

Lesson Plan 08

Water

Age group: Years

Aims:

- a) To learn about water sources, how it is collected, carried, stored and used.
- b) To appreciate the amount of water we use for daily needs
- c) To use recorded measurements for comparison of rainfall in both communities and the effect on the life of the people.
- d) To appreciate the problems of obtaining clean water free from disease.

Each of these aims is dealt with in each of the lesson plans that follow:

- 8a, Collecting water
- 8b, Using water
- 8c, Rainfall
- 8c, Clean water

Resources: General

Teacher Guidelines:

Most schools do projects on 'Water'. In Warwickshire we have 'Severn Trent Water' who supply resources for schools that help to deliver this area of the curriculum.

It is presumed teachers have clear, simple charts and activities for understanding the water cycle, use of water and cleaning water. OWL have some of these resources, which you can borrow, but they can be obtained free of charge from:

Sever Trent Water, 2297 Coventry Road, Birmingham, B26 3PU.

And they can be collected at the Campion Hills waterworks in Leamington Spa by arrangement.

In particular we recommend the use of their 'Starting Points' (Water in the Science Curriculum) Teachers' Guide for KS 1 & 2, which consists of a pack of materials including display posters and photocopyable worksheets



One World Link

Registered Charity No. 700714

Prepared by the OWL
Primary Schools Group
in conjunction with The Ferncumbe School,
Hatton Green, Warwickshire.

Lesson Plan 08 (a) – **Collecting water.**

Age group: Years

Aims:

- a) To learn about water sources, how water is collected and carried.
- b) To appreciate the contrast in the availability of water between Warwick District and Bo.

Resources: *General*

For Warwick District:

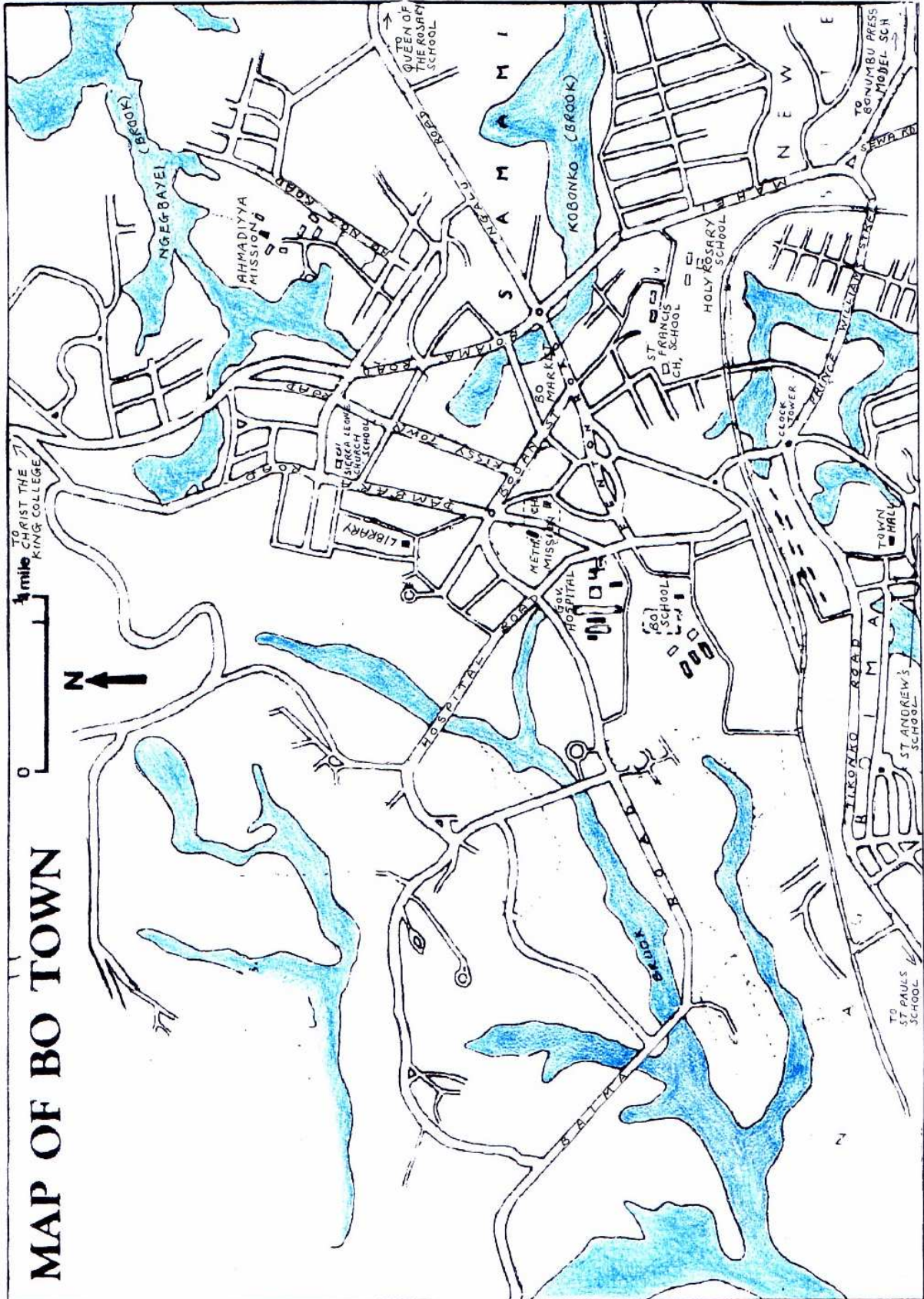
- A map of the SevernTrent area from **‘Homefile’ in Severn Trent Water’s ‘Starting Points’ (essential)**
- Water Cycle charts, both large and small, also from ‘Homefile’
- Severn Trent’s ‘Wet Water Wizard Homefile’

