Bakr and H. Adel, Environmental Education Workshop, Horizon for Environment and Development, Cairo, 1999.

Activity 6.8

You Are Not Alone

Concept:

Being acquainted with the efforts exerted by others to protect their environments supplies us with hope and self-confidence, and makes us feel that we are not alone. Others also want to know what you and your colleagues are doing in your environment.

Objective:

Encouraging the exchange of experiences and information and learning about the environmental protection activities undertaken by libraries and different organizations.

Method:

Periodical press release issued by the librarians of Green Corners that students, girls and boys, and the library friends participate in editing.

Place:

Library computer room.

Suggested duration:

This activity is extended, but there can be, for example, an hour-long meeting of the editing board every two weeks or every month.

Age:

Girls and boys of different ages can participate with help from supervisors.

Materials:

Computer - pen and paper - photographs - drawings - newspaper clips - E-mail addresses if possible - means of taking photos.

Edit it:

The participants in previous training workshops showed a desire to exchange experiences and hear about the latest environmental education activities in different libraries and other organizations involved with local environmental protection. We propose here the idea of issuing a press release to be circulated among libraries, in which news will be published about training workshops, practical activities, research projects, symposia, lectures, ideas and innovations of each library's friends.

1. In order not to make the press release become a further burden added onto the current efforts shouldered by librarians, we suggest the following ideas:
   - A four page press release of A4 size.
   - The press release will be issued every two months.

Activity 6.8

- The editing board will be formed by a limited number of librarians, and their duty is to collect news and suitable materials to be issued by senior editors (librarians) or junior ones (pupils).
- The responsibility of issuing each press release may be the task of the Integrated Care Society, or each library will bear the responsibility of issuing one edition so as to divide this burden equally and periodically.
- The cooperation and participation of computer specialists in the libraries are very important, as they can help write articles and design press releases.
- Libraries that have e-mails can exchange materials this way.
- The editing board agrees upon the length of articles and news. Of course, it is preferable to make them short and summarized in order to issue as much media material as possible. The editing board may agree to ask for the help of some professional journalists.
- Seek the help of children's parents who visit the library and who can give voluntary advice for the project.

2. Discuss these ideas with the group, and make an action plan to turn these ideas into reality. Let's work!

Source: H. Abou Bakr and H. Adel, Environmental Education Workshop, Horizon for Environment and Development, Cairo, 1999.

Activity 6.9

Press File

Concept:

With the increasing interest in environmental issues in Egypt and all over the world, environmental news is commonly found in all Egyptian and Arab newspapers and magazines. This press material may be an important source of environmental information and awareness.

Objective:

Encouraging boys and girls to be interested in the environmental news items found in newspapers and magazines and to learn from them and comment on them.

Method:

Designing an environmental press file using clips from newspapers and magazines.

Place:

A library room or a class in a school, and students' houses.

Age:

Girls and boys 12 years or older.

Suggested duration:

An hour a week to coordinate the press materials and file them.

Materials:

Selected daily newspapers - weekly and monthly magazines - sheets of paper - plastic portfolio space - files or dossiers - scissors - adhesive - markers.

Implement it:

1. Discuss with the group the idea of having an environmental press file in the library containing what is published in newspapers and magazines.
2. Explain to the group that the newspapers and magazines which we buy can be an important source of news and information related to environmental issues and problems in Egypt and the rest of the world; explain also that after they are read, one can further benefit from collecting and filing such newspapers.
3. Bring a group of newspapers issued during the last week and ask the students to review articles, news, photos and cartoons on the environment found in them.

Activity 6.9

4. Give participants an edition of a newspaper or a magazine and ask them to mark the selected press material.
5. The participants will review, together, the selected articles.
6. The participants cut out these articles and paste each separately on a piece of paper. Use the blank side of already used papers to minimize consumption of paper.
7. Ask them to design subfiles about certain environmental issues such as water use, the black cloud, oil contamination of the coastal regions, NGOs' efforts to protect the environment, recycling, environmental laws, international and local conferences and symposia.
8. Keep such articles in dossiers in a corner of the library and let the participants agree upon a certain time to bring the collected press materials and put them in the press file.
9. Work may be divided according to the participants' interests. Some may choose to collect from Al Ahram newspaper, and others may choose Al Akhbar, Al Ahaly, or Al Wafd.
10. Encourage students to refer to the press file when writing a research paper or searching for topics for wall magazines in the library or school.
11. Discuss the benefits of this work for pupils.

Source: H. Abou Bakr and H. Adel, Environmental Education Workshop, Horizon for Environment and Development, Cairo, 1999.

Activity 6.10

Propose A Solution

Concept:

Among the objectives of environmental education are motivating positive thinking and encouraging students to suggest innovative solutions for local environmental problems, fostering their feeling of responsibility towards the environment.

Objective:

Developing their ability to propose innovative and strong solutions for local environmental problems.

Method:

Discussing certain local environmental problems. Such problems may be noticed by the students while they walk around the library or school, through drawing their streets and districts, or collecting information for the environmental press file or organizing a brainstorming session in the library.

Place:

Library hall or classroom.

Age:

Boys and girls 12 years or older.

Materials:

Sheets of paper - pencils - newspapers sheets on a stand - markers or blackboard and chalk.

