STREAM TEAMS

ACTIVITY GUIDE FOR WILDLIFE CLUB LEADERS AND MEMBERS

Produced by Nature Seychelles and Wildlife Clubs of Seychelles, with the support of the Environment Trust Fund, Public Utilities Corporations (PUC), Ministry of Education and Youth.

Stream Teams

Activity Guide for Wildlife Club Leaders and Members

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Introduction

Seychelles are made up of 115 of the most beautiful islands in the world, scattered over 1.3 million square kilometres of the western Indian Ocean. Just four degrees south of the equator lie the granitic Inner Islands, which include Mahe, the largest island and home to the nation's capital, Victoria. The islands were formed by a splinter of India that detached from the subcontinent 650 million years ago and drifted into mid-ocean.

In larger islands of Seychelles we are lucky to have numerous rivers and streams cascading down from the mountains. On Mahe, Praslin and La Digue there are 146 named rivers, and many others that are not named. This means that almost everyone's school and home is within close walking distance of a river.

This Stream Teams guide will enable you to organise and carry out programmes and activities that are fun, interesting, informative and safe for children to be involved in outside of the classroom. It will provide the basis for outreach programme activities that involve local communities and help to raise awareness among children and adult of the importance of looking after stream and river ecosystems, for the benefit of wildlife and for all of us.

The aim of this guide is two-fold:

i) To provide WCS leaders with an activity-based resource for teaching about water conservation.

ii) To heighten Club members' awareness of the importance of protecting local waterways and reducing pollution of the streams and rivers in their community.

What are the benefits of this Stream Teams activity guide?

Children taking part will learn all about the connection between their local streams and what happens within their community water catchment areas, and about links between rivers and the marine environment. Stream Teams will provide a memorable, student–centred learning experience.

As part of the Stream Teams initiative, Club leaders should attend specialist training workshops. This prepares them to lead Club members' participation in the following activities:

- Adopt a local section of a stream near the school.
- Conduct biological monitoring several times throughout the year.
- Conduct habitat assessments and complete datasheets.
- Report problems such as illegal discharges, waste disposal, fish kills and erosion.
- Perform a Stream Teams restoration activity, such as stream debris clean-up, and tree planting to stop erosion.

Participants need only a desire to be out in streams learning more about aquatic ecology and the conditions of their waterways.

As part of the Stream Teams programme, why not adopt a river near you, and do regular check-ups to see if it is healthy and clean, or polluted and sick?

Adopt – A – Stream!

Dear Club members and Leaders,

The following activity was taken from materials developed by the Adopt – A – Stream Foundation (http://www.streamkeeper.org/tools/steps.htm)

Your club can become stream keepers. Follow the five –step stream adoption process outlined here to develop your own Adopt-A-Stream program. This process is used as a model for stream stewardship programs in the community based clubs. By following these steps, you and other members of the club will be well on your way to becoming stream keepers.

1. Investigate your watershed

Take some time to explore the area around your schoolyard. Is there a stream nearby? If yes, begin the process by choosing a stream for stream keeping efforts. Once you have chosen a stream, collect and study all the information you can possibly find about the stream of interest and its watershed. Find out about the stream's history, geology, demography, land use, fauna and flora.

Some possible Sources of Information

- Ministry of Environment and Natural Resources (Education Division, Conservation Division, Education Unit)
- Ministry of Education and Youth (Education unit)
- Nature Seychelles (Education Unit)
- Wildlife Clubs of Seychelles (Stream Team Focal Point)
- Seychelles Bureau of Standard
- Public utilities and Coorporation
- Weather Met office

Ask Public Utilities Cooperation, Ministry of Environment and Natural Resources, National Achieves and Museums inventories in the river, and any other data or information you can think of.

2. Organised a Stream keeping Group

Ask around to see if other people in your local area are interested in working to protect and enhance the condition of your stream and watershed. Try to include as many different types of people as you can. Make your group officially by giving it a name, like "Friends Les Mammelles River", "Trois Freres" etc.

3. Identify short term and long term Goals

Next, establish short – and long –term goals with your group. Short-term goals describe what you would like to accomplish over the next 6 months to 1 year. Long-term goals describe what you would like to accomplish over the next 5 years onwards.

Examples of Short-Term Goals

- Conduct a watershed inventory (gather information on watershed)
- Develop and start a stream monitoring program to collect physical, chemical, and biological data on our stream
- Create an educational flyer to inform streamside landowners about stream do's and don'ts
- Create and place stream identification signs
- Conduct a community stream cleanup

Examples of long-Term Goals

- Protect remaining stream and wetland habitats
- Restore and enhance degraded stream and wetland sites
- Lobby for changes in land-use laws to afford more protection to streams and wetlands

4. Develop an Action Plan

Starting with your short-term goals, work out an action plan for each goal, this action plan usually answer the questions who, what (the goal), where, when, how, how much, resources available, and deadlines. Try to delegate responsibilities to all members of the group. Give them tasks and ask them to report their findings at the next meeting.

5. Become a streamkeeper

- Put your plan into action. Carry out all the actions to achieve your short-and long-terms goals. As a Stream keeper, you become responsible for your adopted stream. You and your group will watch over the stream, monitor the health of the stream and surrounding watershed, and adjust your action plan according to your stream's changing needs.

- The Adopt- A-Stream Committees can keep you informed and up-to-date about Stream Keeping activities, programs, and other materials.

Environmental Audit

BACKGROUND INFORMATION

Conducting Environmental audits is a way of gathering information about the wildlife occupying a river or streams the environmental resources being use in the area, and existing or potential environmental problems. Environmental audits can be conducted in a small area such as a classroom, a whole building, such as a school (which can include the compound), or even a larger geographic area such as a district. A quick audit can be done in a couple of hours, while a more in – dept audit might take several weeks.

An environmental audit can provide you with background information to help prioritize actions needed to improve the environment, such as clean ups, greening of the river bank, awareness, campaigns, habitat restoration, planting etc.

KEY CONCEPTS: environmental audit

KEY SKILLS: observing, group work, Identification, collecting data, problem analysis

CURRICULUM LINKS: geography, Science, language, PSE

SETTING: outdoors and indoors

MATERIALS: audit sheets, clipboards, binoculars, field guides

An audit can include elements such as:

- A survey of all the wildlife found in the area
- A description of all the habitats found in the site
- An investigation of the water quality of rivers/streams found in the site
- An analysis of the waste produced, and how waste is dealt with.
- A description of any existing or potential environmental problems in the area being audited, such as a polluted river or marsh, eroded soil, etc.
- A survey of people's perceptions about the environment being audited.

You will have to design your audit according to the time you have available and the ability of your club members.

Introduction

- Discuss the meaning of the term "environmental audit" and the reasons for conducting one.
- As a group, plan the area that you would like to audit, and the best way of actually doing it.
- Have some of the club members design an audit sheet (See sample worksheet next page), while another group works on drawing out a map of the area to be audited.

ACTIVITY

- Have the club member's work in groups to conduct the audit.
- Divide the class up into groups and ask each group to concentrate on a different part of the audit.
- Bring the groups together to share their findings and to calculate the overall score for the audit.
  Total score of:
  60 or higher – great!
  40-60 – still needs work
  Fewer than 40 – time to take action!
- Map out the habitats and wildlife found, environmental problem hotspots, and any other relevant information on your map of the area.
- Produce a list of recommendations for actions according to priority and how easily they could be implemented.

SUMMARY

- Meet with the school head teacher or other relevant person to present your findings, and propose actions which could be taken.
- Produce a report on the findings of your audit it in a newspaper or Wildlife Club magazine.

EXTENTION

- Make a note of the priority actions recommended that can be taken up by children themselves. Choose one or two actions and implement them.

Worksheets: Stream Team Environmental Audit

Date:_____ Time:_____

Location:_____

Group members:_____

Fill in the audit sheet and give a score for each aspect to find out how healthy your adopted river is.

1. WILDLIFE: List any animals observed on the river bank.
(Score 1 pt for each different species observed).

Score

Mammals: **Insects:**

Birds: **Other animals:**

2. VEGETATION: what kind of trees and plants are growing in the area?
(Score 1 pt for each different species observed).

Trees & Shrubs: **Other plants:**

(put a * next to the animals and plants that are native to Seychelles)

3. HABITATS. List the different habitats that can be found within the river/stream area, eg. River bank, amount the rocks, river bed, opens grassy area, etc.
Draw a rough map to show their location.
(Score 3 pts for each different kind of habitat).

4. BUILDINGS. Are they close to the river bank? Well maintained?
Do they fit in with the environment? Are there any drainage pipe **into the river?** (Score 1-10)

Score

5. WATER. Describe the water condition in the river. Are there any human activities? Are there any animals in the river? (Score 1- 5)

6. Pollution. Conduct a water test in the river. Refer to activity sheet on page ? (Score 1-10).

7. Waste. Are there waste any waste? What type of waste? Make a list of waste materials found in area. (Score 1-5)

8. Noise. Is the area generally free of traffic or other noise pollution? (Score 1-3)

9. Outdoor activities: Activities: Describe any facilities in the area for relaxation and leisure. Score 1-5)

RESTORING HABITATS

KEY CONCEPTS: habitats, restoration

KEY SKILLS: planning, tree planting

CURRICULUM LINKS: science, geography

SETTING: indoors and outdoors

MATERIALS: gardening equipment, reference books on wildlife and plants

BACKGROUND INFORMATION

Many conservation organisations in Seychelles and around the world are concentrating on their efforts on saving and restoring habitats for wildlife. Human beings and their association activities such as farming, constructions of roads and buildings etc. take up a lot of space, often leaving little or no room for wildlife. The wildlife either has to adapt, move elsewhere, or die out.

