AustralianA HANDBOOKAidON OUR ENVIRONMENT



World Vision



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World Vision Uganda, P. O Box 5319 Kampala Telephone: +256-414-251642, +256-312-264690 Website: www.wvi.org/Uganda

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The authors of this guide have made every effort to ensure accuracy and currency of information in this guide. The authors disclaim any liability, loss, injury or damage incurred as a consequence, directly or indirectly, of the use and application of the contents of this book.

Compilation and editing: Gaster Kiyingi Editing: Martha Akello Peer reviews: Atwijukire Simpson, Robert Muwawu, Jonathan Mayanja, Simon Amunau, Robert Mugerwa, Illustrations: Sekiranda Moses Additional illustrations: Pace Uganda Manual Book design: Michael Bunnya Kalanzi (MeBK ConSult) Photo Credit: Jonathan Mayanja, Gaster Kiyingi

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For more information about Farmer Managed Natural Regeneration (FMNR) visit the FMNR hub on www. fmnrhub.com.au.





About the handbook

Farmer Managed Natural Regeneration (FMNR) is one of the World Vision Uganda's models to address environmental degradation challenges. The model hinges on the ability of most indigenous tree species to regenerate or coppice naturally, if allowed to. World Vision seeks to use this as an entry point into creating awareness about environmental consciousness in schools; a reason as to why the FMNR Project in Uganda has spearheaded the development of this handbook; and the primary audiences targeted by the book are primary school children.

The handbook covers 5 thematic areas (knowing the environment, conserving the environment, the role of trees in our environment, climate change and expanding learning beyond class rooms). Within each thematic area, there are lessons designed in such a way that they provide practical exercises, which is an opportunity to engage children in real action in order to increase learning about the theme of the lesson. The exercises can be done either during the session or carried separately. The handbook has illustrations and drawings that relate to the theme of the lesson.

It also provides practical exercises that improve awareness about the environment and trees, while at the same time engaging children in conservation efforts around the school. It is hoped that teachers and other users find it useful.

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Theme One: Knowing Our Environment

Lesson I: Knowing our environment

What does the term environment mean?

"The term environment is everything that surrounds us and how it affects growth of living organisms."

There are two types of the environment:

- 1. Natural environment this is the environment created by God such as natural forests, lakes, swamps and rivers.
- Man made environment this is the environment created by human beings such as bridges, buildings, towns and forest plantations.

The natural environment includes:

Atmosphere = Space occupied by air above us. In the atmosphere there is air, dust, clouds and flying objects (birds, aeroplanes). Hydrosphere = Space occupied by water and this includes lakes and rivers. Here we find fish, hippos, sea animals such as sharks, snails among others. **Lithosphere =** Space occupied by soil and stones that make up the earth. In soil we find earthworms, algae and reptiles.

Biosphere = Space occupied by life. This includes all living things.

Why is the environment important to us?

- 1. The environment is home for human beings.
- 2. It is where we breathe and eat.
- 3. In the environment, all living things depend on one another.
 - The sun provides light and heat for plants.
 - The plants are consumed by animals.
 - Some animals are consumed by fellow animals
 - Some animals are consumed by human beings.
 - Some animals eat human beings.
 - Plants and animals provide raw materials for construction and clothing.
 - Insects like bees pollinate plants.

EXEPCISE: Identify 6 types of living things found in the parts of the environment in the table below

Part of the environment	Living things found in that part of the environment				
Atmosphere (the air above us)					
Hydrosphere (in water bodies)					
Lithosphere (in the soil)					
Biosphere (all living things)					

Understanding our environment



Let us start by looking at one type of living things and how they live with one another. Here, we have **a** cow eating grass under a tree.

Then, we look at how the many cows and many trees live together. The cows need the trees for shade. The cow dung from the cows makes the soil fertile for the trees to grow.





In life, the many living and non living things stay together and benefit one another. Do you see how many living things are in this diagram? Name them if you can.