Present the problem:

1. Encourage students to present the environmental problems they have observed during different activities.
2. Ask one of them to write the problems on the board or a sheet of paper.
3. Choose one problem as an example.
4. Raise the question, What are the reasons for the problem?
5. A chosen student will write down the reasons mentioned by other students. Discussing the reasons will help the participants to concentrate on the roots of the problem when suggesting the solutions.

Propose a solution:

1. Encourage the participants to think carefully to search for solutions.
2. Some may say, "We are not able to solve such problems," or, "The problem is larger than our ability." In that case, explain that there are two kinds of interventions:

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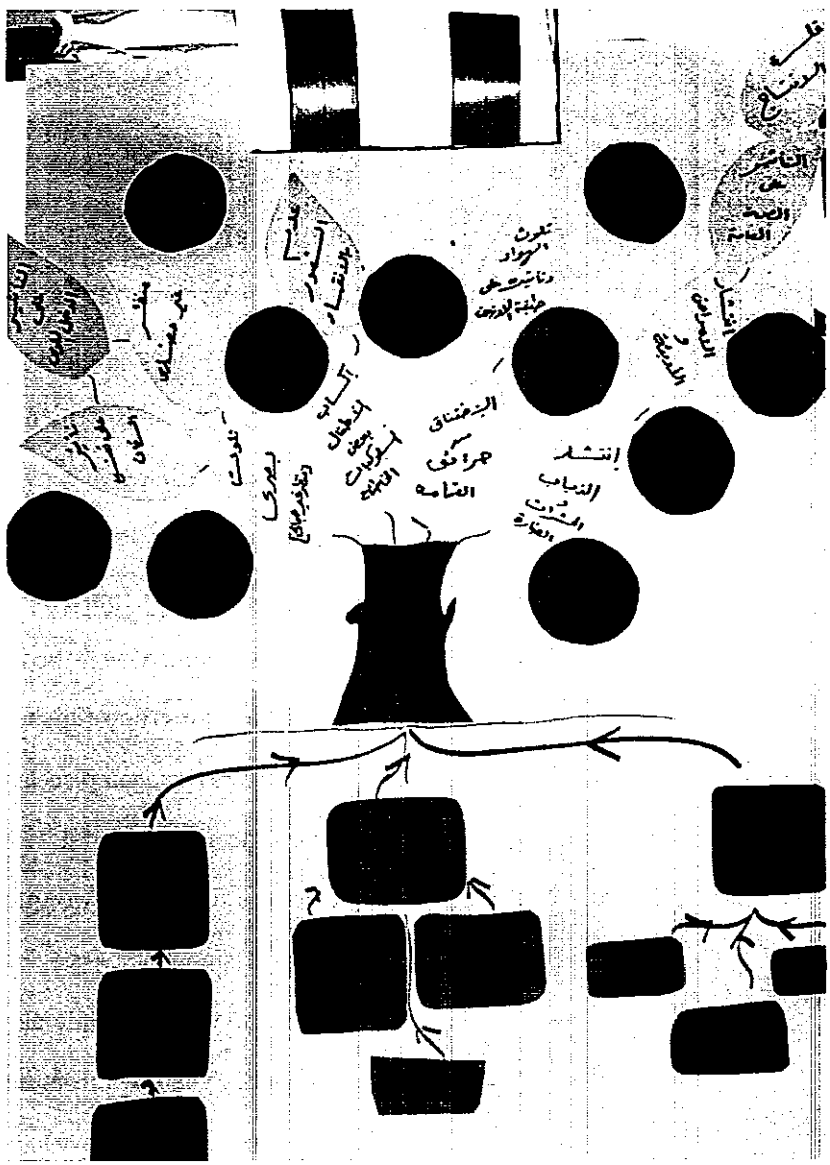
a. Changes we can make, such as decreasing water, electricity and paper consumption, and sorting wastes and reusing some of them.

b. Inviting others who are able to help find solutions to play a role, such as writing to officials or inviting them to the library to discuss the problem, or writing to newspapers.

3. Try to practice both kinds of interventions and remember that environmental education aims at creating positive, aware and informed citizens.



Source: H. Abou Bakr and H. Adel, Environmental Education Workshop, Horizon for Environment and Development, Cairo, 2000.

Activity 6.11

The Game Of Hazelnuts

Concept:

Sustainability means providing this generation of human beings with its needs without harming the environment. It means also that we should maintain the natural resource base in order to protect the rights of the coming generations to enjoy these resources as we did.

Objective:

Conveying the concept that any natural resource has a limited ability to renew itself. The way we deal with this resource could either maintain this ability or destroy it.

Method:

A simple game played by a group of students. They will imitate the way some people deal with natural resources.

Place:

Library hall or studying room.

Age:

Boys and girls 10 years or older.

Suggested duration:

30-45 minutes.

Materials:

A large sheet of paper with the objectives and rules of the game written on it - table for recording results - marker - a pot or bowl with a diameter of 30 cm - around 140 nuts, small balls, or big peanuts.

Play it:

1. A small group of four or five persons sit around a bowl which contains 25 nuts. The supervisor presents the game by hanging up a piece of paper with the objectives and rules written on it.
2. The players read the objectives and the rules silently.
3. The supervisor gives a signal for the game to start.
4. After the game is finished, the total score of each player is recorded, as is the total score of the group.
5. After the first group finishes its turn, four to five new players take their place and the game is repeated three times.
6. Then the following two questions are asked in a group session:
   - How did you feel while playing?
   - What did you learn from the game?
7. Important points that have to be taken into consideration during the discussion include cooperation, self control, confidence, the renewability of natural

Activity 6.11

resources, the depletion of resources, the total score, and the equality of resource distribution.

