Grade 8 Agriculture and Nutrition

Terms 1, 2 and 3 - notes for 12 topics

IN EVERY TOPIC

- What you will learn and the key words.
- Short, clear notes with worked examples.
- Questions to try and a topic test, with the answers at the back.

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Strand 1.0 Conservation of Resources | Term 1

1.1 Soil Conservation Measures

WHAT YOU WILL LEARN

By the end of this topic you should be able to:

- describe methods of soil conservation in the agricultural environment
- carry out soil conservation activities in the environment
- demonstrate a caring attitude towards soil in the environment

KEY WORDS

soil erosion, soil conservation, strip cropping, grassed waterway, stone line, trash line, soil bund, contour.

1. Soil erosion and why soil must be conserved

Losing our soil

Soil erosion is the removal of the top fertile soil by running water, wind or animals.

Causes: bare soil (no plant cover), farming on steep slopes without structures, overgrazing, cutting trees, ploughing up and down the slope, heavy rain.

Effects: loss of fertile topsoil, gullies, low crop yields, silting of rivers and dams, floods.

Soil conservation means protecting soil from erosion and keeping it fertile.

2. Methods of soil conservation

Five methods

Strip cropping: growing crops in strips across the slope, alternating a row crop (maize) with a cover crop or grass, so running water is slowed.

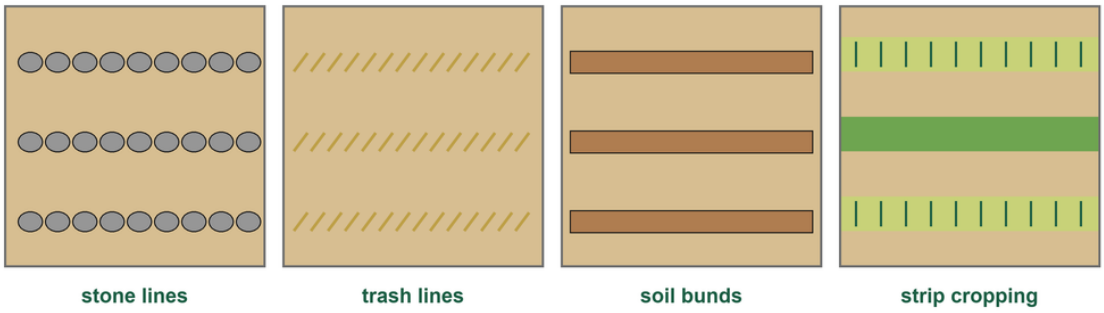
Grassed waterways: channels planted with grass that carry excess water safely off the farm.

Stone lines: lines of stones laid along the contour to slow water and trap soil.

Trash lines: crop residues (maize stalks, weeds) laid along the contour.

Soil bunds: ridges of soil built along the contour to hold water and soil.

Search digital or print resources for pictures of each.



Soil conservation structures

3. Marking contours

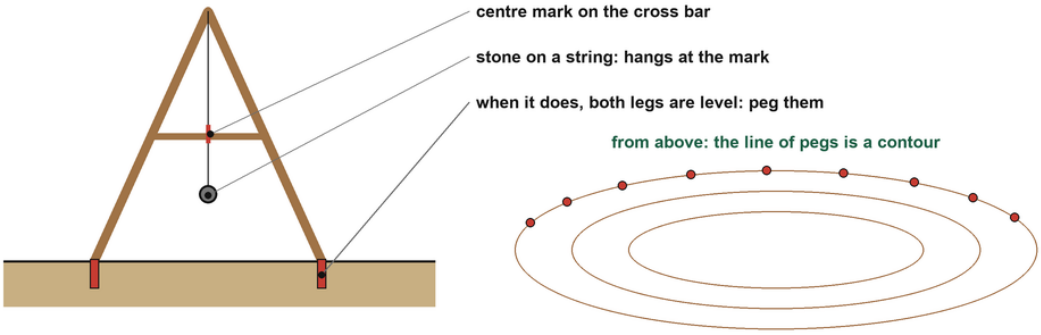
Practical: making and using an A-frame

Materials: three sticks, string, a stone, pegs.

Tie three sticks into a letter A. Hang a stone on a string from the top. Mark where the string hangs when both legs stand on level ground.

On the slope, move the frame until the string hangs at the mark: both legs are at the same height. Peg each leg position and keep going across the slope.

The line of pegs is a contour. Conservation structures are built along it so water cannot run downhill along them.



Marking a contour with an A-frame

4. Constructing trash lines

Practical: trash lines

Materials: crop residues, pegs and string, gloves.