Never forget: Whenever you destroy one thing in your environment, you destroy the way the living things live together. For example, if you cut a tree, a cow suffers because there will be no shade.

Lesson 2: What makes up our environment?



These are some of the things found in the environment

EXEPCISE: Using the animals, birds and insects shown above, fill in the table below.

Animal or Bird or insect	What is its local name?	What does it eat?	Where does it live?	What kind of weather does it prefer?	What kind of tree does it prefer for its home or food?



Lesson 3: Things destroying the environment: Charcoal burning



Activity:

Read about charcoal burning because you will use this information during the debate organized by the teacher. The motion will be, "Charcoal burning destroys our environment and therefore should be stopped immediately".

What is charcoal?

Charcoal is a product of trees that is used for cooking. Charcoal is produced in many parts of Uganda such as central Uganda, western and northern Uganda.

Charcoal burning is an economic activity in many homes. It is a source of income.

How is charcoal produced?

- **Step I:** Trees are cut into pieces.
- **Step II:** They are put together and covered with grass and soil for burning.
- Step III: Leave the pieces to burn for some time to make charcoal.
- Step IV: When ready, the soil is removed and charcoal collected into bags.
- **Step V:** It is then ready for selling.

Disadvantages of charcoal production

- It destroys trees that would be a source of oxygen and shade for other living things.
- It releases carbon dioxide into the atmosphere, causing climate change.
- It spoils the soil where charcoal burning takes place.
- The heat from charcoal burning kills organisms in the soil.

- Trees are a home for many animals and when they are cut down, these animals move away.
- When trees are cut from an area, that area can be open to soil erosion.
- Charcoal burning releases carbon dioxide which is a dangerous gas to the environment because it causes climate change.
- People engaged in charcoal burning normally suffer from various diseases.
- Crop yield also becomes low.

Advantages

- Charcoal is used for cooking food,
- Mature trees and trees that do not make good timber are converted into charcoal which is useful,
- Charcoal sellers pay tax and the money is used by government to buy medicine in hospitals and pay salary for teachers.
- Money from charcoal is used to buy food, sugar, clothes, soap and other necessities in homes.

What can be done to reduce impacts of charcoal burning

- People should be encourage to plant trees
- Farmers should allow the trees that were cut down to sprout and grow back into bigger trees.
- People should use energy saving cook stoves that reduce the amount of charcoal used.

Lesson 4: Activities that destroy our wetlands

What are wetlands?

Wetlands are areas where water is present either at or near the surface of the soil all year round. There are a number of plants and animals that live in the wetlands. The crested crane and mud fish are some of the examples. There are many wetlands around Lake Victoria, Kyoga and River Nile.

Importance of wetlands

- They are a source of raw materials for cloths, mats, ropes, thatching material for houses and various art and craft materials.
- Fish, birds and animals in wetlands are good food source.

- Wetlands are important source of water for domestic use.
- They are a source of income for households through sell of raw materials.
- Wetlands absorb heavy rain reducing floods
- Wetlands also purify water by removing solid materials.
- Wetlands are good for recreation such as boating, fishing, swimming, bird watching and hunting.
- Students visit wetlands for study purposes.
- They are home to many plants and animals.

The pictures below show things people do that destroy our wetlands.



Construction of roads in wetlands limits flow of water



Brick making leaves ponds that harbour mosquitoes



Growing crops such as rice in wetlands



Trees in wetlands are cut for brick burning



Constructing houses in wetlands



Grazing reduces number of plants



Markets in wetlands reduce space covered by wetlands



Theme Two: How To Conserve Our Environment

Lesson 5: Improving soil fertility through composting

What is compost?

Compost is organic matter (bits of plant and animal) that has been left to rot with the help of bacteria and other creatures. Compost adds manure to the soil.

How is compost used to improve soil fertility?