8. In this game, the pot represents the container of resources (soil, for example), the nuts represent the resources themselves (crops or soil fertility), and refilling the pot represents the normal rates of resource renewal.

Note:

The first round of the game (the first group of players) lasts only for a few minutes, because when the start sign is given all the players snatch as many nuts as they can, so the pot is emptied and the supervisor cannot refill it. The second and third groups usually play for a longer time and take more rounds. If that doesn't happen, then the supervisor can start discussing the similarity between this game and what takes place in real life. Direct the discussion towards the concepts of sustainability, the rational use of resources, and the ability of nature to renew itself. After this discussion, it is expected that the new group of players will take a longer time and play for more rounds. Every player should have more goals, and thus the group will have more total scores.

Source: Veldhuizen, Laurens van, et al. *Developing Technology With Farmers*. UK: Zed Books, 1997.

Activity 6.11

The Game Of Hazelnuts

Objective:

The objective of each player is to take as many nuts as he can during the game time.

Rules:

- When the sign is given, all the players start taking nuts from the pot at the same time, using only one hand. That is "a round."
- After each round, the supervisor doubles the number of nuts remaining in the pot, with a maximum of 25 nuts added.
- The game is over when the pot is empty, or after ten minutes.

Score Table

Players	First Group	Second Group	Third Group	Fourth Group
Player (1)				
Player (2)				
Player (3)				
Player (4)				
Player (5)				
Total				
Minimum				
Maximum				
Average				

Activity 6.12

Green Ideas

Concept:

Protecting the environment, loving nature, respecting its organic and inorganic elements, developing positive values in people and encouraging their talents and interests.

Objective:

Stimulating the spirit of creation and innovation in boys and girls, encouraging them to practice whatever hobbies they like, enjoy their leisure time, and develop positive attitudes towards the environment.

Method:

Organizing individual or collective competitions of different kinds depending on the different attitudes and interests of the boys and girls.

Place:

Library, activities hall, classroom, or home.

Age:

The levels of this activity vary so as to fit different age groups.

Suggested duration:

This activity is extended. Its time depends on the type of competitions which will be organized. A one hour session can be held at the beginning to review ideas and define the rules of the contests.

Materials:

They depend on the competition to be organized.

Make it:

1. In an open discussion session, ask the boys and girls about their favourite hobbies, and the preferred ways of each of them to spend their leisure time.
2. You will find that there are some students who like collecting stamps, and others who like drawing, writing poetry or short stories, playing a kind of sport, inventing or designing machines, writing or acting plays, doing newspaper research and holding meetings.

Activity 6.12

3. Divide the group into teams according to their hobbies. The activity will be more exciting if several libraries participate in it. This requires coordination among the managers of the libraries and the librarians.
4. Decide with the group to organize competitions on environmental subjects you propose or they choose. The kind of competition will suit the hobbies of each one of the group.
5. Here are some ideas and suggestions; you may think of even better ideas.

Environmental stamps competition:

Nations issue stamps with pictures of plants, birds, animals, or butterflies. They also issue stamps about environmental conferences, International Environment Day, or Earth Day.

- Ask the group to collect as many of these stamps as they can and put them in an album. This activity can be enhanced if boys and girls also collect information about the country that issued the stamps: its location, area, inhabitants, and environment. Also, they can collect information about the subject of the stamp - for example, about the bird on the stamp, its significance, and the hazards facing it. If it is about an environmental conference, the information might be about its time, date, place, objectives, and accomplishments.

Poster:

This activity is for boys and girls who like to draw and paint. Ask the group to choose one or more subjects for the competition such as neighborhood cleanliness, generating power, water, reusing and recycling wastes, noise, or minimizing air pollutants. Provide the group with the needed materials for the work like various types of papers and colors. Encourage team work as much as possible, but not so that it prevents individual competitions. Refer to the background information at the end of this chapter to find guidelines for making a good poster.

Poetry, songs and short stories:

This activity is for the enjoyment of girls and boys who have literary talents. The competition can be about the environment in general, or some particular environmental

Activity 6.12

issues. A judging committee can be formed including a number of supervisors or library managers, as well as some writers or poets. The presence of poets and writers among the kids will increase the credibility and recognition of their work.

Short plays and puppet shows:

Some may think that writing and producing a short play or a puppet show must be done by "professionals," but the truth is that there are many possibilities for collective creation, and there are many people with experience in this field. Training librarians to do stage and puppet shows can help them to stimulate the talents of the students. It may also encourage them to design and perform small shows to which the neighborhood and library visitors are invited. Two important points are to be taken into consideration here. First, allow the children to do whatever they like. Second, help them by providing any information available in the library, or through organizing a session with a specialist.

Illustrated stories:

This activity is for children who have writing talent as well as the talent to draw and paint. Illustrated stories can be drawn on flip charts, or they can be created on a wool board using adhesive and colored cardboard. Use the background information at the end of this chapter as a guide for learning how to use such methods, materials and tools.

Source: H. Abou Bakr and H. Adel, Environmental Education Workshop, Horizon for Environment and Development, Cairo, 1999.