Along the pegged contour, lay crop residues in a line about 30-50 cm wide and press them down. Make more lines lower down the slope.

Benefits: slow running water, trap soil, rot to add organic matter, cheap (uses farm waste).

Check after the next rain: soil should collect on the upper side.

5. Constructing stone lines

Practical: stone lines

Materials: stones, pegs and string, gloves.

Along the contour, dig a shallow trench (about 10 cm) and set stones in it, larger stones at the bottom, smaller ones filling gaps, forming a low wall.

Stone lines slow water, trap soil and last many years; they suit stony areas.

Comparison: trash lines are cheap but rot; stone lines last long but need stones and labour.

6. Constructing soil bunds

Practical: soil bund

Materials: jembes, spades, pegs and string, grass splits, gloves.

Along the contour, dig a shallow channel and throw the soil downhill to make a ridge about 30 cm high. Compact it by stamping.

Plant grass on the bund to hold it together.

Bunds hold back water so it soaks in, and trap soil; they suit gentle slopes.

7. Strip cropping and grassed waterways

Practical: strips and waterway

Materials: seeds or seedlings, grass splits, jembes, pegs.

Strip cropping: mark strips about 5-10 m wide along contours; plant a row crop (maize or beans) in one and grass or a cover crop (sweet potatoes) in the next, alternating.

Grassed waterway: on the natural drainage line, shape a wide, shallow channel and plant grass (for example Kikuyu or star grass) to carry runoff without eroding.

8. Building a farm model

Practical: farm model

Materials: cartons, cardboard, soil, papier-mache, small stones, grass, twigs.

In groups, build a sloping farm from cardboard and papier-mache.

Show: contour lines, strip cropping, a grassed waterway, stone lines, trash lines, soil bunds and trees on the hilltop.

Label each feature and pour a little water from the top to show how the structures slow it.

9. Maintaining conservation structures

Practical: inspection walk

Materials: notebook, jembe.

After rain, walk the school farm and check each structure.

Maintenance: repair breaks in bunds; replace rotted trash lines; reset fallen stones; replant bare patches of grass; remove silt from channels; control grazing.

Record what was found and repaired.

10. Caring for soil

Summary and attitude

Soil takes hundreds of years to form but can be washed away in one storm.

Methods: strip cropping, grassed waterways, stone lines, trash lines, soil bunds, planting trees, cover crops, mulching, avoiding overgrazing.

A caring attitude: never leave soil bare, do not burn crop residues, plant trees, teach others.

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TRY THESE

1. Define soil erosion.
2. Give three causes of soil erosion.
3. What is strip cropping?
4. What is a grassed waterway?
5. What does an A-frame help to find?
6. How do you know both legs are level?
7. What are trash lines made of?
8. Give two benefits of trash lines.
9. Why are stones set in a shallow trench?
10. Which areas suit stone lines?
11. On which side is the soil thrown?
12. Why is grass planted on the bund?
13. Name a cover crop for strip cropping.
14. Name a grass for waterways.
15. Name five features on your model.

16. Why plant trees on the hilltop?
17. Give three maintenance tasks.
18. When should structures be inspected?
19. Name five soil conservation methods.
20. Why is soil precious?

TOPIC TEST

T1. Why is ploughing across a slope better than up and down?
T2. Which method suits a stony area?
T3. Why do contours curve on uneven land?
T4. Why should trash lines not be burnt?
T5. How can grass planted behind a stone line help?
T6. What could happen if a bund is not along the contour?
T7. Why should a grassed waterway not be grazed heavily?
T8. Present your model to another class.
T9. Draw up a maintenance rota for the school farm.
T10. Write a short message to farmers on caring for soil.

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Strand 1.0 Conservation of Resources | Term 1

1.2 Water Harvesting and Storage

WHAT YOU WILL LEARN

By the end of this topic you should be able to:

- discuss ways of storing harvested water for domestic use
- take part in harvesting and storing water in the school for domestic use
- show responsibility in harvesting and storing water for domestic use

KEY WORDS

water harvesting, run-off, gutter, tank, water pan, pond, first flush, contamination.

1. Why harvest and store water

Catching rain

Water harvesting is collecting rainwater and surface run-off and storing it for later use.

Importance: water for drinking, cooking, washing and animals in the dry season; saves time walking to rivers; saves money; reduces run-off and erosion; supports kitchen gardens.

Sources: rooftops (roof catchment), rocks, roads and paths, the ground surface.

2. Ways of storing harvested water

Storage methods

Water containers: jerrycans, drums, buckets: cheap, portable, small volume.