For Bo:

- Map of the Bo area showing streams and swampy areas (sheet 2a)
- ‘Water in Bo’ worksheet (sheet 3a)
- ‘Ways of Getting Water’ worksheet for calculations (sheet 4a)
- OWL CD-ROM ‘images’ with photos of wells, river, etc. (sheet 5a)
- Suggested question and activity sheet (sheet 6a)

Lesson Plan 08 (a) – Collecting water.

Streams and swamp areas in Bo (wet season)



Lesson Plan 08 (a) – Collecting water.

Water in Bo

Brooks and swamps

This is the cheapest source of water because it is free, but the water is not treated and could carry dirt and diseases. It also has to be carried from the stream to the home, and water is very heavy. It is usually carried in metal buckets. Many people take their washing to the river, rather than bringing the washing water home.

Wells

Underground water is filtered as it passes through the rocks and so it is clean and safe to drink. One way to collect this underground water is to dig a well. The water can then be collected by a bucket on a piece of rope. A well lasts for very many years because there are no parts that can wear out. But digging a well is a very long and hard job, and expensive cement is needed to line the well. It needs to be covered to prevent anything falling into it. Towards the end of the Dry Season some of the wells dry up and then people have to go to the streams.

Handpumps

Another way to get clean and safe water is to use a pump. To get a pump on your land, you first have to pay people to dig a hole, or who have a drilling 'rig' to drill a hole deep into the ground, until they find water. Then they have to put a long tube down the hole, and fit a pump to the top. Digging or drilling the hole and fitting the tube and pump are all very expensive. But when the pump has been fitted, the water is free and it is also clean. The pump has moving parts that will eventually wear out and need replacing. Some of these wells are situated at the local primary school and it is the job of the children to fetch water from the well. There is a charge to take water from the pumps of 100 Leones (A day's wages for a worker is about Le 5000) Many children have to go out at 6.30 in the morning to fetch the water before they can wash and eat before going to school.

Treated water

This water comes from the River Sewa 7 miles outside Bo and is treated so that it is safe to drink. It is operated on a commercial basis by the Sierra Leone Water Company (SALWACO). The water treatment works does not always have the necessary chemicals and lack of electricity means that mains water is not pumped to many parts of Bo and even in the lucky areas it may only be once or twice a week. Instead, the water company delivers the water to people in bowsers (water tanker lorries) and fill tanks purchased from them. This is too expensive for most people.

Rainwater

This is free, but it has to be collected. Only people with corrugated iron roofs can collect rainwater. They need to buy guttering to collect the water and barrels to store it in.. There is not much air pollution in Sierra Leone, so the rainwater is safe to drink. Rainwater cannot be used all the year round, since there is no rain in the Dry Season and it is not easy to store enough water.

Lesson Plan 08 (a) – Collecting water.

Ways of getting water in Bo
SOME CALCULATIONS

Pumps

The pump in your compound can pump 8 litres of water every minute. You can move the handle up and down 12 times every minute.

- To get 160 litres of water a day in Bo, I would have to pump for minutes.
- This would mean moving the pump handle up and down times.

In the UK we use 480-520 litres a day.

- To get 480 litres of water I would have to pump for minutes.
- This would mean moving the pump handle up and down times.

Wells

The well in your compound is 10 metres deep. The bucket you use holds 5 litres. A litre of water weighs a kilogram.

- In Bo, to get 150 litres of water a day I would have to pull the bucket up times.
- This would mean pulling a total distance of..... metres.
- The weight of water I would lift would be..... kilograms.
- If it were in the UK, to get 500 litres of water a day I would have to pull the bucket up times.

Rainwater

You have 3 barrels which collect water off the roof of your house. Each barrel holds 250 litres.