Background Information For Chapter Six

- Agenda 21
- Scientists And Environmental Issues In The Twenty-First Century
- Positive And Negative Attitudes
- What's The Next Step?
- Be Positive
- Making Paper Manually
- Spread The Word
- Sustainable Development
- Growth Of The Urban Population: 1950-2025
- Some Articles Of Law 4, 1994

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Agenda 21

Information

One of the most important results of the Earth Summit, the United Nations Conference for Environment and Development that was held in Rio de Janeiro, Brazil in 1992, was the creation of a detailed agenda for the twenty-first century. This is known as Agenda 21.

Governments signed Agenda 21 as a voluntary agreement; there is no obligation for governments to implement all of its articles. Agenda 21 is an action program that consists of forty chapters and covers many topics on environmental protection and sustainable development. These topics include health, fresh water, oceans, poverty and disposal of wastes.

Agenda 21 has become a guiding document to help governments manage their environments in many parts of the world. An annual ministerial meeting is held, under the auspices of the UN Committee For Sustainable Development, to follow up on the implementation of Agenda 21.

However, many people think that Agenda 21 is incomplete and full of many loopholes pertaining to the issues of wars, population growth, human rights, the role of mega- and multinational corporations, refugees, nuclear disarmament, rates of consumption, the media, and renewable sources of energy.

Source: Pachamama. *Our Earth - Our Future, By Young People of the World.* A Joint Project of the United Nations Environment Program and Peace Child International. UK: Evans Brothers Ltd., 2000.

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Information

Scientists And Environmental Issues In The Twenty-First Century

More than two hundred environmental experts from fifty countries were asked to list the environmental issues they expect to be included in government agendas at the outset of the twenty-first century. The experts answered as follows:

1. Climate change	51%
2. Scarcity of fresh water	29%
3. Deforestation and desertification	28%
4. Pollution of fresh water	28%
5. Mismanagement	27%
6. Loss of biological diversity	23%
7. Population growth and human immigration	22%
8. Changes in social values	21%
9. Pollution resulting from waste disposal	20%
10. Air pollution	20%
11. Soil deterioration	18%
12. Chemical pollution	16%
13. Urban sprawl	16%
14. Ozone layer depletion	15%
15. Energy consumption	15%
16. Emergence of new diseases	14%
17. Depletion of natural resources	11%
18. Food shortages	11%
19. Harmful emissions resulting from industry	10%
20. Natural disasters	7%
21. Wars and conflicts	7%
22. Emergence of new pests	6%
23. Genetically modified organisms	6%
24. Sea level rise	5%

Source: Pachamama. *Our Earth - Our Future, By Young People of the World.* A Joint Project of the United Nations Environment Program and Peace Child International. UK: Evans Brothers Ltd., 2000.

Information

Positive And Negative Attitudes

Many young people worldwide were asked about the ten most important positive environmental trends and the ten most important negative trends that have appeared in recent years. Those young people answered as follows:

The Most Important Positive Environmental Trends:

1. Increase in the recycling of materials and wastes.
2. Attention to deforestation and replanting forests.
3. Attention to the protection of wild animals.
4. Increase in the use of solar energy.
5. Attention to the preservation of water.
6. Increase in environmental awareness.
7. Increase in the measures taken against pollution.
8. Increase in the presence and impact of non-governmental environmental organizations.
9. Emergence of many natural foods and products in markets.
10. More attention to the rainforests.

The Most Important Negative Environmental Trends:

1. Increase of pollution.
2. Continued deforestation.
3. Intensification of the hunting of wild animals.
4. Increase in air pollution in large cities.
5. Expansion of the ozone hole.
6. Aggravation of the problem of water pollution.
7. Water scarcity.
8. Increase in the concentration of poisonous wastes.
9. Overpopulation.
10. Increase in the amount of garbage and solid wastes.

Source: Pachamama. *Our Earth - Our Future, By Young People of the World.* A Joint Project of the United Nations Environment Program and Peace Child International. UK: Evans Brothers Ltd., 2000.

Information

What's The Next Step?

The positive and negative attitudes on the previous page were the opinions of youths from all over the world. Try to pose the following questions to students who regularly visit the library:

- What are the most important improvements that have been achieved in the field of environmental protection in Egypt?
- What are the most important positive trends in the field of environmental protection in the world?
- What are the main environmental problems that require the most attention in Egypt?

We can also encourage students to think positively about the problems and negative trends that they observe. We can pose the following questions:

- In your opinion, how can we face these problems?
- What can we do to solve these problems or to mitigate them?
- In your opinion, what are the reasons behind this problem and its continuance?

You can encourage students and youths to write their opinions and answers on a wall magazine to be hung in the library or the classroom. Leave a space for other students to write their comments and opinions in order to make the wall magazine a means of dialogue among students on environmental issues.

Source: H. Abou Bakr and H. Adel, Environmental Education Workshop, Horizon for Environment and Development, Cairo, 2000.

Information

Be Positive

- Put your household wastes in bags, then put them in a place designated for garbage so that they do not attract insects, dogs, cats, and mice.

- Recycle bottles, glass, cans, plastic, paper and cardboard.

- Organize clean-up campaigns in your district or your street with the help of your neighbors and friends in order to make the place in which you live clean and beautiful.

- Plant trees in your street or district.

Source: *Fifty-one Suggestions for Protecting the Ocean*. Ministry of Environment and Soil Treatment and the National Agency for Ocean Protection in cooperation with United Nations Development Program (UNDP), 1994.