- It is used to add manure in the vegetable gardens.
- It is also used to add manure in flower gardens so that flowers grow well.
- It is used when sowing seed in a nursery bed.
- · Compost should be mixed with top soil to allow crops take nutrients from it.
- Compost can also be used for mulching between crops or around trees.
- Compost can be mixed with soil and used for raising tree seedlings and can be used as fish feed.
- Compost can be mixed with water and used as a compost tea as a quick boost for indoor plants.

The are two ways to make compost:

A) First method: A compost pit for dry conditions

This is how to make a compost pit suitable for dry conditions:

- 1. Dig a pit which is about 1.5 metres long, 1.5 metres wide and 2 feet deep.
- 2. Put layers of maize and rice stalks, banana leaves or parts of plants which will take a long time to become rotten.
- 3. After a few layers of different waste products, you can add a layer of ash (not too much) or top soil. If you are using waste food from the kitchen, cover it well or you will attract rats and other pests.
- 4. Repeat Step 2 and 3 until the pit is full.
- 5. Water each layer before adding the next, finishing with a layer of topsoil. Cover the pit properly.
- 6. Pour plenty of water on the mound/pit under the cover once a week, this is to prevent overheating
- The compost is wet enough when your hands stay damp after squeezing a handful. If the water runs out it is too wet.



B) Second method: Compost basket

Refer to the diagram below on how to construct a compost basket.

- I. Use hard sticks to construct a circular basket fixed on the ground as shown in the illustration.
- 2. Add layers of waste products which can rot and mix them with top soil and ash. Remember to water every layer.
- 3. Make sure the waste does not run out of the basket.
- 4. Cover the top with banana leaves and dry grass to avoid moisture loss.
- 5. You are advised to construct the compost basket within the garden so that as the manure gets out of the compost basket, the plants use it immediately.
- 6. Water the basket regularly.



Activity: Ask your teacher to guide you on how to make compost?

Lesson 6: Mulching as a way of protecting our soil.

What is mulching?

A mulch is a layer of old leaves, dry grass, small branches of trees or manure which is put on the soil around plants in order to protect them and help them to grow.

Mulching helps prevent soil erosion and adds manure to the soil. This makes the soil more fertile and reduces weeds in the garden, keeping the soil moist.

The materials used for mulching are:

- Crop stems and stalks.
- Dry banana leaves and leaves of other plants
- Leftover crop such as banana and sweet potato peelings.
- Compost and manure.

Do not use the following materials for mulching

- Plastics and polyethene bags should not be used.
- Remains of the same crop to mulch the same crop in order to prevent spreading disease. For example remains of maize to mulch a maize garden.
- Green vegetation is not normally used to mulch because it attracts pests and fungal diseases.

Activity: Ask your teacher to guide you on how to do mulching.

These are the materials required:

- Crop stems and stalks
- Dry banana leaves and leaves of other plants
- Leftover crop residues such as banana and sweet potato peelings
- Compost and manure

Follow the following steps to much the school garden.

- 1. For large plants, such as cassava spread the mulch between the rows and around each plant.
- For small plants (such as cabbages) or seedlings apply it between the rows and not directly around the plants (see illustration below). In this way you will not encourage diseases, but will reduce weeds and add organic matter to the soil.
- 3 Try different thicknesses of mulch to see which works best for your crops.
- 4. Always apply mulches to a warm but wet soil. Mulch applied to a dry soil will keep the soil dry.
- 5. Renew your mulch after every 6 months



Never forget: Mulching saves a

gardeners time and work in the long run. You will spend less time weeding, digging in a loose soil. Mulching prevents water from evaporating from the surface of the soil and less watering is necessary.

Lesson 7: Reducing volume of firewood and charcoal for cooking

Our homes use a lot of firewood and charcoal for cooking meaning that many trees are cut down. This has to stop because it destroys our environment.



This is a charcoal stove called *sigiri* in local

languages of Uganda. It

wastes a lot of charcoal

saves heat. A sigiri that does not save charcoal should not be used for

unless it is made in

such a way that it

cooking.

This is a Lorena energy saving cook stove. With one source of fire, you can cook using three sauce pans at a go and save a lot of firewood. All households should have and use this stove for cooking.