It is essential that we start to find ways of living alongside wildlife, and one the ways of doing this is by providing natural or "wild areas" right around the places we live, play, go to school, and work.

This activity is all about creating a wildlife area right in your area of the river you have adopted. You don't need a big area. After you have map your river you need to start your actions. The idea is to transform the river bank into garden of native plants that will attract birds, insect, butterflies and other wildlife.

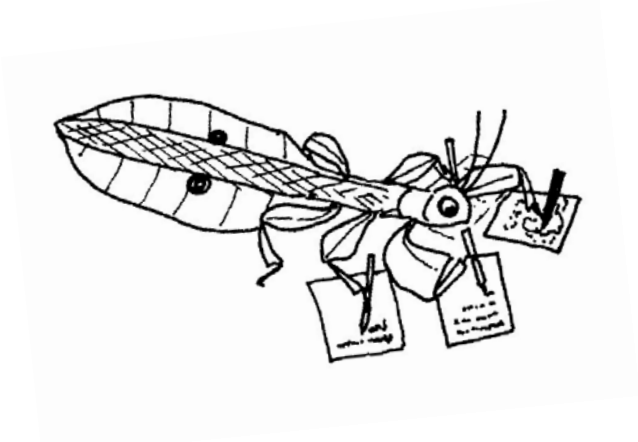
Creating a wildlife garden on a river bank can involve quite a lot of work, and will take a bit of time to develop into something attractive, cool and will control evaporation of water in the river. If possible, try to get the whole club members and the community involved in planning the restoration work, planting shrubs, trees, and other plants, removal of invasive plants species and maintaining the area: this will ensure that everybody understands what you are doing and why.

When designing your wildlife garden, be sure to ask for advice from experts from the Ministry of Environment and Natural Resources (forestry section), the herbarium Natural History Museum, Nature Seychelles, etc. Try as much as possible to use native plants in your restoration work (see suggested list next page), but **NEVER, NEVER** collect these yourself from the wild, as many species are protected and collecting them is illegal, and can contribute to their decline. Instead, create a nursery in the school ground and grow your own plants from seeds, or ask the **Forestry Section in the Division of Environment** to help you obtain the plants or seeds you need.

Introduction

- Ask the students to describe familiar areas where wildlife can be found. Conduct a brainstorm session to come up with the kinds of natural features that attract wildlife: food plants, hiding places, water, shelter from the elements, etc.

- Visit the river you have adopted to investigate areas that might make a good wildlife garden and restoration work.



ACTIVITY

- Have the students work in pairs or small groups to design a wildlife garden.
- Invite guest speakers from Forestry (Division of Environment and Natural Resources) to talk about native plants which are attractive to wildlife, and tips for good garden design and restoration work.
- Ask each group to present their design and plan to the rest of the school and community.
- Inform the rest of the school and community about your plan to build a wildlife garden and restoration work, and get them involved: Conduct a survey to find out how other people in the community feel about having a wildlife garden on the river bank and restoration work, invite other students and the community to design plans for the garden and hold a competition for the best plan.
- Once you have agreed on the best plan, and had the green light from authority concern, start restoration work and your wildlife garden.
- Take photographs or make a video to document the creation of the garden.

SUMMARY

- Evaluate the success of your garden as it grows, and continue to make improvements to it.
- Write an article about your restoration and wildlife garden for school newsletter and local newspaper.

Extension

- Build a bird feeder for your garden.

Here are example of bird feeders made from plastic bottles and other recycle materials

Fact sheet: Native Plants for River Bank Restoration

Native plants that grow well in dry, sunny places (red earth soils)

TREES:

Vakwa bordmer
Vakwa d'montanny
Latannyen fey
Latannyen milpat
Lafous gran fey
Lafous pti fey
Bwa-d-nat
Gayak

SHRUBS:

Bwa dir
Bwa kafoul
Bwa kwiyer
Bwa-d-ranet
Bwa sandel
Bwa sitron (wright's g
Bwa siro
Kafe maron gran fey

OTHER PLANTS:

Lalyann san fey
Lerb koupan
Zolivav
Koko maron
Lavannir maron (Wild vanilla)

Native plants that grow well in dry, sunny places (sandy soils)

TREES:
Vakwa bordmer
Bonnenkare
Bodanmyen (Indian almond)
Bwa blan
Bwa kasan bordmer
Porse
Bwa-d-roz
Var

SHRUBS:
Vouloutye
Bwa savon
Bwa saple

OTHER PLANTS:
Patatran
Lerb bourik
Pwa maron

Native plants that grow well in shady damp places

TREES:
Vakwa parasol
Latannyen lat
Best near a river

Latannyen fey
Latannyen milpat

SHRUBS:
Bwa dir
Bwa savon
Bwea saple

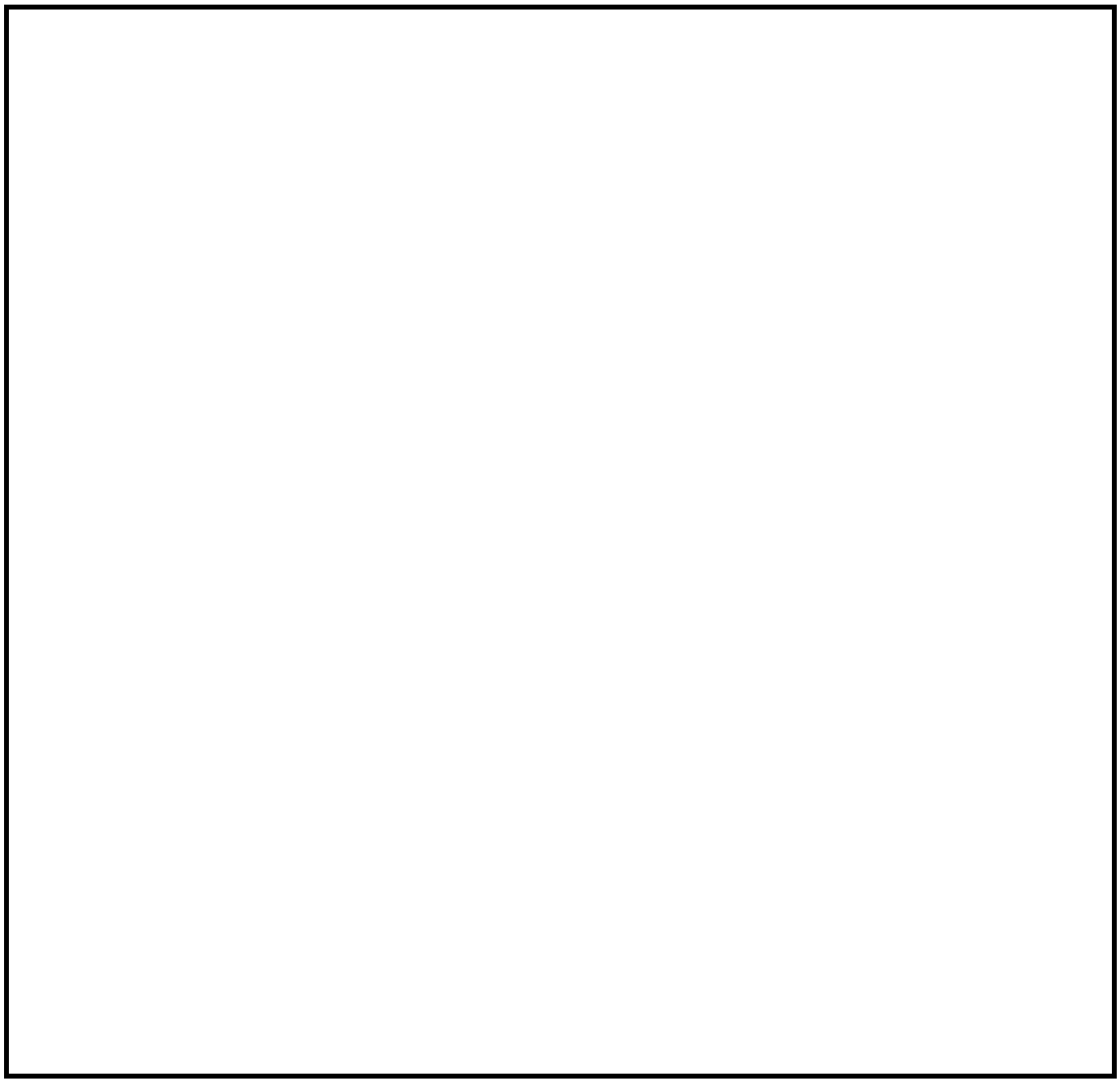
OTHER PLANTS:
Koko maron
Fouzer taba
Lerb koupan
Kapiler
Fouzer (various native ferns

Refer to the book "Wild Plants of the Seychelles Coastal Zone" by Katy Beaver (your school library should have a copy) for illustrations of many of the plants listed above.

REMEMBER: NEVRE COLLECT THESE PLANTS YOURSELF FROM THE WILD!
Ask the Division of Environment for help with obtaining plants or seeds!

Worksheet: Plan your River Bank Restoration

Draw a map of the area of the river bank that you would like to turn into a wildlife garden:



Sketch in the areas where you would put trees, shrubs, and other plants. Add other elements information board, benches, birdfeeders, a bin etc.

The water cycle fact sheet

The total amount of water in the world never changes. What does change is its form. It can change from liquid to gas (water vapour) or solid (ice), and back again. The movement of water from the land and the sea to the atmosphere and back to land is called the ***water cycle***. It is driven by solar energy – the heat and light of the sun.