Information

Making Paper Manually

The Society of Environmental Protection, in Al Muqattam, established a facility to make paper manually out of used paper, scraps of cloth, and some plant fibers. This facility employs a number of girls and youths from the families living in the district.

This paper facility is one of a group of facilities that recycles wastes. There are facilities to recycle plastic, glass, and metal, in addition to a facility that uses scraps of cloth to make beautiful creations with fine artistic features.

In the paper facility, paper is made manually out of wastes according to the following steps:

1. Sorting the raw paper and cutting it.
2. Turning it into a pulp.
3. Making paper sheets out of the pulp.
4. Pressing the manufactured paper to remove excess water.
5. Spreading the paper to dry.
6. Sorting the paper according to the required standards.
7. Dyeing the paper.
8. Making paper products such as bags, envelopes and files.
9. Recording the quantities and kinds of paper items produced.

Source: *Report of the Regional Workshop: Making Paper Manually from Local Plant Fibers and Wastes.* Center of Environment and Development in the Arab Region and Europe (CEDARE), 1996.

Spread The Word
1. Woolly Board

Information

Materials:

Wooden frame - a piece of wood or strong cardboard - nails - staples or string and needle - bright colored woolly cloth such as velvet, hemp, wool, old tricot pullover - rough sandpaper or scottish bands - adhesive material - paper and colors or colored cards.

Tools:

Hammer - pincers - scissors - saw - stapler - pencil.

When to use:

1. In small groups.
2. To present the life cycle of a certain disease-causing organism.
3. To present the relationship among a number of elements that form an integrated whole, such as a food chain and a food web.

Properties:

1. Easily made.
2. Inexpensive.
3. Supervisors or grown boys and girls can make many units and leave them in schools and libraries.
4. Pictures and illustrations can be used for many different subjects.
5. It enables us to clarify the logical order of a group of successive events or steps.

Requirements:

A trainer or a coordinator. It is not a self-explanatory tool.

Source: H. Abou Bakr and H. Adel, Environmental Education Workshop, Horizon for Environment and Development, Cairo, 2000.

Information

Spread The Word
2. Flip Chart

A successive group of pictures, forms and sentences that create a story or an integrated series of ideas.

Materials:

Sketch book or reinforced paper - ribbon of colored cloth - colored pictures - coloring pens - adhesive materials (resin).

Tools:

Scissors - a hole punch - a ruler - pages can be bound by wire or a plastic spiral binding machine.

When to use:

1. In small groups.
2. To present a story with successive events or a series of ideas.

Properties:

1. It can be made by using clips taken from newspapers, magazines, or other sources.
2. The subjects can be decided by the target group with the help of the trainer or coordinator.
3. Pictures and written sentences can be mixed.
4. It arouses the attention, imagination and expectations of listeners.
5. It provides a chance to convey a message that has been prepared and carefully revised before being presented.

Requirements:

1. It needs a trainer or coordinator to play the role of the narrator of events.
2. It requires a good deal of preparation before it is ready to be used.

Source: H. Abou Bakr and H. Adel, Environmental Education Workshop, Horizon for Environment and Development, Cairo, 2000.

Spread The Word
3. Wall Magazine

Information

It is a collection of various subjects presented in an attractive way and written using simple language.

Materials:

Large board of thick paper - painting pens - adhesive bands - colored pictures - adhesive material.

Tools:

Nails - hammer - scissors.

Where and when to use:

1. In a suitable place for the magazine to be hung that allows many people to stand and read it.
2. When time is available for the magazine to be read - for example, it could be hung in the school playground so that students can read it during a break, or it could be hung in the library entrance.
3. When we need to present various subjects to convey new information.

Properties and requirements:

1. It should be hung in a suitable place that is clear to the passers-by and is appropriate to their height.
2. If there are holes in the magazine, such as windows or doors, it is preferable for these weak parts to be supported so as not to be torn.
3. The handwriting should be clear and big so that it can be read from a place that is relatively far away.
4. Information in the magazine should be accurate.
5. If there are riddles in the wall magazine the writer should allocate a place for these riddles to be answered or designate a contact person.
6. The date, name, and author of the paper should be stated. The name chosen for the paper should be suitable for its subject matter.
7. The wall magazine should keep up with the current events that draw the readers' attention, in addition to focusing on the local news related to the place.
8. Articles should be short to accomodate people who are reading them while standing.
9. Articles should be attractive and written in a simple language.

Source: H. Abou Bakr and H. Adel, Environmental Education Workshop, Horizon for Environment and Development, Cairo, 2000.

Information

Spread The Word
4. Poster

Materials:

Board of thick paper - pencil - an eraser - coloring pens or liquid colors - colored pictures according to preference - adhesive material.

Tools:

Nails - hammer - scissors or cutter.

When to use:

1. To convey a precise piece of information quickly, for example, to be put near a highway or in a place where one can stop for a few minutes.
2. To convey a piece of information to an illiterate person who depends on pictures and drawings.

Properties and requirements:

1. To express one idea or at most two.
2. It should be directed to all levels and ages.
3. It should be put in a suitable place for it to be read quickly.
4. The colors should be attractive, words should be simple and sentences should be short.
5. If there are symbols used in the poster, everyone should understand their significance.
6. Before making the poster, it is preferable that a group of sketches be done to determine the arrangement of the pictures and also to pay attention to the size of the various parts.