This is the three stone cooking stove. It is wasteful because it uses a lot of firewood and most heat goes into space. People should be discouraged from using this stove.



Activity: Answer the following question on firewood and charcoal

- Where do you get firewood you use for cooking at home?
- From which trees do you get firewood?.Are they planted or grew on their own?.....

.....

.....

.....

 How far from your home do you go to collect firewood?

- How many hours does it take you to collect firewood?
- Apart from firewood, what other materials are used for cooking in your home?
- Do your parents buy firewood? At what price?

- At what price?
- What type of stoves do you use for cooking in your home?

.....

.....

• What health problems are related to cooking using firewood?

Theme Three: The Role Of Trees In Our Environment

Lesson 8: Know your tree and its usefulness in the environment

What is a tree?

A tree is a wooden plant with a long stem with branches and leaves. Trees are used for making timber. Some trees produce fruits eaten by human beings.

What is a shrub?

A shrub is a plant that has several short stems usually less than 6 meters.

How are trees and shrubs useful to the environment?

- They provide shade.
- They are windbreaks for school buildings and homes.
- Trees and shrubs are important in the rain making process.
- When their leaves fall on ground, they improve soil fertility.
- Small animals live under or on the trees.
- Trees and shrubs control climate change.

Know the tree vocabulary

Annual rings - Circles in the middle of a tree trunk that indicate a tree's age; one circle for each year.

Arboreal - describes a living thing that lives in trees (birds, small animals).

Bark - The outside "skin" of a tree.

Branch - The part of a tree that grows outward from the stem.

Bud - The place on the stem or branch where flowers or leaves will come from.

Carbon Dioxide - The gas that is released by humans and other animals when they breathe; plants need it to live and manufacture their food through a process called photosynthesis. **Chlorophyll** - A green substance in plants which enables them to use sunlight in order to grow.

Cone - This is a structure that contains tree seed like the seed of pine trees.

Conifer - Trees that grow cones with seeds, such as pines.

Deciduous - The name for trees that lose their leaves in the dry season. Examples are Mvule trees.

Evergreen - Trees that keep their leaves all year long and therefore appear green all the year round.

Flower - The part of a plant that produces fruits.

Forest - A large area covered with trees. Usually this area should be more than 40 acres.

Fruit - A seed container that develops from a flower; some examples are oranges, mangoes, jack fruit among others.

Habit - The shape of a tree.

Habitat - The natural environment where trees and other living things live.

Leaf - The green part of a tree where food is created for the tree through photosynthesis.

Lobe - The part of a leaf that "sticks out".

Needle - A long, narrow leaf, sometimes pointed, like those on a pine tree.

Nursery - A place where young trees are raised.

Oxygen - The gas that is produced by plants; humans and animals need it to live.

Photosynthesis - The way in which plants make their own food using sunlight, water, carbon dioxide and chlorophyll.

Rainforest - An area with a thick cover of trees, covering a very large area and receives very high annual rainfall of at least 1000 millimeters.

Root - The underground part of a tree that holds it in the soil; roots also take in water and nutrients to help make food for the tree.



Sapling - A young tree less than 3 feet tall.

Seed - The part of a tree that will produce new trees when planted and it germinates.

Seedling - A very young tree.

Shrub - A plant that has several woody stems.

Species - A single type of tree, like the eucalyptus or Mvule tree.

Stomata - Tiny holes on a leaf where carbon dioxide goes in and oxygen comes out.

Tree - A large woody plant, usually with one main trunk, growing over 5 meters high.

Tree Crossword Puzzle

Using your vocabulary for trees, fill in the following crossword puzzle.