The heat of the sun makes water ***evaporate*** from sea, open water and wet surfaces in general. It also causes plants to lose water through their leaves by a process called ***transpiration***. Seychelles wetlands are often made up of a patchwork of open water and clumps of vegetation that produce a lot of water vapour by evaporation and transpiration.

As the day warms up, the water vapour formed in the air by evaporation and transpiration rises higher and higher. When the vapour reaches the upper atmosphere, it cools. Cool air holds less water vapour than hot air. As the air cools, the water vapour forms into tiny droplets of liquid suspended in the air, which form clouds. This process is called ***condensation***. The droplets come together and are too big to remain suspended, so fall as ***precipitation*** – the big word for rain, hail or snow.

Plants and trees catch some of the rain. The rest falls on the ground, where it may soak in, flow away (as run off), or be absorbed by plants. Water that soaks into the ground flows in underground rivers ***called aquifers*** that fill underground reservoirs. This is the ***ground water*** – supplying springs and wells.

Water flowing above ground is known as ***surface water*** – supplying lakes, rivers, streams, reservoirs, wetlands, and eventually the sea. Every river, stream, and underground reservoir is supplied with surface and ground water by its own area of land. This area is called its watershed or catchment area.

Wetlands, forests, climate and the water cycle

In mountains islands, the climate is often very predictable, with hot sunny mornings followed by afternoon showers. Wetlands and forests play an important role in maintaining this pattern.

After sunrise, the atmosphere heats up and water evaporates from the sea and open water, and is transpired by plants, particularly in wetlands and forests. Meanwhile, the land becomes warmer than the sea and warm land breezes blow inland. They carry the water vapour towards the mountains. The warm, moist air rises by a process called ***convection***. Warm air carries more moisture than cool air. As it reaches higher altitudes, it cools. The water vapour can no longer be carried in the air and it ***condenses***, forms thunderclouds, and falls as heavy afternoon rain.

Of course, not all rain forms like this. During the day, water is constantly evaporating from the sea, and forming clouds that fall as rain in heavy showers and storms.

Source: Adapted from Wondrous West Indian Wetlands

WATER CYCLE WORDS

Are you a water cycle expert? Find out by trying to fit the following words to the definitions below.

Using your answers, label the diagram below.

PRECIPITATION, EVAPORATION, CONDENSATION, RUN–OFF, GROUNDWATER, TRANSPIRATION, THE WATER CYCLE

The water cycle

a.	Is the change of a gas or vapour to liquid (eg the formation of rain in the atmosphere)
b.	Is the process whereby water travels from the Earth to the air and back to the Earth
c.	Is the loss of moisture from the surfaces living plants
d.	Is water that collects naturally in underground reservoirs
e.	Is the change of water from liquid to gas
f.	Is any type of moisture that falls to Earth
g.	Is the flow of water from land into lake, rivers or wetland

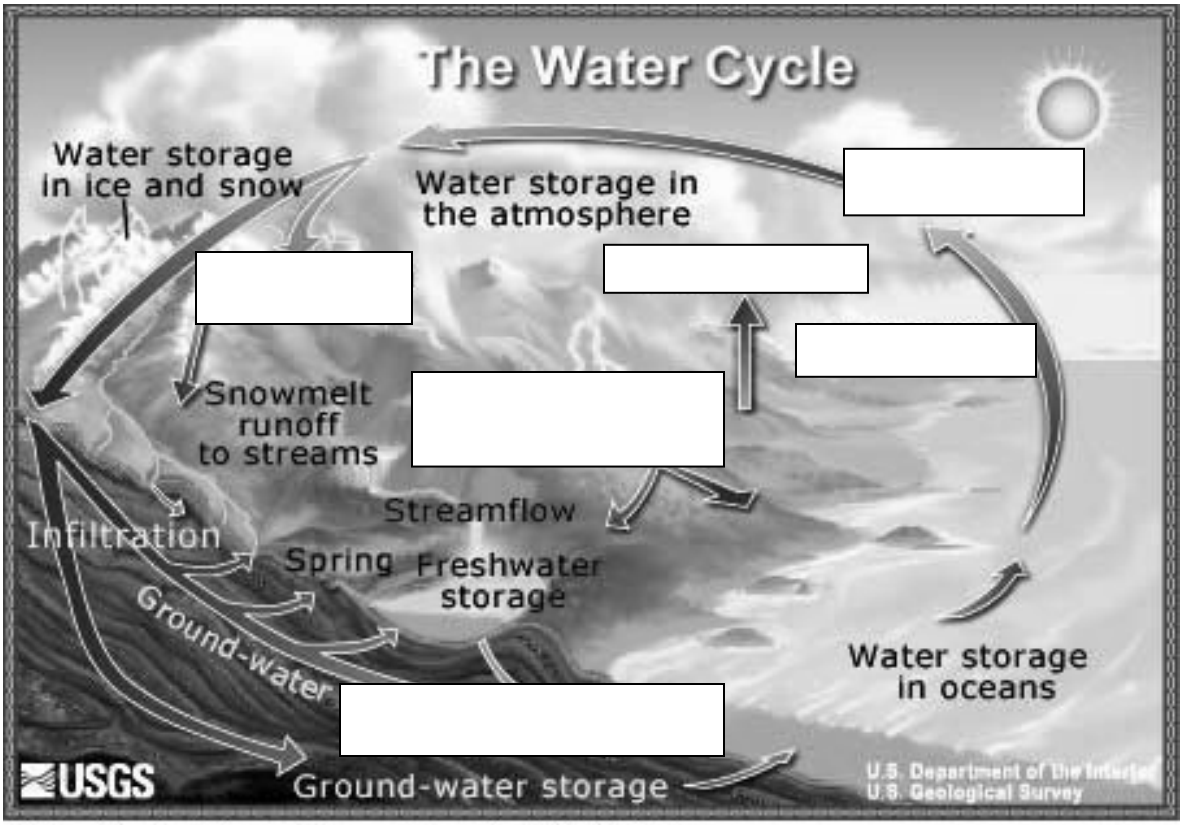


Illustration by John M. Evans, Colorado District, USGS

RAINFALL OVER MAHE

The map (overleaf) shows annual rainfalls amounts for Mahé. Lines which join places with equal rainfall are called isohyets (iso=equal). High rainfall amounts are taken as 2000 mm and above.

1) Shade your map (land areas only) to show the rainfall distribution over Mahé, using the key provided

2) Using an atlas of Seychelles or a tourist map to help you, label the following peaks: Morne Seychellois, Trois Fréres, and Montagne Brulée, Mont Le Niol. Match each one with a number on the map (1-4)

Peak	**Number**	**Height in metres**
Morne Seychellois		914m
Trois Fréres		699m
Mont Le Niol		681m
Montagne Brulée		501m

3) Identify your school/home on the map. Does the map reflect the rainfall amounts you normally experience? Compare these figures with data collected for the year by the school weather station.

4) Do you experience water shortages? What measures have been put in place to see you through the dry season? Suggest other ways in which more water could be saved.

5) Find out more about the two large reservoirs found on Mahé. Investigate their history. Were people moved out of the area so that they could be built? Why they both are situated in the north of the Island.

Extension Exercises

Note to teachers – the following activity is best done in pairs spread out over one week.