These are some questions that may help us during poster making:

1. What is the purpose? Is it an invitation or an advertisement?
2. What is written on it?
3. Where is the information located on the poster? Is it on the top or the bottom, or on the right or the left?
4. What is the poster size?
5. In your opinion, does the poster attract attention?
6. Can you clearly see the designs and writing on the poster from a distance?
7. Are the colors of the poster attractive?
8. Does the message concentrate on the negative side or the positive side of the problem?

Source: H. Abou Bakr and H. Adel, Environmental Education Workshop, Horizon for Environment and Development, Cairo, 2000.

Spread The Word
5. Using Puppets To Perform A Play

Information

Movable models represent realistic people or animals, public figures, or imaginary creatures.

Kinds of puppet:

1. Glove Puppets.
2. Shadow Puppets.
3. Marionettes.

When to use:

1. To tell an interesting and attractive story or tale that aims at conveying a precise message.
2. Sometimes people feel shy telling a story face to face with the audience, so puppets are a suitable means in this case.

Properties and requirements:

1. First, we should determine the target audience, its interests and conditions.
2. Determine the message to be conveyed to the target audience.
3. It is important for the message to be conveyed indirectly.
4. It is preferable to present the message in a humorous way suitable to the nature of puppetry.
5. Before the show, the puppeteer should stand in the place of the audience to determine the best position for the puppet.
6. The puppet should be held up so that the audience can see it.
7. It is preferable for the puppet to move constantly while speaking so as to hold the audience's attention.
8. It is advisable for the group to rehearse the puppet show regularly to improve their skills in holding and moving the puppets.
9. The scenario of the play should be prepared before making the puppets in order to determine the kinds of characters to make. The script should be written in simple, colloquial language.

Tools and Materials:

- There are a lot of ways to make puppets, ranging from the very simple to the very complex, but the ultimate aim is to make convincing characters.
- Every kind of puppet has a specific group of tools and materials needed to make it.

1. Shadow puppet:

String to enable movement - cardboard - a stick to move the puppet - cloth or white gauze - light source - cassette player and tapes - scissors and sewing needles - colored cloth - a puppeteer.

2. Glove puppet:

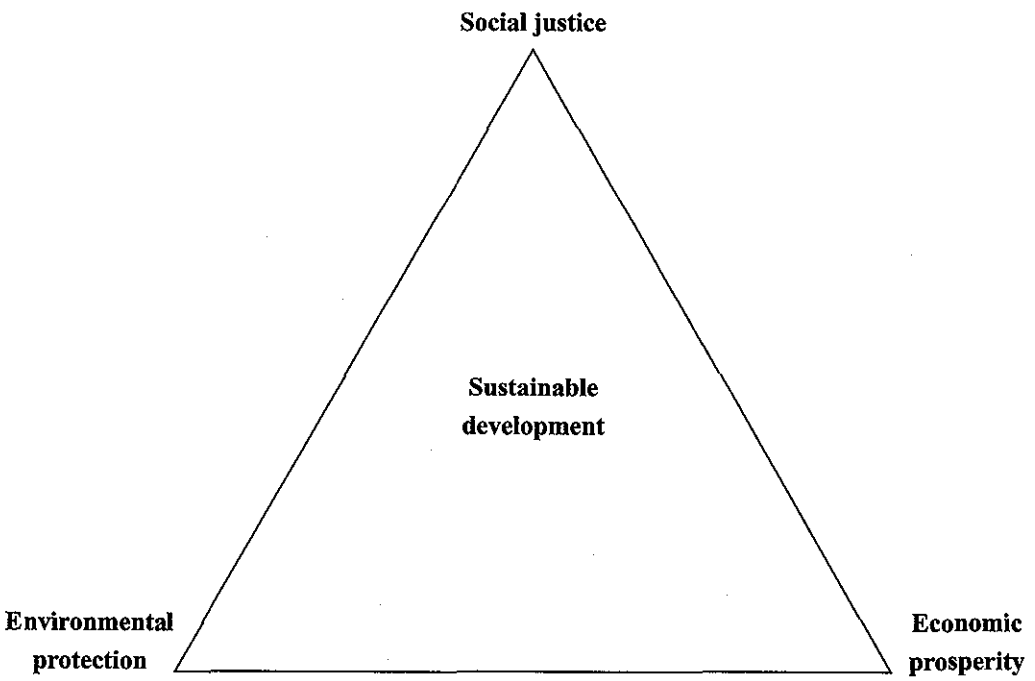
Old socks - cotton to make the head - buttons for eyes - cardboard - sewing needles and strong thread - colored cloth according to preference - colored wool - thin wire - pens - scissors - resin.

Source: H. Abou Bakr and H. Adel, Environmental Education Workshop, Horizon for Environment and Development, Cairo, 2000.

Information

Sustainable Development

Sustainable development means development that fills the needs of men and women and boys and girls. It should be economically profitable and socially acceptable. Also, it should not negatively affect the environment, deplete the natural resource base, or negatively affect the chances of other groups of people to earn a living. This development meets the demands of the current generation without unjustly limiting the rights of the coming generations to enjoy the same level of resources. The revenues should be distributed justly to all members of society, men and women, according to equitable and humane economic relationships.



Sustainable Development

aims at fulfilling the needs and expectations of the present without affecting the capability of meeting the needs and expectations of the future.

Components Of Sustainable Development

Environment: aims at establishing a healthy environment.