ACROSS

- I A large woody plant, usually with one main trunk, growing over 5 meters high
- 4 The underground part of a tree that holds it in the soil
- 5 A long, narrow leaf, sometimes pointed, like those on a pine tree
- 7 Tiny holes on a leaf where carbon dioxide goes in and oxygen comes out
- 8 A very young tree
- 10 The name for trees that lose their leaves in the dry season.
- 13 The part of a tree that will produce new trees when planted
- 14 Living things which live in trees

DOWN

- I The main stem of a tree
- 2 A large area covered with trees
- 3 The green part of a tree where food is created for the tree and oxygen is produced
- 6 An area with many trees in a hot climate with very high annual rainfall
- 9 Trees that keep their leaves all year long
- 11 The part of a tree that grows outward from the trunk
- 12 The fluid inside of a plant that distributes food and water to various parts of the plant
- 15 The outside "skin" of the woody parts of a tree



This is a game of looking for words that relate to the vocabulary of trees. Search for the tree words that you now know from your tree vocabulary.

С	0	Ν	1	F	E	R	К	R	Α	В
R	Y	E	М	E	Ν	0	С	В	S	R
0	G	E	U	J	W	0	L	U	А	Α
W	Т	D	I	Ν	Т	Т	0	D	Р	Ν
Ν	А	L	В	F	R	U	1	Т	Х	С
U	R	E	М	S	D	Ν	W	Т	Т	Н
Y	В	F	Α	1	1	1	0	Н	R	D
Р	0	Α	С	Е	G	0	D	Т	Е	М
0	R	Е	V	Е	R	G	R	Е	Е	Ν
Ν	E	L	F	Р	С	U	S	L	U	В
Α	Α	0	Α	Z	Ν	R	Y	Q	S	V
С		Т	J	К	0	Х	Y	G	Е	Ν

- Arboreal Bark Branch Bud Canopy Cone Conifer Deciduous
 - Evergreen

Fruit

Leaf Needle Oxygen Root Sap Seed Tree Trunk



Lesson 9: Parts of a tree and their use

Different parts of a tree?

Roots - This is the part of a tree that attaches into the ground to obtain and store nutrients. Some tree roots such as cassava are edible and some have medicinal value.

Trunk - This is the main stem connecting the roots and the branches. It is used for timber and firewood.

Branch - This connects the leaves to the trunk. Many birds sleep on tree branches. Branches are a source of firewood.

Crown - This is a combination of branches, leaves, and flowers connected together from the main stem. This provides shade and are rest places for animals such as lions.

Seed - This is the reproduction unit of a plant through germination. Many seeds of trees are edible by both people and animals.

Leaf - This is a flat but green part attached to the branches. It is the main organ for photosynthesis and transpiration for the plant. • Leaves of trees are eaten by animals such a giraffes. They also have medicinal value.

Evergreen trees - these are trees that do not shade off leaves during the dry season.

Deciduous trees - these are trees that shade off their leaves during the dry season such as Mvule.

How do trees grow?

Trees grow from tree seed through a process known as germination. Some grow from stumps through a process known as regeneration.

They manufacture their own food through a process called photosynthesis. Young trees are called **seedlings.**

Every year, a tree adds on a layer of skin (wood) represented as rings, as it grows (see cross-section of a stump on page 22). Those rings are used to estimate the age of the tree.

Parts of a tree





Venn Diagram exercise on deciduous and evergreen trees

Using the Venn diagram below, give common examples of deciduous and evergreen trees in your environment. Use local names in case you do not know the English and/or scientific names of the trees.





Lesson 10: Start your own tree nursery

What is a tree nursery?

A tree nursery is a place where young trees are raised until they are ready to be transplanted into the garden.

What is the most important feature of a tree nursery?

The most important feature is the shade where young trees called seedlings grow.

Is it necessary to choose the right site?

Yes:

Why?

Because:

- a. We need to reduce death of seedlings;
- b. We need to make it easy to look after the seedlings
- c. We need to produce enough good seedlings for planting

How do I choose a good site?

Tree nursery needs to be near to an adequate supply of water but also:

- a. Not on a very steep slope;
- b. On loam soil;
- c. Where there is shelter; and
- d. Easy to reach when transporting the seedlings for planting.

Why is it important to have water?