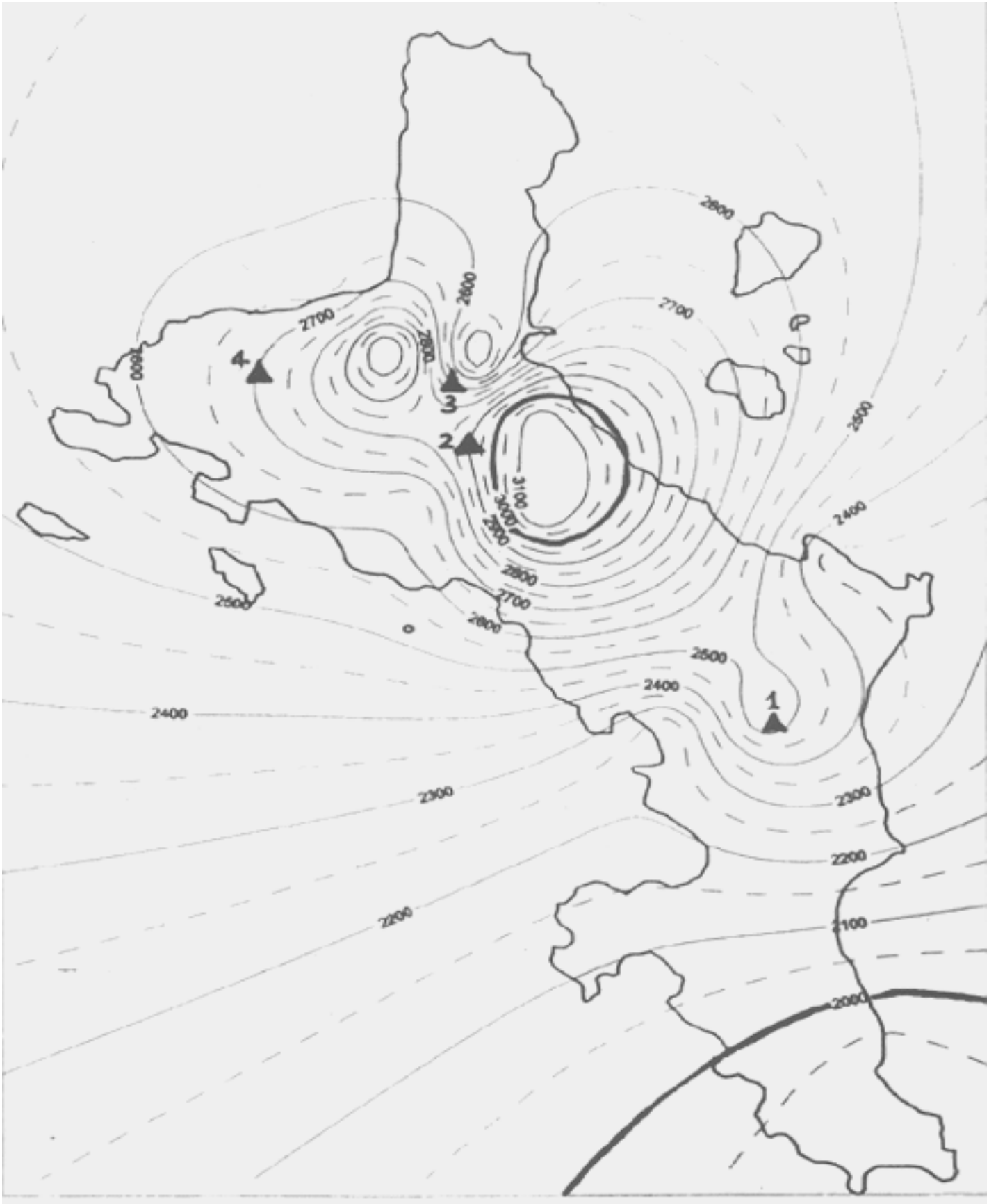
Sharing a Limited Resources

1. For one week you have to bring two litres of water each day which you have to share between you. Decided who is going to bring water to school. What did you use it for? What difficulties did you encounter in sharing your water? Were there responsibilities involved? What positive thing have you learnt by doing this exercise? At the end of the week, write a report on your experience of sharing water.

2. You are on a survival of the Fittest competition and have to survive a weekend on Conception Island which is known to be dry place. You may not borrow or share anything with the other contestants. List five essential items you would take to see you through those three days in the field. Explain why you have chosen the items in your list.

3. Talk to your parents or grandparents about how they obtained their water supply when they were your age. Find out how they had to walk to fetch water? If you had to walk 1 km with a 10 kilo container, would you be more careful about using water? Give examples of how you would save water.

Map Showing Annual Rainfall



Water Cycle Adventures

Objectives:

To apply information about the many forms of water and the water cycle to create a comic strip story. To write and draw fictional stories which include scientific facts.

Materials

- Writing paper and pencil (for story draft)
- Art material (drawing paper, pens, colouring materials) for comic strip

Background

The water available on planet Earth is the same water that has always been available and the only water that ever will be available. The water we drink is the same water that dinosaurs drank some two hundred million years ago. Water is on a never-ending cyclical journey between earth and sky. This journey is referred to as the water cycle.

During its journey, water is continuously reused and recycled. It is also changes form. Water falls to the earth as rain, snow, sleet, or hail. What happens to water once it reaches the earth depends on where lands. It might seep into the ground and move slowly along the groundwater to a nearby lake or stream. It might sink into the ground and be taken up by a plant, moving through the plant to its leaves and evaporating back into the atmosphere (transpiration) as water vapor.

Water might land on a lake or pond and spend a season or two freezing and thawing; changing back and forth between a liquid and a solid. Water might land on a river or a stream and continue its journey on to the ocean, or it might be heated by the sun and evaporate as water vapor back into the atmosphere, where it condenses into droplets and becomes part of a cloud formation. Eventually, the water in the cloud falls back to the earth and the journey begins again.

If we understand that we all have all the water that we ever will have, we can better appreciate why it is so important that we do our best to keep water clean. Nature has its own built-in water cleaning system, but sometimes human carelessness causes water to become so dirty that nature's cleaning system gets **bogged down.**

When harmful substances are discarded into the environment, sooner or later they enter the water cycle. When chemicals are released into the air from smokestacks, sooner or latter they fall to the earth with the rain and snow. When we put harmful substances onto the land or bury them in the ground, sooner or latter they may find their way into groundwater or surface water, which may turn out to be the water we drink. In nature's water cycle, everything is connected.

Procedure

1. Begin by asking students to name forms of water as a liquid (e.g., rain, groundwater, ocean, lake, river, pond, puddles), a gas (i.e., water vapor), and solid (e.g., ice, hail, snow).

2. Tell the students they are going to create a comic strip about a drop of water that has an adventure through the water cycle. Give each student a different water cycle /phase starting point. For example, have one student begin as a drop that is frozen in a pond, have another begin as a drop in a puddle on a hot summer day, and have another begin in the ground as groundwater where it slowly moves to surface water or its drawn from a well. This way, each student's story will go through the water cycle in a different way.

3. Tell the students that during its adventure their drop of water must find itself in situations where it becomes all three forms: a solid, a liquid, and a gas. The drop may even encounter some form of pollution (e.g., air pollution in clouds, pesticides sprayed on land, leaking underground storage tank, cow manure, carelessly disposed paints or chemicals, oil spills).

4. Have the students develop their story line first. The story should have a beginning, middle, and an ending. Students can use the water cycle as a way to sequence the story. Ask the students to describe how the water drop feels as it changes form or how it feels and how others feel (e.g., people, animals) if someone pollutes it.

5. On the drawing paper have the students put their water story adventure into a comic book format. Use cartoon “balloons” to indicate when the drop or some else is speaking. Put the pictures in the order in which the action happens. Bind the cartoon strips with a cover to create a comic book.

6. When the comic books, have been completed, have the student’s show and tell their stories to the class.

Extension

- Have the students divide up into news teams. The teams will develop news broadcasts that tell stories about a water drop’s encounter with pollution, including interviews. The students can describe how the drop got polluted and how it might be expected to recover. The broadcasts can also include weather forecasters, who describe weather conditions and show on a map where the drop was when the incident took place.

- Have the students create a travel brochure or travel advert for other water drops. Tell the water drops where they can go to avoid pollution and have fun and adventure.

HOW WATER FITS UNDERGROUND

Objective

To explain that groundwater fills the spaces between particles and teach about the water table.

Materials

Each group of 3-5 students
Needs:

- 1 clear cup filled to the with gravel and half-filled halfway with sand
- 1 cup filled 1/3 with water
- crayon or 2 pieces of tape

Source

Adapted from Gee-Wow!
Adventure in water Education
Groundwater Education in
Michigan

Background

When water hits the ground, gravity pulls it through the pores in the soil until it reaches a depth where all of the spaces between the particles are filled with water. The water level at this point is a called the water table. The water table can be affected by various factors. It can rise during high periods of rainfall, and fall during a drought.

Below the water table, all the spaces between particles are filled with water, **also known as groundwater**. When there is an underground saturated, permeable, geologic, formation capable of producing significant amounts of water in a well or spring, it is called an aquifer.

Nearly 90% of all aquifers developed for water supplies are composed of sands and gravels. Porous sandstone, limestone, and highly-fractures crystalline and volcanic rock are other common aquifer materials.

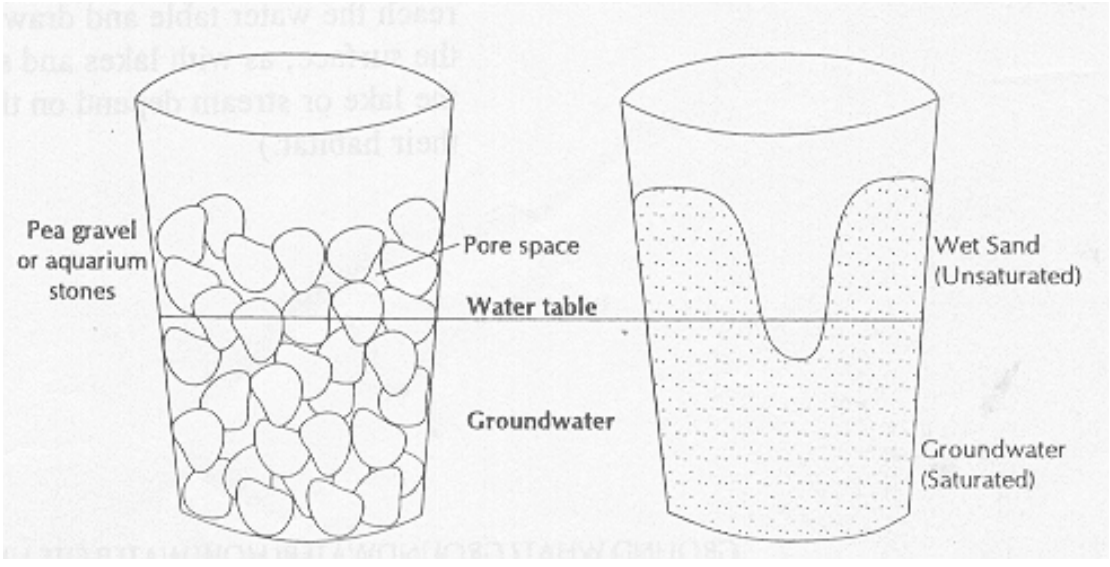
Procedure

1. Divide students into groups and hand out cups containing gravel and water. Ask students to examine the materials in their cup and describe where the water fits in it (between gravel particles). Explain that water found in the ground is groundwater. This is like the water found under the earth's surface.

2. Have each group find the top of the water in the cup, and using a crayon or a piece of tape, mark it on their cup. Explain that this is the water table.

3. Distribute one cup of sand, and one cup of water to each group. Have students examine the sand for things like particle size, color, texture, etc., and share their observations with their group.

4. Students should slowly pour the water into the cup of sand. Those not pouring should be carefully observing where the water goes. (It fills up the spaces between the sand particles).