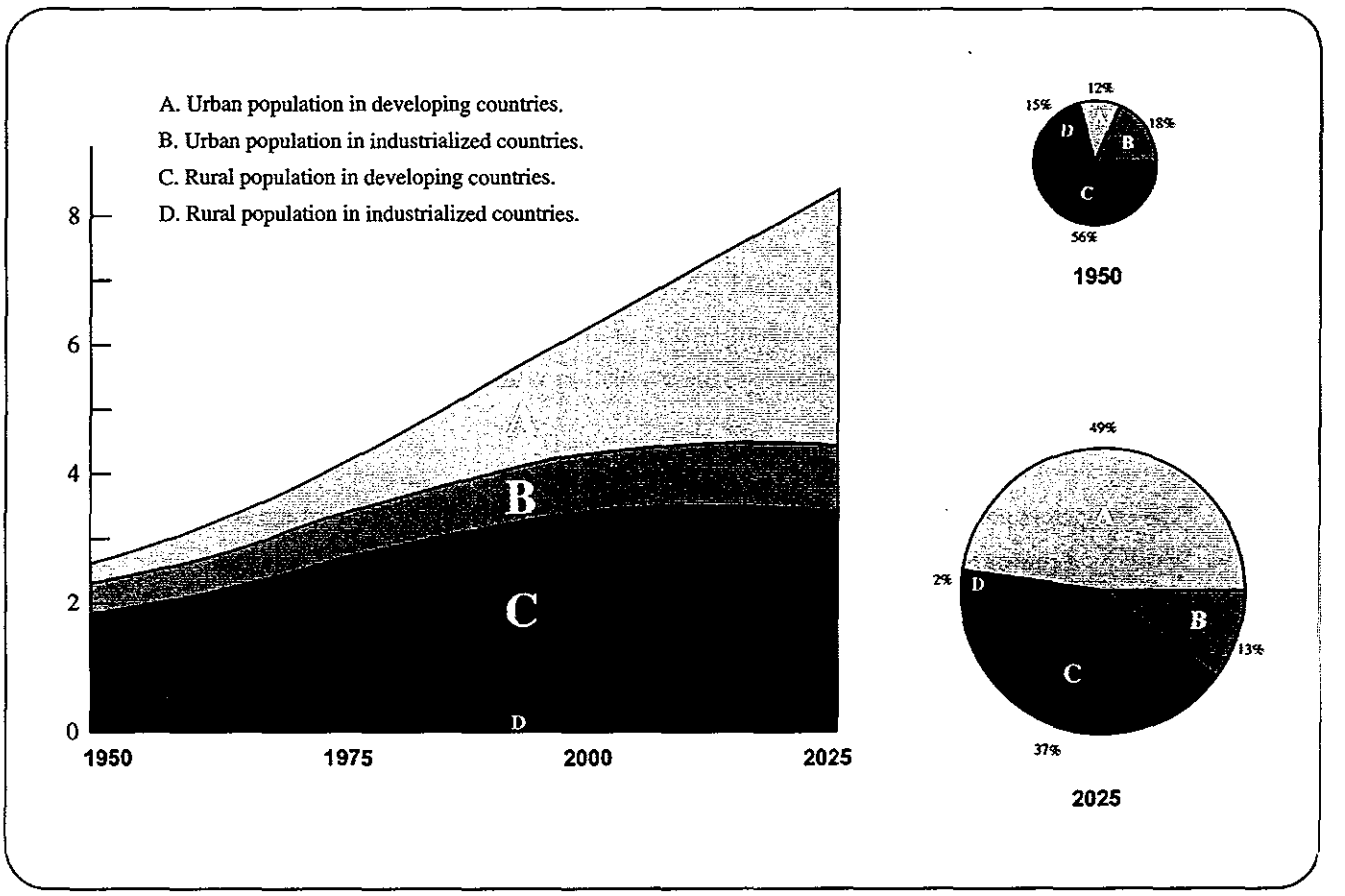
Economy: aims at establishing economic prosperity.

Justice: aims at establishing just and equal practices in dealing with all categories of society.

Source: *Knowledge of the World Series: Our Joint Future.* Kuwait: National Council for Culture and Arts, 1989.

Growth Of The Urban Population: 1950-2025

Information



Note:

The industrialized regions include: North America, Japan, Europe, Australia and New Zealand. The developing countries include Africa, Asia (except Japan), Latin America, and the Caribbean countries.

Source: *Teacher's Guide to World Resources*. Washington, D.C.: Institute of World Resources, 1994.

Some Articles Of Law 4, 1994 For Environmental Protection In Egypt

Environmental Impact Assessment

The competent administrative authority or license-granting authority evaluates the environmental impacts of the establishment needing to be licensed according to the elements, designs, specifications and rules issued by the Environmental Affairs Agency in coordination with the competent administrative authorities.

Article 12

The competent administrative authorities or license-granting authorities send a copy of the environmental impact assessment referred to in the previous article to the Egyptian Environmental Affairs Agency (EEAA) in order for it to express its opinion and to come up with proposals needed to be implemented in the field of technology and to cure any negative environmental effects. These authorities have the responsibility of making sure that these proposals are executed. The EEAA should send its opinion about this evaluation to the competent administrative authority that grants licenses no more than 60 days after the receipt of the evaluation; otherwise, the evaluation will be considered accepted.