- A. Plants need water to grow especially in the dry season;
- B. The water should be clean with no toxic materials or soil particles dissolved in it;
- C. The water should be free or cheap, because tree seedlings need a lot of water.

Can a school establish a tree nursery?

Together with the school administration, pupils can start a nursery, learn how to manage them and produce seedlings for planting. Follow the guide on the next page to start one at your school.



Activity: Read the following steps and ask your teacher to guide you on how to start a school tree nursery



Remember! A nearby source of water is important. After you have planted in the field, take care of your small trees. Water them. Protect them from livestock and children playing by putting up a fence or other protection. Destroy termite mounds.

Lesson II: Planting a tree!

(Planting procedure for trees?)

You can reduce death of trees planted by planting and handling seedlings carefully. Seedlings need care, fertile soil, good moisture, no weeds and control of pests and diseases. Seedlings too, do not require excessive heat, wind or water logging. Clear the bushes, do lining and pitting using good spacing and choose the right species to plant for the right purpose.

Basic rules for tree planting

- Plant during the rain season.
- Plant trees on a cooler day not a hot sunny day.
- Protect seedlings during transportation!
- Store seedlings properly if immediate planting is not possible.
- Treat seedlings properly at the planting site to avoid deaths.
- Use your hands and hoe when planting seedlings.
- Plant seedlings at least to the orignal level planted while in the nursery.

• Plant straight seedlings as needed because you get better results with straight seedlings.

• Protect your young trees from animals, weed and fire.

• Check the survival of your seedlings (300 trees per acre is recommended).



"It is better not to have planted, than to have trees planted incorrectly."

Ask a professional forester for guidance in case of any problem.



Make proper lines using a string. The space between the two lines should be 3 metres by 3 metres. Sometimes it is 1.5 metres by 1.5 meters as shown in the diagram below.



The reasons for planting in a straight line are:

- Trees look good when they are in a straight line.
- Trees also grow straight and produce good poles and timber.
- It is easy to weed them when they are in a straight line.



Every child at school can grow trees. Trees maintain the local climatic conditions and fight climate change. They hold soil by preventing rain from washing and taking it away. They maintain soil nutrients and structures.

Communities living near forests depend on forests for food, fruits, medicine, fodder for their animals, firewood, charcoal, poles for construction of homes, timber, fribre for art and crafts, and honey.

Forest products are traded for money and are important source of raw materials for industries.





Exercise

- I. What do trees need to grow?
- 2. What shall we look for when we choose a place to plant a tree?
- **3.** Give at least three ways in which planting a tree helps the environment.
- 4. What are the rules for planting trees.



Lesson 12: Watch it grow!

You need to know how to look after the trees you have planted and here is the guidance.You must put this in practice.

Once a week, the class will visit their woodlot to do the following:

- Weed the seedlings. You may weed the entire woodlot or weed around the seedling.
- Identify the problems that the trees may be facing. Some of the problems to look out for include lack of water, termites, roaming animals eating off the leaves, caterpillars feeding on leaves or death of the seedlings.
- Water in the morning and evening when the sun in not too hot.
- · Replace the dead seedlings
- Repair the fencing material (using thorny bushes) around the woodlot to stop roaming animals from entering the woodlot and damaging the trees.
- Ring fence each of the seedlings
- Dig out the termite mounds to control termites.

As the trees grow, it is important to remove unnecessary branches (a process known as pruning).

This will help your tree to grow straight.

Never forget:

Trees grow much slower than crops such as maize. Be patient as you watch your trees grow.

Exercise

List ten things you need to do to make sure your tree grows well and fast.





Lesson 13: Agro-forestry; mixing trees and crops

This is what you need know to about Agro-forestry

- Agro-forestry is the practice of combining trees with crops. The trees benefit from the crops through weeding while the crops benefit from the trees when the leaves fall down and become manure.
- It helps farmers to have many living things on the farm and making soil fertile for future use.
- Agro-forestry trees help plants to survive very

Photos of Agro-forestry gardens

dry conditions and improve crop harvests by providing shade and manure from falling leaves.