They should also watch for the telltale bubbles of air that may form as air is being forced out of the spores between particles by the incoming water.

5. Ask students to mark the water table in the cup of sand and water with a crayon on the tape.

6. One students in each group should make a hole in the sand with their finger or a pencil, a small pool of water will form in the hole. The top surface of the water in this pool is the water table.

a) Have the students feel the sand on the top. How does it feel? Why? (The sand at the top of the cup is dry or damp. It is not saturated, like the sand under the water table).

8. Have students poke a hole in the bottom of their cups, and let the water drain out of the bottom. Then, feel the sand. Is it dry or damp? (Damp) why? (Because some water sticks to the grains of sand).

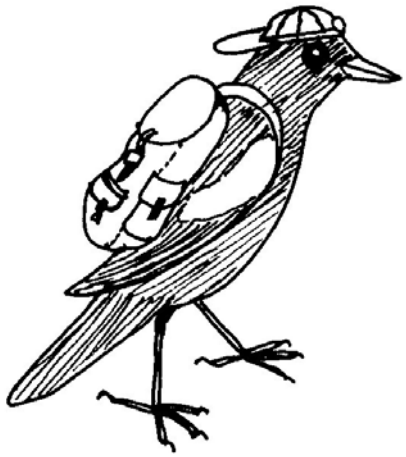
9. **Discussion Questions**

a) What happens to the water that comes down when it rains or snows? (It runs off into lakes or ponds, evaporates into the air, or sinks down into the ground and travels to the water table).

b) What was between the sand or gravel particles before water was poured into the cups? What is between sediment particles underground if there is no water there? (Air, which is displaced by the water).

c) How far underground is the water table? (The depth of the water table varies with the area. In most lakes and streams, the water table to people. In other places, it can be just a few to several hundred feet under the ground).

d) Why is a water table important to life on earth? (People use wells to reach the water table and draw water. When the water table is at the surface, as with lakes and streams, all the plants and animals in the lake or stream depend on the water in the water table to exist in their habitat).



WHAT'S BEEN POLLUTING THE GROUNDWATER?

Materials

- Clear plastic soda bottle
- Pieces of old nylon Stocking or tights
- Rubber band
- Clean gravel
- Clean sand
- Water
- Beakers
- Measuring spoons
- "Rain cups" paper cups with holes punched in the bottom
- 1 pipette per team (to add food coloring)

Pollutants

- Table salt (2Tbs). represents road salt, which may dissolve in snow or rain and get into ground water
- Red food coloring (5-20 drops) Represents hazardous or toxic materials
- Vegetable oil (2Tbs). represents motor oil
- Paper towels soaked in ½ cup Of water and 5 drops of blue food coloring, represents contaminants in garbage at landfills, which can leach into the groundwater
- Baking soda (2Tbs). represents Commercial fertilizer
- Vinegar (2Tbs), represents household chemicals

Background

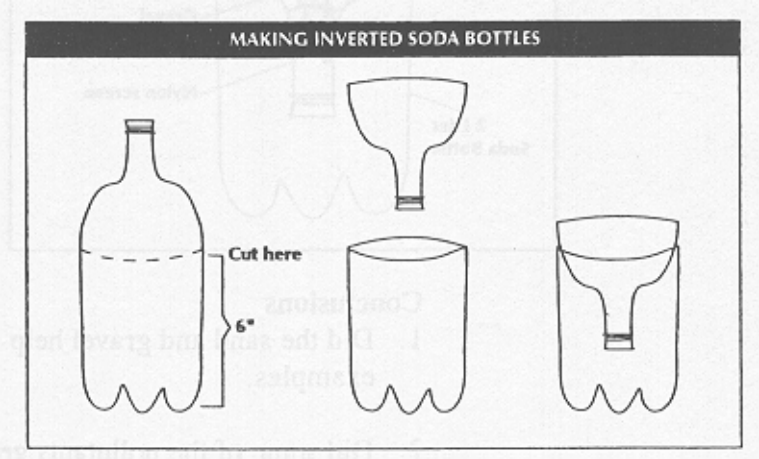
Mr. and Mrs. Public have been confident the water in their groundwater well is excellent quality. They know that the soil is an excellent filter. As water flows through the soil, many contaminants are left behind and cling, or absorb, to the soil particles.

But lately Mr. and Mrs. Public have begun to worry that perhaps some contaminants are being dissolved and carried along as the water slowly soaks into the ground and becomes part of the groundwater. They have asked the water detectives to perform an experiment to find out how good a filter the soil really is.

Step 1: Read the following experiments all the way through.

Step 2: State your hypothesis: Make a prediction about what you think will happen before you do the experiment). For each "pollutant," write the name of the pollutant and state your hypothesis on the Water detective Data Sheet. What do you think water will look like after it passes through the various contaminants in the ground water model?

Step 3: Perform the experiment.



Procedure

1. Make a groundwater model

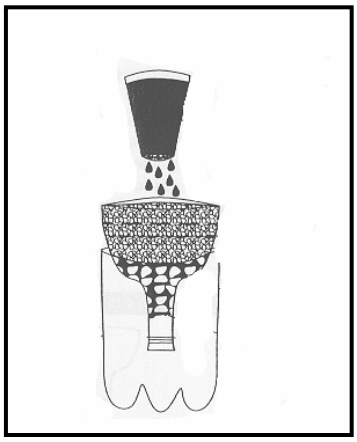
a) Cut 6 inches off the bottom of several plastic soda bottles as shown in illustration. Use the bottom of the bottle (if clear) as a stand.

b) Cover the necks of the bottles with pieces of nylon stockings or tights. Secure them tightly with rubber bands.

c) Inverts the tops of the bottles into the sands (bottom halves of the bottles) as shown in the illustration, or use a beaker as a stand instead.

d) Put a 2 inch layer of gravel, and a 2-inch layer of coarse sand into the inverted top of one soda bottle.

2. Pick one of the “pollutants” and place it on the top of the soil (sand) in the groundwater. (The “pollutants” are not harmful to you. However, they are being used to represent harmful substances).



Ground Water Model

3. Slowly pour water through the “rain cup” and on to the surface of the soil. (This represents rain).
4. Pour the rain water until it begins to drop into clear beaker at the bottom of the groundwater model.
5. Did the “pollute” water look cleaner after it was poured trough the model? Note any changes in color and smell. Record your observations on the data sheet provided.

6. Repeat steps with other “pollutants.”

Conclusions

1. Did the sand gravel help to filter out some of the pollutants? Give examples.

2. Did some of the pollutants get through the sand and gravel? Give examples.

3. Were you ensuring about whether pollutants had been filtered out? If so, what other means might you use, besides sight or smell, to determine their presence? As you added more and more pollutants to the soil surface, how was the quality of water affected?

4. How did your results compare with your hypothesis?

   Hints: After performing this experiment, the water detectives told Mr. and Mrs. Public that the best way to keep groundwater protected from pollutants is to make sure that pollutants don’t get into the soil in the first place.

WATER DETECTIVE DATA SHEET

"POLLUTANTS"	HYPOTHESIS	ACTUAL RESULTS

WHAT'S BEEN POLLUTING THE GROUNDWATER?

RAP IT IN WATER

Objective:

To allow students to use their groundwater
Knowledge and experiment creativity with words and sounds

Source:

Adapted from: USEPA, Office of children's Health Protection

Background

This project is an excellent way to continue a water education unit review with creativity. It works best if students have had an opportunity to become acquainted with water terms and concepts.

Procedure

1. After basics are covered, review with the class what they have learned about water. Then assign groups of three to five to work together to write a rap song about water.

2. Set some parameters that must be included in each of the raps. For example, instruct students that there must be a least three water facts mentioned in the song, or that they must rap about effective techniques or practices that protect and conserve water.

3. Schedule a time for students to perform their rap songs. You might want to invite parents, friends, the community and other classes to watch and encourage the students. Adult and youth guests can clap along or even participate in some way.

4. A rap can be a short poem, sung or spoken to a rhythm. The following is an example of a rap.

Listen everybody
We've heard about it in the news.
Environmental threats
Just give me the blues.

Our planet is a hurtin'
The water is unclean.
And begin to make it clean.

A little conservation
Is all that it will take.
We'll heal our hurtin' planet
Starting with this river.

You pick up the litter
I'll collect the trash.
Together we can do it
And our planet, it will last.

Objective

To have student's thinks through how people use water and determine that water is essential to everyday living and that water is a part of the standard of living to which we are accustomed in our society.

Materials

30 copied tickets (3 sheets) for student
1 envelop for each student
1 Collection box for tickets

Source

Adapted from: Gee-Wow! Adventures in Water Education in Michigan

WATER TRIPPING:

A Water Conservation Game

Background

On average, the human body requires about 2.5 quarts (2.4 liters) of water per day. But we sue a lot more water than is needed internally. In the box below are some estimates of daily household water use for an American family.

Using the figure of 100 gallons per person per day, we use much more water than the body needs to survive. Some of this goes into activities like food preparation and hygiene, but how much water is wasted by one's lifestyle?

Compare the following domestic use per capita figures for an "average" family ***(note: 1 gallon is approximately 4½ litres).***

India	6.57 gallons/day
Nigeria	32.4 gallons/day
USA	144 gallons/day

These figures demonstrate that lifestyle, availability of technology, and availability of water all affect the consumption rate of water.

Amount of Water Used Per Day Per Four Person Household		
USE	GALLONS	LITERS
Toilet	25	93
Shower	80	296
Washing dishes	15	56
Laundry	18	67
Lavatory	3	11
Basic needs	3	11
TOTAL	144	534

Procedure

1. Tell students the class is going to play a game that demonstrates water use and the reasons for conserving water.

2. As a group, list trips student trips students take during a school day when they use water. Charge one ticket for each use of water on each trip. (Categories may include: drinking fountain, rest room, lunch, recess, etc).