Article 20

The competent administrative authority will inform the establishment owner of the evaluation result by a registered letter. Within 30 days starting from the receipt of the letter, the owner may submit a written objection before a committee formed by a decree of the Minister of State for Environmental Affairs. In this committee, the EEAA, the establishment owner and the competent administrative authority or the licensing authority are represented.

Article 21

According to the rules of this law, the establishment owner should keep a record to show the impacts of the establishment's activity on the environment. The executive regulations will set a standard form for this record, for the time table to be kept and for the data registered in it. The EEAA is in charge of following up the recorded data to make sure that it conforms with reality, and must take the necessary samples, perform the suitable tests to recognize the impacts of the establishment's activities on the environment, and determine the extent of the establishment's compliance with the standards set to protect the environment. If there are any violations, the agency will inform the competent administrative authority to make it incumbent upon the owner to rectify these violations as quickly as possible. If they are not rectified within 60 days, the agency, with agreement of the competent administrative authority, can take the necessary judicial and legal measures to stop the illegal activity, and to claim appropriate damages to cure the harm resulting from these violations.

Article 22

Environmental Monitoring Networks

Information

Environmental monitoring networks, with all their stations and work units, are formed according to the provisions of this law. The said networks also shall periodically monitor environmental pollutants and submit the data to the concerned parties. To achieve this goal, it can be assisted by research centers, specialized authorities and parties which, in turn, shall provide the networks with all research and data required. The Egyptian Environmental Affairs Agency (EEAA) is to supervise the establishment and operation of the environmental monitoring networks.

Article 24

The EEAA shall design an emergency plan for facing environmental catastrophes. The plan is to be approved by the cabinet. The emergency plan shall be based particularly on the following:

- Collecting available local and international data on the methods of facing environmental disasters and reducing their consequent damages.
- Identifying the available resources at the local, national, and international levels and determining ways of using them in order to find a rapid solution for fighting disasters.

Article 25

Information

Protection Of Wildlife

A piece of land owned by the government, not less than 1000 m^2, shall be set aside in each district and village for the purpose of setting up plant nurseries. The products from these nurseries shall be sold to the public and agencies at market value. The administrative departments to which these nurseries are affiliated shall prepare guidelines for planting trees and taking care of them. The Egyptian Environmental Affairs Agency (EEAA) shall participate in financing these nurseries.

Article 27

It is forbidden by any means to hunt, kill or catch species of wild birds and animals identified by the executive regulation of this law. The possession, transportation, or public appearance with or sale of these birds or animals, whether alive or dead, is absolutely banned. It is also banned to destroy or spoil the eggs of such birds.

Article 28

Hazardous Wastes And Substances

Information

Transferring hazardous wastes and substances without a license from the relevant administrative establishments is completely banned. The executive regulation of this law explains the procedures and provisions of granting the license as well as the establishment responsible for issuing it.

Article 29

It is prohibited to erect any establishment for the purpose of treating hazardous wastes unless it is authorized by the qualified administrative establishment, and has the approval of the EEAA. The disposal of the hazardous wastes shall be subjected to the provisions and standards specified by the executive regulation of this law.

Article 31

It is banned to import hazardous wastes or to allow them across the borders of the Arab Republic of Egypt. Without the license of the authorized administrative establishment, it is banned to permit ships carrying hazardous wastes to enter the territorial waters or the maritime economic zone of the Arab Republic of Egypt.

Article 32

Those who are responsible for producing or circulating hazardous substances, whether liquid, solid, or gaseous, must take all precautions to guarantee the protection of the environment from any damages. The owner of the establishment which is producing such hazardous wastes should keep, according to the provisions of this law, a record of these wastes that specifies how they were disposed of as well as the party that agreed to receive the waste.

Article 33

Information

Protecting The Atmosphere From Pollution

The site on which the project is to be established must fit the activity of the establishment in a way that guarantees maintaining the permitted limits of air pollutants. In addition, the total amount of pollution resulting from all the establishments in a certain region must comply with the permitted limits.

Article 34

The establishments subjected to the provisions of this law shall, in exercising their activities, be committed to stopping any emissions of air pollutants which exceed the maximum limits specified in valid laws and resolutions, in addition to what the executive regulations of this law specify.

Article 35

Any machines, engines, or vehicles causing emissions that exceed the limits specified by the executive regulation of this law shall be banned.

Article 36

It is prohibited to dispose, treat, or burn garbage or solid wastes, except in places specified for such purposes that are far from any residential, industrial or agricultural regions, or any water streams. The executive regulation of this law identifies standards, rules, and the minimum distance that should exist between places specified for such purposes and the above-mentioned regions.

Article 37

It is banned to use or spread any insecticides or any other chemical compounds for agricultural, public health or other purposes except after complying with rules, regulations, and safety provisions specified by the executive regulation of this law in a way that secures the protection of human beings, animals, plants, water streams and other environmental components directly and indirectly, in the present and future, from the harmful impacts of these insecticides or chemical compounds.

Article 38

All establishments and individuals, when undertaking boring, digging, building, demolishing, or transporting wastes or dust, shall be committed to taking all precautions necessary for the safe storage or transference of such substances to prevent volatilization, as it is clarified in the executive regulation of this law.

Article 39

Noise

All establishments and individuals should not exceed permitted limits of noise when carrying out production or service activities or any other activity, especially when operating machines and equipment, or using horns or voice amplifiers.

Article 42