- Trees such as Musizi (*Maesopsis eminii*) or Mugavu (*Albizia coriaria*) are good agro-forestry species.
- When trees are inter cropped with crops, it is important that this is done in clear lines (see photos below)



Agro-forestry trees exercise

List the different types of trees that are normally grown with crops in your area. Write their local names in case you do not know the common English names.Write the crops they are grown with.



Lesson 14: Farmer Managed Natural Regeneration (FMNR)

Farmer Managed Natural Regeneration (FMNR) is a simple, method of looking after trees in gardens, or grazing areas or areas set aside for forests.

Trees are allowed to grow from existing tree stumps and roots. This approach also allows trees germinating from seeds in the soil to grow.

- The farmer selects the stumps he want to grow trees from and decides how many stems will be allowed to grow on each stem based on what his/her needs are.
- The excess stems are cut and used as firewood.
- The remaining stems are pruned off after every six months.
- Farmers are encouraged to leave natural trees in their gardens to provide shade to control moisture in the soil as the plants grow (see picture below).



FMNR exercise

Move around your home or school compound and identify the trees growing on stumps. Name them and count them. Indicate their local uses.



Lesson 15: Popularizing FMNR in schools

Exercise:

Observe the photos here below and develop two FMRN message for each of the photos.















Never forget:

.....

It is less costly to grow trees from stumps, or looking after those that germinate on their own. Therefore regenerate more trees to get a lot of benefits.

Theme Four: Climate Change

Lesson 16: Understanding climate change

Climate change is the change in weather patterns over a long period of time and includes changes in temperature, rainfall, or wind patterns, among other effects. It is caused by both natural and human causes.

The natural causes are:

- Heat from the ground that is released to the atmosphere
- Direct heat from the sun
- Heat released from the sun.

Things that people do that cause climate change are:

- Deforestation cutting trees for firewood and clearing land for agriculture.
- Burning vegetation which releases heat, smoke and gases into the atmosphere
- Use of petroleum products that release gases to the atmosphere.
- Growing crops such as rice in swamps.

- Littering waste everywhere.
- Poor agricultural practices

The effects of climate change are:

- There are many floods in Teso, Lango and Kasese destroying houses and crops.
- Low yield and animal deaths,
- Landslides in Mt. Elgon conservation area that have destroyed houses and crops,
- Increases in spread of disease such as malaria across the country.

You need to fight against climate change by:

- Planting and growing new trees.
- Remove and stop throwing used polyethene papers (*buveera*) in our environment
- Encourage parents to use energy-saving cookstoves.
- Stop growing crops in swamps
- Harvest and use rainwater.

Causes of climate change



Deforestation



Pollution of the atmosphere/air



Increased use of firewood and charcoal



Cultivation of crops in wetlands



Tree planting

- Establish nurseries that will be sources of seedlings for your tree planting.
- Allow seedlings to get used to field conditions.
- Plant in well prepared land, maintain spacing and continue watering if rains fail.
- Schools can plant along lanes. Trees make the school environment better.



Rainwater harvesting

- Fit all roofs with gutters and collect all the water into a water tank.
- Use the collected water to irrigate crops, wash clothes and cars, Treat the water for domestic use.
- Animals can also consume the same water.



Waste management

- Establish garbage and compost pits to make manure from bio-degradable waste.
- Collect all plastic bottles and kavera in a rubbish container.
- Make sure the garbage is taken away for disposal in a landfil.



Raising awareness

- Talk to your peers about the causes and impacts of climate change.
- Hold public rallies and peaceful demonstrations.
- Hold debates to improve your understanding of climate change.





Activity #2: Climate change exercise

In the space below, list the things that people in your village do that may cause climate change in your local environment.



Activity # 3: Climate change essay competition

In the space below, write a composition of not more than 500 words on climate change, its impact and what should be done to stop it.



Lesson 17: Rainwater harvesting

Rainwater harvesting is the process of capturing rain water for domestic use. It is commonly from the roof of a house.