3. Give each student 30 tickets and an envelop in which to keep them. Have each student put her name on the tickets.

4. It costs the students one ticket each time they use water. Use a central collection box.

5. Have students keep a record of their water use.

6. **Discussion Question** on the third or forth day

   a) On what kinds of things have you spent your water tickets?
   On some activities more than others?

   b) What if there was no water tickets left for the rest of the week?

   c) What can we do to save water?

   d) What can we do to get more water?

   e) If one person has some tickets left over and other person doesn't is it fair to trade?

   f) If you were out of tickets now, do you wish you had saved some for later?

   g) If you played this game again, would you do anything differently?

7. List with students things they can do to make the water they have (at home and at school) go further. This list may include: turn water off while brushing teeth (saves about 2 gallons); take short shower instead of a bath (save at least 24 gallons); shut off dripping taps (save 1,000 gallons or more per year); turn the faucets off while soaping your hands, hair, or body; get water in restaurants only when you are going to drink it; etc.

Extension

- Have students write an essay entitled "The Day the Water Ran Out," and discuss that topic in class. Have students talk about what would happen if the water ran out.

Water Tickets

 NAME ……..	 NAME ……	 NAME ……
 NAME……..	 NAME…….	 NAME……
 NAME…….	 NAME……..	 NAME…….
 NAME……..	 NAME…….	 NAME……

WATER TRIPPING: A WATER CONSERAVTION GAME

WATER CONSERAVTION AT HOME

Fresh water is running out

So what can we do?

- Make water conservation a way of life. We **CAN** make a difference if we **ALL** makes it our responsibility to use less water every day.
- Conservation of fresh water means using less water and reducing water pollution.
- Try out the following to see how much water you could save at home. Complete the column on the right.
- Tick those you are already practicing at home.

Water-saving activities to try at home	Litres of water used	Alternatives	Litres of water used	Litres of water saved
Have a shower	30	Have a bath	110	
Wash vegetables in a bowl	9	Wash vegetables under a running tap	240	
Hand wash clothes in a bucket	40	Under a running tap	240	
Wash a full load in a washing machine	130	Wash half load	130	
Use rainwater for washing a car or watering the garden	30	Use treated water	230	
Wash your car using a bucket of water	18	Wash your car using a hose	300	
Install dual-flush toilets Half flush	4.5	Full flush	9	
Install spray taps for washing up to minimize the outflow of water	30	Normal flow	90	
When brushing your teeth fill a mug with water	0.5	Leave the tap running	45	
Wash dishes by filling two bowls or sinks; one for washing, one for rinsing	25	Leave the tap running	130	
Use a mop and a bucket to clean floor	18	Use a hose for five minutes	178	
		Total saved (litres)		

Here are few more practical tips that help water conservation.

- Collect rainwater that comes off the roof in barrels and use for watering your garden.
- Leave frozen food/ice cubes out to defrost instead of ruining under tap.
- Repair leaking taps immediately.
- Use a sprinkler to water the garden instead of a hose.
- Help to protect water catchment areas by not cutting down trees in forested areas and close to rivers.
- Participate in tree planting activities.
- Use plants that do not require frequent watering e.g. shrubs, cactus family, ‘mother in law’s tongue’ etc. Seek advice from a horticulturalist if you are unsure of the best varieties to use.

WHAT'S IN A RIVER?

Level: P5 – P6

SUBJECTS:
Science
Social science

DURATION:
80 minutes (continuous)

SETTING:
Indoors and outdoors

MATERIALS:
dipnets.
Handlens, a bucket, jars, microsope
River check list

INTRODUCTION

A river is a natural habitats and home to many living organisms. All life forms found in a river have developed features which enable them to live and function, despite minor changes caused by humans, in their habitat.

It is expected that this activity will encourage children to discover and appreciate the diversity of freshwater life in a river.

OBJECTIVES:

1. To investigate plants and animals living in rivers, and to observe their adaptations.
2. To appreciate the diversity and value of river life.

PROCEDURES:

1. To introduce the topic by asking the students to brainstorm on the different kinds of living things they would expect to find in one of the rivers.

2. Ask the students if they have ever heard a river taking. Tell them that the other day the river near the school told you to invite the class down to visit, and see the plants and animals that live there.

3. Take students to visit a river near the school. Split the students into groups of 4-5 to work together. Give each group a handlens, a dipnet, and a couple of plastic containers, to help them collect and observe animals. Also give each group a river life checklist and a pencil to record the different types of plants and animals they find.

4. Before they begin, tell the students that the river gave you five golden rules to follow if you came to visit, and that the whole class must promise to respect these rules.

   These are the golden rules:

   - Students must be careful not to disturb the habitat by stirring up the sand or silt, crushing plants, and moving rocks.
   - Students may collect plants and animals in order to observe them, but they must be gentle with them and put them back where belong afterwards.
   - All captured animals must be kept in water in containers.
   - Students must have fun!

5. Allow the students to explore for about 30 minutes. Students should be encouraged to observe where different plants and animals can be found, how different animals move, how they breathe, how they feed, and other adaptations. Interesting animals collected by groups can be put into larger bucket of river water for everyone to see.

6. Bring everyone together to look at the plants and animals in the bucket. Briefly discuss what the children have seen.

7. Return the plants and animals to their habitat, and go back to the classroom to go over the checklists. (if a microscope is available, bring back some river water to see microscopic plants and animals).

8. In the classroom, ask each group to report on what they found. Try to share an interesting fact or story about each plant or animal mentioned, eg. Medicinal plants, who eats who, peculiar adaptations, etc.

9. Follow up the river study by doing the activity, “Web of Live”. Showing the interdependence of living things in the river.

EVALUATION:

1. Ask the students why these plants and animals are living in the river, and not in the sea, or in the desert.
2. Ask the students what we can to help protect plants and animals which live in the rivers.

EXTENSION:

1. Do the activity “Who am I?, using river plants and animals.
2. Do a role play about a river being polluted and get students to present different plants and animals.
3. Ask students to draw or write about their favourite plants or animal.
4. Ask the students to write a letter on behalf of a river plants/animals to the class, explaining what it need to survive and how students can help it.

RIVER CHECKLIST

Name(s):……

Date:……

Name of river/stream:……

Weather condition: ……

Animals (Description the animals you have observed).

Gourzon……..

Tilapia……..

Mosquito larva/Pupa……

Water beetle……..

Water boatman……

Water skater……..

Dragonfly larva……

Fresh water shrimp……..

Caddlisfly larva……

Mayfly larva……

Water louse……

Water flea……

Water snail……..

RIVER CHECKLIST

Name(s):……

Date:……

Name of river/stream:……

Weather condition: ……

Plants (Description the plants you have observed).

Sedges……

Canadian Pondweed……

Duckweed……

Water lettuce……

Moss……

Others: ……

……

Any signs of human activities……

……

……

Any signs of animal activities……

……

……

……

ANIMAL LIFE

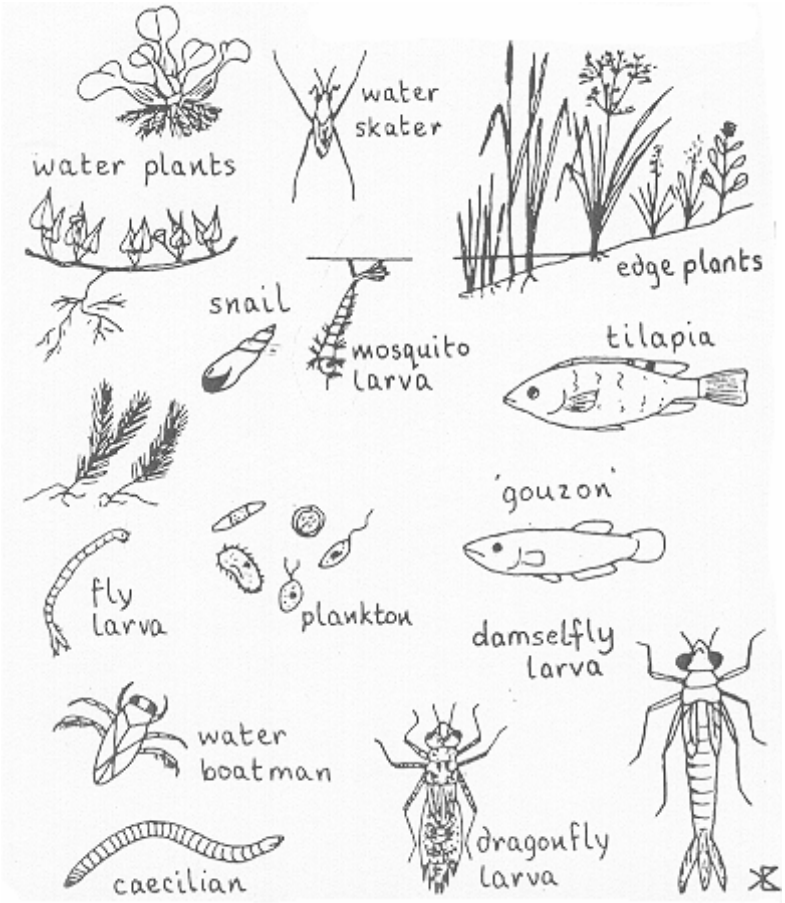
You will probably be surprise by the variety of animals living in your river. Some of them live on and under rocks, some hide in plants, some live in the mud or gravel, and some swim in the water.