Tanks: plastic, metal or masonry, above or below ground: hold large volumes, protect water from dirt.

Shallow water pans: dug in the ground to collect run-off for animals and irrigation.

Water ponds: larger excavations, sometimes lined with polythene to reduce seepage.

Others: underground tanks, sand dams in dry riverbeds (common in Makueni and Kitui).

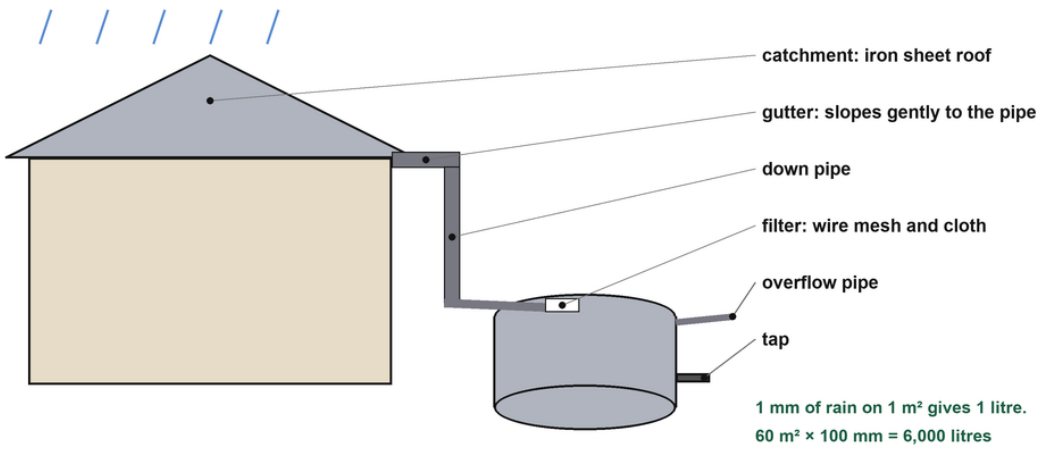
3. Roof water harvesting

From roof to tank

Parts: catchment (iron sheet roof), gutters along the roof edge, a down pipe, a filter (wire mesh and cloth) at the tank inlet, the tank with a lid, a tap and an overflow pipe.

First flush: let the first rain wash the roof and run away before collecting, so dust and bird droppings do not enter the tank.

Gutters must slope gently towards the down pipe.



Roof water harvesting

4. Calculating how much water a roof can collect

A simple rule

1 mm of rain on 1 m^2 of roof gives 1 litre of water.
A classroom roof of 60 m^2 in a month with 100 mm of rain: 60 × 100 = 6000 litres.
Allow some loss (splashing, first flush): about 80% is collected, so about 4,800 litres.
A 5,000-litre tank would be about full.

5. Harvesting water in the school (part 1)

Practical: planning

Materials: notebook, measuring tape.
Walk round the school after rain and note where run-off flows and which roofs have no gutters.
Choose an initiative: fixing gutters to a tank; placing clean containers under roof edges; digging a small, fenced water pan for the school garden; channelling path run-off into a garden.
Plan: materials, roles, safety, dates.

6. Harvesting water in the school (part 2)

Practical: harvesting and storing

Materials: gutters or split pipes, containers or tank, filters, jembes, gloves.
Carry out the plan with the teacher present: fix split-pipe gutters at a low roof edge (teacher fixes them), place filters, set containers on a firm base, or channel run-off into the garden.
Cover all containers; label water for drinking only if it is treated.
Record the work in a log.

7. Keeping stored water safe

Safe water

Keep tanks covered; clean gutters and filters regularly; wash tanks once or twice a year; use a tap instead of dipping cups.
Treat drinking water: boil it (rolling boil for at least one minute), add a water treatment solution as the label directs, or use a filter.
Prevent mosquito breeding: cover containers and remove stagnant water around them.

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8. Maintaining water harvesting structures

Maintenance

Gutters: clear leaves and dirt; fix leaks; keep the slope correct.
Tanks: check for cracks and leaks; repair taps; keep lids on; clean regularly.
Pans and ponds: remove silt; repair the lining; keep fences strong; plant grass around them to reduce silting.
Groups present a maintenance plan for the school's structures.

9. Responsible use of harvested water

Every drop counts

Responsible use: fix leaking taps; close taps after use; reuse water (washing water for plants); use only what you need; report leaks.
Summary: harvest from roofs and surfaces; store in containers, tanks, pans and ponds; keep it clean; maintain structures.
Make a pledge on saving water at school and at home.