How does rainwater harvesting help?

- We get a lot of water when there is no water in the taps and bore-holes.
- We get clean water yet there is dirty water in the wells
- Helps save money because it is free.

Rainwater harvesting can provide water for:

- Homes with even big numbers of people.
- Schools with large numbers of learners
- Hospitals with lots of patients every day.

How do you collect rain water from a roof?

- Make a gutter either on the entire house or the side of the house from which you want to collect water.
- Contact an expert on how to fix the gutters and knowing the right sizes to gutters.
- Connect the gutters directly into the tank.
- You can also use large saucepans, jerrycans, drums, large plastic containers in case you do not have money to buy a large tank.
- Ensure that mosquitoes are kept out of the container where water is stored.
- Seal the tank to reduce the risk of diseases such as malaria.



What can rainwater be used for?

Rainwater can be used for:

- Washing clothes and household utensils.
- Irrigating crops and flowers both at schools and households
- Cleaning toilets (this applies to urban areas)
- Drinking if it is kept clean.
- Cooking food.



Methods of treating water before drinking it









Boiling

... or ...

Solar disinfection

... or ... Adding chlorine ... or ... Adding lime or lemon juice

ESSAY WPICING. Write a composition on how rain water is harvested, cleaned and used and take it to your science teacher for marking.



Lesson 18: Agriculture and irrigation – a way to go in the era of climate change

Agriculture: is the growing of crops. Crops grow well when the soils are fertile. An area without trees will be less fertile. Farmers are encouraged to leave some trees in their gardens. Gardens that have scattered trees always produce better yields.

Irrigation is the artificial application of water to the land or soil or plants. It is used to assist in the growing of crops and watering of trees during dry season.

Methods of irrigation_There are many methods of irrigating farmlands, crops or trees.These include:

Surface irrigation – where farmers disperse water on crops or trees.

Sprinkler irrigation – this is when water runs through pipes and is sprayed onto the field.

Drip irrigation – where a water container releases drops of water slowly on to the plant.

Because of climate change, crops and trees planted often require to be irrigated especially in the dry season.

Young farmers guide to drip irrigation





Lesson 19: Growing fruit trees on farm

Fruit trees produce fruits that are eaten by people and animals. Some fruit trees grow on their own such as tamarind. Others are grown in gardens and compounds (such as avocado, guava, pawpaws, mangoes, oranges, apples, among others.

Fruit trees are easy to grow. When selecting which fruit trees to grow, choose those which grow well in your environment.

Fruits survive in hot seasons





Fruit tree exercise

List the different fruit tree species in your local area.

Essay competition:

Write a composition of 100 words describing the importance of fruit trees in your area.

Theme Five: Expanding the Learning

Lesson 20: Listen to radio, read newspapers, write letters

As a young person, you need to keep learning more about the environment. You can learn more by forming a discussion group. In the group, you discuss issues concerning the environment. The topics to discuss include managing the environment, planting trees, protecting wetlands, harvesting rain water and many others. The picture on the right shows pupils discussing some of the topics mentioned above.

The Environment Club of your school can also create awareness among communities neighboring your school through demonstrations. The picture below shows pupils walking within the communities telling people to plant trees, harvest rain water and protect drainages. You can do that too.



Form a Debating Club. You can select opposers and proposers to discuss topics of your choice. In order to be able to debate well you need to read or listen to radio about the topic to be debated.







Exercise:

Write to friends and relatives in different schools and tell them about your environment club, your trees planted at the school and all the things you have learnt about the environment. When you do this, more people will know more about the environment.



Activity: Letter Writing

The teacher asks pupils to write letters to people of their choice telling them about the good things they do to protect the environment.

The format of the letter should be as follows	s:
	Name of the pupil writing the letter Address of the pupil writing the letter
	Date
Name of recipient of the letter Address of the recipient of the letter.	
Dear Sir/Madam	
Ref: Our environment conservation activities at school	
Yours	
Name of the pupils writing the letter	