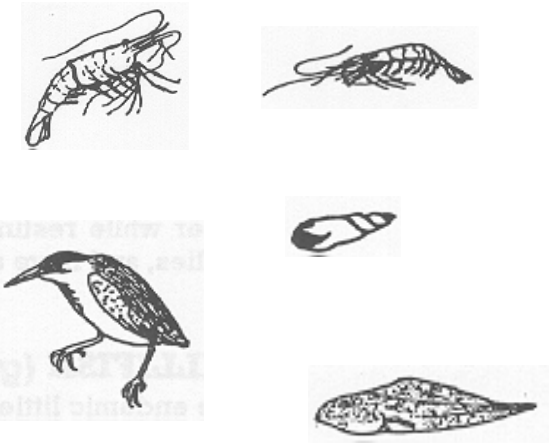
Use a net to scoop around the bottom and in the plants to find animals. You pick up rocks and gently scrape the animals into a container of water (white tray). Keep the container in the shade to keep the water cool.

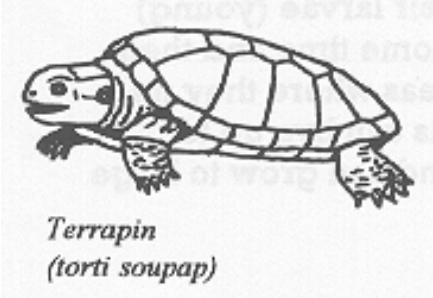
Don't forget to put all the animals back where you found them as soon as possible.

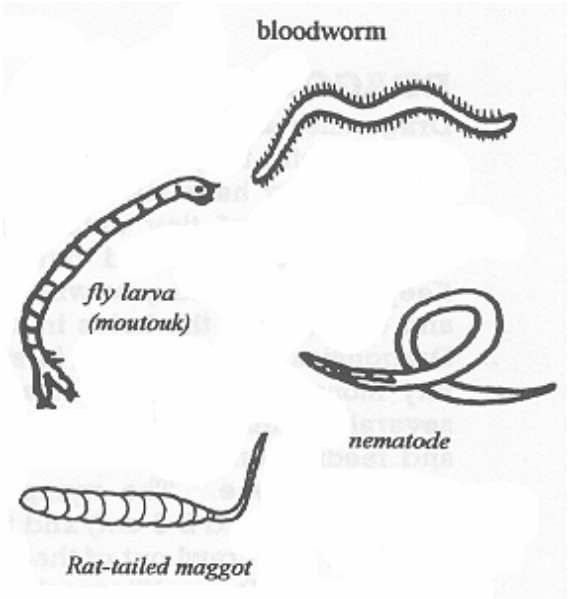
Pictures below illustrate some animals and plants that you might see in your river!

Some animals are not label in the pictures can you find their names.









FROGS

This little frog, called “grenwir” in kreol, is common along riverbanks and in marshy areas. Many people are familiar with the call, “vingt-huit, vingt-huit” sung by lovestruck males just after a heavy rain. Frogs are amphibians which mean they adapted for both land and water. Most frogs, these ones included, lay their eggs in water, and their tadpoles live in water and breathe with gills. Eventually the tadpoles develop legs to move around on land and lungs for breathing air. We have other kinds of frogs in Seychelles: the endemic tree frog (Krapo) whose long tailed tadpoles swim in fast flowing streams, and the tiny endemic sooglossid frogs that do not live in water but in the mountain forest.

DRAGONFLY (Sigal)

Dragonfly are insects, and if you look at one closely while they stop for a break you will notice that they have six legs, two big compound eyes, a pair of tiny antennae, and four long wings which keep watching and you will see it breathing in and out through the holes in it’s long abdomen. Dragonflies lay eggs in still water, and the tiny monster-like nymphs that hatch out spend several months’ underwater, breathing with gills, and feeding on delicacies like water bugs and mosquito larva. The nymphs eventually get quite big (around 2-3 cm) and emerge from the water and crawl out of their skins as beautiful dragonflies. Damselflies, which are more delicate and hold their wings folded up against each other while resting, are close relatives to dragonflies, and have a similar life cycle.

KILLIFISH (Gourzon)

The endemic little killifish, better known as gourzon, that live in our rivers are small brown fish that are mainly found in small streams and rivers. Unfortunately, most of the gourzon that used to live in the lower rivers have been wiped out by the introduced tilapia.

Gourzon are predators, feeding mainly on small water insects and crustaceans. Their nondescript brown colour provides a good camouflage against the streambed, giving them some protection from hungry green-backed herons (mannik) and other predators. While still fairly common in rivers free from tilapia, gourzon populations are also threatened by river pollution and siltation, preferring to live in clear, clean waters.

TERRAPHIN (torti soupap)

There are two, possibly three species of the small endemic fresh water turtles called terrapins. Like other endemic wildlife, these are protected by law, and it is therefore no longer legal to keep them as pets or eat them, as Seychellois used to commonly do. Their natural habitat is the freshwater marsh, where they spend their time hunting for fish insects, snail, and plants – pretty much everything edible! The best time to observe terrapins is in the cooler hours of the evening or early morning, and easier still if you are near the marshes of La Digue where they are still quite common. Terrapins are found on most of the granitic islands which have large marshes, but on more populated islands they have declined in numbers.

FRESH WATER EEL (Angye)

Fresh water eels were once feared by washerwomen who use rivers in the past. The eels live in rivers but lay their eggs in the sea. Their larva (young) drifted in the sea for some time and then returns to coastal areas where they migrate up rivers. Eels can live up to twenty five years and can grow to large sizes.

RIVER BINGO

TEACHER'S GUIDE

Objective:

- Familiarise students with the fauna and flora in and around the rivers via a game.
- Introduce the term ADAPTATION to the students.
- Introduce them to river to explore the wildlife and adaptations they have.

Level:

Primary, Secondary

Materials:

- Teachers River Bingo Cards
- 15 students' River Bingo Sheets
- Bottle tops, pebbles or paper markers

Duration:

Allow 30-45 minutes for this activity; 2-3 class periods for the extensions

Procedure:

- Explain the game Bingo if the students do not already know the rules
- Place cut-out Teachers cards in basket, hat, or bag
- Have students form groups of 2-3 depending on class size
- Distribute the river Bingo Sheets, giving one to each group
- Give out 20 -25 bottle tops (or Bingo Markers) to each group

Playing the Game:

- Pull out Teachers Card one at a time and call out the name of the species.
- Lay them out on a table for latter identification.
- Students can play/win either downwards, across, and diagonally.
- Once the group calls out BINGO, have them repeat the species marked and double check against the Teacher Cards.
- Play several rounds of Bingo until the students are familiar with local river wildlife.

Extensions:

- Explain to the students what an adaptation is. After studying their Bingo sheets, have each group list some adaptations that the wildlife on their sheets might have. On the black board or large sheet of paper, list the adaptations the groups of students came up with. Discuss the adaptations that the river organisms most likely possess.

- Visit a nearby river and have the students try to identify the wildlife present. Collect samples from the water and river bed. Place the smaller and less fragile species in a bucket or white tray for close identification. Can the students recognize any species adaptations present?

- Return to the classroom and have students mark off on their Bingo sheets the wildlife they actually saw and identified. Look up any organisms that you have not identified.
- Have each group design a mini booklet, poster, sketch, song, or poem about their river experience

Field Safety Guidelines

When out in on field trips follow these few steps to ensure everyone's and your own safety:

- Let your parents or an adult know where you are going and what you will be doing.
- Stay within the boundaries directed by the teacher. **DO NOT** crosses private property without permission.
- Always stay with your group. Conduct sampling under the supervision of an adult.
- Avoid walking or jumping on slippery ground or rocks of fallen trees.
- Bring plenty of water to drink (and a snack if necessary).
- NEVER drink water from or wash food in a river or stream no matter how clear the water looks.
- NEVER cross rivers or streams that are fast flowing or above the knee height.
- Disturb plants as little as possible. If unable to identify a plant, take a picture or draw a description of the plants for further studies.
- Remember to return creatures and rocks back where you found them.
- Wear gloves and boots when coming in contact with water or soil you believe may be contaminated.
- Always wash hands with soap and potable water (suitable) for drinking after completing.
- Wear insect repellent and sunscreen and a cap if necessary.
- Ensure you bring along a first –aid kit.
- Do not dump waste in the river. Place all waste in containers or plastic bags and dispose of them back at the school or a public bin.
- Do not fool around and cause distractions. **DO NOT** take chances!

Ancient Egypt and the River Nile

Water is fundamental to our existence. As living beings, we cannot survive for long without it. Throughout history, this basic requirement for water has led communities to be based along waterways due to the power and life-sustaining qualities that water provides.

Run-off from hills, mountains, and plains, flowing across watersheds, and channeling water into nearby ponds, lakes, and rivers provides the moisture required to produce crops and support the animals and plants that we depend on. Rivers provide the means to transport food and other products from one region to another. Communities near rivers often become centres of trading and wealth.

The river is also a centre of social life, used for recreation. If we look back at history, the importance of rivers to our societies has not changed much. Just as modern societies are often based beside rivers, so was Ancient Egypt.

In ancient times, Egyptian society depended upon the Nile River. Egypt flourished for around 3,000 years because the people used the river for farming, to water crops and animals, for social events, community projects, religious purposes. The central importance of the river in the Ancient Egyptian's daily life is seen in their art, religion, writings, politics, and social life. The river shaped nearly every facet of their existence.

The ancient Egyptians were a religious people. They worshipped the Sun and Nature. As farmers they depended on the Nile, which flooded and brought fertile new topsoil onto the land. They depended on the warm rays of the sun to help produce good harvests. They understood their dependence on the natural processes of the Earth. They had belief in the after-life.

To them, the sun and the river were two natural forces with both creative and destructive power. For the life-giving rays of the sun that caused the crops to grow could also cause them to shrivel and die. And the river that replenished the soil with its life-giving silt could destroy whatever lay in its path or, if it did not rise, bring famine. The sun and the river shared in the pattern of death and rebirth. The sun 'died' when it sank on the western horizon only to be 'reborn' in the eastern sky the next morning. And the 'death' of the land

followed by the germination or ‘rebirth’ of the crops each year was directly connected with the river’s annual flood. Rebirth was a central feature of the Egyptian scene. It was seen as a natural sequence to death and undoubtedly lay at the root of the ancient Egyptian conviction of life after death. Like the sun and the crops, man, they felt sure, would rise again to live a second life.”

Such religious beliefs pervaded society. Egyptians often buried their dead on the West bank of the Nile River. We think this was because they believed that the underworld was in the west where the sun died each day. Relatives of the dead often buried miniature boats with the dead to transport the soul in the afterlife. Like many other tomb artifacts, these were often marked with symbols of the sun God Re.

Sometimes these boats were big. A 142 foot wooden barque was buried with one pharaoh near a pyramid. Some scholars believe that the boat was used to transport the dead pharaoh at his funeral. The Egyptians believed the sun god Re traveled in two barques, one for day travel and one for the night.

Some historians say that the first written language arose out of the need to keep records of harvests and rainfall. Very few people could write. Those who could hold a special position in Egyptian society and were revered as powerful and important people. There are more than 700 hieroglyphs – pictures representing objects, ideas, or sounds. Some historians also think that advances in astrology – the study of stars - arose out of their need to be able to predict when the river would flood the plains.

From a dry, empty and barren landscape to a lush, fertile strip of land capable of supporting plant and animal life, Egypt became the most advanced civilization of ancient times. Without their Ingenuity in mastering the power of the river, the enduring success of Ancient Egyptian civilization would not have been possible. This story reminds us of the importance of rivers even today, and how we should respect the power and the fragility of nature.

Activity pages

Water world hunt

Directions

Below is a list of words and phrases that all have something to do with water. These words can be found printed forwards, backwards, up, down, or diagonally!

Words

Acre, foot, aquifer, conservation, contamination, delta, depletion, drainage basin, erosion, estuary, floodplain, groundwater, headwaters, hydrologic cycle, infiltration, pollutant, quality, recharge, river, runoff, saturation zone, surface water, tributary, watershed, water table

A	N	I	S	R	L	I	V	O	D	B	U	A	V	E	S	T	U	A	R	Y	Z	Q	H	H
C	V	L	S	U	Y	N	W	P	M	G	K	N	I	S	A	B	E	G	A	N	I	A	R	D
R	A	I	R	V	L	F	D	E	U	C	L	Z	I	O	Y	D	T	B	A	Q	F	E	O	C
E	K	Q	U	A	L	I	T	Y	S	L	U	D	M	E	N	I	A	L	P	D	O	O	L	F
F	U	D	Z	Q	I	L	K	S	U	N	A	D	E	L	T	A	W	O	S	V	U	W	S	L
O	R	A	G	O	C	T	Q	U	V	K	O	S	Z	P	W	U	E	S	J	Q	D	Y	S	E
O	T	E	M	D	O	R	A	U	D	Q	U	I	O	P	L	D	J	T	M	Z	J	E	O	L
T	R	I	B	U	T	A	R	Y	A	I	C	O	T	Y	B	E	S	L	W	H	A	U	Q	C
E	E	U	Q	L	A	R	Y	A	L	Q	M	A	V	A	R	P	T	D	O	L	N	Y	S	Y
Y	R	G	N	K	C	I	Q	L	V	T	B	X	D	O	V	T	S	I	Z	A	D	Y	K	C
J	A	R	J	O	L	O	C	V	I	E	U	W	S	Y	K	R	D	U	O	E	S	G	O	C
A	S	O	G	U	F	N	E	V	K	Z	R	I	U	Y	P	M	E	D	H	N	L	U	N	I
Q	R	U	F	O	G	F	A	V	J	E	O	Q	R	O	S	G	I	S	D	O	N	Q	H	G
M	H	N	U	N	A	J	V	E	I	N	K	C	F	I	Z	O	R	Q	N	Y	N	T	S	O
N	J	D	W	V	B	O	S	P	Q	G	X	D	A	L	T	E	J	D	N	O	E	O	A	L
I	J	W	A	Z	O	D	U	O	E	K	C	A	C	E	T	U	Q	K	D	S	C	N	E	O
Q	U	A	N	T	I	T	Y	L	B	I	S	C	E	A	Q	J	E	G	R	A	H	C	E	R
D	I	T	W	L	A	N	B	L	F	Y	Q	J	W	C	K	S	T	Z	P	A	J	Q	M	D
A	J	E	H	E	M	A	I	U	Z	E	B	Q	A	R	P	Q	G	A	B	E	T	L	X	Y
J	W	R	I	V	T	E	K	T	A	E	V	R	T	Z	S	R	E	T	A	W	D	A	E	H
Q	J	U	X	R	A	O	B	A	Q	U	I	F	E	R	P	Q	L	C	A	E	X	A	U	Y
C	U	A	E	W	J	S	U	N	P	D	H	K	R	S	R	N	X	G	Y	S	G	B	S	E
Z	T	T	U	W	H	M	C	T	S	U	R	C	O	N	T	A	M	I	N	A	T	I	O	N
I	A	S	Y	A	B	Y	X	J	K	W	C	W	A	Q	O	P	J	C	Y	I	N	S	O	G
W	K	U	S	M	S	S	A	T	U	R	A	T	I	O	N	Z	O	N	E	E	V	F	W	K

Source: the Groundwater Foundation

STORY

The House of Moon and Sun

Many many years ago, Sun and Water were great friends and lived together on earth. Sun visited Water very often, but Water never went to visit his friend Sun. This happened for such a long time, that finally Sun decided to ask Water if there was any problem.

- I realized - Sun said one day - that I always come and visit you, while you never came to my house. Would you tell me why does this happen?

- All right - Water said - the point is not that I don't want to visit you. But the problem is that your house is not big enough for me. If I came and visit you with all my family, I will end up pushing you away from your own house.

- I understand - Sun said -, but anyway, I want you to come and visit me.

- It's fine - answered Water -, if you want me to come and visit you, I will. After all, you visited me so many times. But, in order of making this possible, you will have to build a very big garden; and it has to be very big, because we are many in my family, and we take lots of space.

- Don't worry, I promise I will build you a garden big enough for you and your family to visit me.

The two friends were very happy. Sun went immediately to his house, where his bride Moon was waiting for him. Thus Sun explained Moon the promise he made to Water, and the day after he began to build an enormous garden to receive Water in it.

When he finished building it, Sun told Water that he and his family were invited to his house. So the day after Water and his relatives, fish and water animals, knocked to the door of the house of Sun and Moon.

- Here we are! - said the guest. - Are you all ready? Can we enter without problems?

- You can enter whenever you want - answered Sun.
So Water began pouring in, inside the garden of Sun and Moon. In a few minutes the level of waters was high as the knees of Sun and Moon, so the guest Water asked:

- Can we continue flowing? Is there enough space?

- Sure there is, don't worry - answered Sun. - Come in, all those who want.

And Water went on flowing inside the garden, reaching the height of the head of a man.

- All right -, said Water - do you still want more of my relatives to enter?

Sun and Moon looked in their eyes, and agreed that there was nothing else to do, so they told Water to enter. They had to climb up to the ceiling, for there was very little space above the water. Water asked again if they could continue pouring in, and Sun and Moon repeated that there was no problem, and the house filled up more and more. So much water entered in, that soon it exceeded the level of the ceiling, and Sun and Moon had to get out and recover in the sky, where they remained till now.

WATER TERMS AND DIFFINITIONS

Aquifer - an underground geological formation able to store water - like a natural storage tank.

Condensation – the turning of a vapour into liquid, e.g. water vapour into rainfall, due to cooling.

Drought – an extended period of dry weather resulting in unusually dry conditions on the ground, with wetlands disappearing or dwindling, and crops affected. Lack of rain will stunt the growth of most plants and may dry them up completely.

Erosion – the wearing down of any surface – e.g. rocks or soil – by the action of water, wind, ice or even human traffic.

Estuary – the bay area of a river, where it widens on flat ground to meet the ocean, where there is mixing of fresh and salt water.

Evaporation – the conservation of a liquid into vapour, usually because of warming, the opposite process to condensation.

Groundwater – water held underground.

Hydrological cycle – the water cycle around the world, which moves water from liquid to gas to solid forms as it heats and cools.

Irrigation – the controlled application of water to land to supply crops and other agriculture.

Mangrove – saltwater wetlands in tropical and sub – tropical areas, with a specialized vegetation associated with it.

Marsh – a wetland with mostly soft plants that grow in water or saturated soil.

Permeable – capable of allowing in or through water.

Pollution – contaminated in the air, water or soil that cause harm to the natural workings of these.

Precipitation – rain, snow, etc – water returning from the atmosphere to Earth when it condenses to a point where it can no longer be air – borne.

Run – off – water that flows off land following precipitation.

Transpiration – evaporation from the leaves of plants after these have drawn the water into their systems.

Waterlogged – saturated – holding as much water as it can.

Watershed – the land area from which water is drained into a stream or other channel – also called.

Wetland – land where water is the dominant factor in determining the nature of soil development and the types of plants and animals found there.

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