- In Bo, if the barrels were full and I used 150 litres a day, the water would last days.
- The months when I would be most short of water would be:
.....
.....

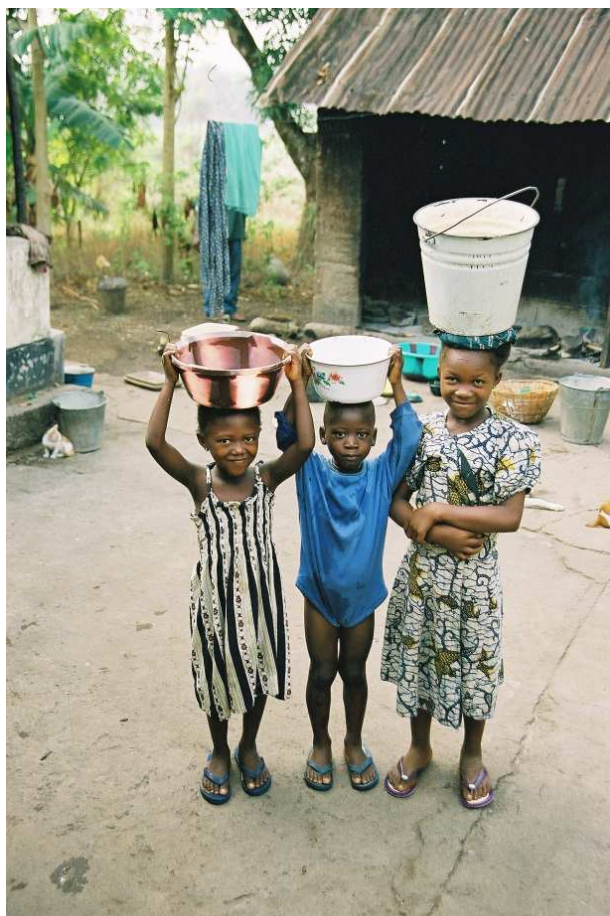
If the barrels were full and I used 500 litres a day, the water would last days.

Brooks and swamps

The stream is 100 metres from your home. You carry the water in buckets that hold 5 litres. A litre of water weighs a kilogram.

- To carry 150 litres of water, I would have to go to the stream times.
- The total distance I would have to walk would be metres.
- The total weight of water I would carry would bekilograms.

Lesson Plan 08 (a) – Collecting water.



8(a) Collecting water, page 6

Suggested activities and questions

Water in Warwick District

Using the Severn Trent '*Homefile*' page 3 (photocopied):

1. Colour p3 as suggested to learn about where we get our water in this region and class discussion.
2. Think about the turning on a tap for a drink of water. Imagine its route back to rain. The Water Cycle chart will help.

Water in Bo District

3. Look at the map of Bo Town. Where is the water in the rainy season? Can you find a map of Warwick and Leamington and compare?
4. If you live in Bo and want some clean water to drink, where do you get it from? Look at the photos and explain what you see.
5. Would it be a good idea to drink water from the streams or swamps?
6. There is now a big effort to chlorinate the wells regularly. Why is this done?
7. Work in groups and take it in turns to read 'Ways of getting water in Bo'. Take a piece of paper and divide it into 3 columns and 6 rows like this

Method	Advantages	Disadvantages

8. Work out how much water your family uses every day – see the Daily Water Challenge on pages 3 and 4 of the Severn Trent's '*Wet Water Wizard Homefile*'.
9. We collect our water from the taps in our houses. Having found out that the people collect most of their water from different sources, try the calculations on the sheet 'Ways of getting water in Bo'
10. In this country, could you pump and carry all the water you use? Discuss.
11. Ask your teacher if you can write a letter to the children in your linked School and ask how many buckets of water their family need every day and how they get it.

8. Lesson Plan 08 (b) – **Using water**
1b

Age group: Years

Aims:

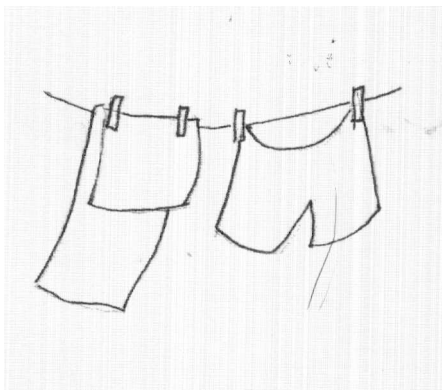
- a)
- b)

Resources: *General*

Lesson Plan 08 (b) – Using water.

How many ways do you and your family use water?

1. Use words or drawings (or both) to give your answer in the space below. Two have been done to get you started.
2. Then use a coloured pencil or crayon to circle the uses which you think are the same for children living in Bo (Perhaps you can look at some photographs first)



swimming

Lesson Plan 08 (c) - Rainfall.

Age group: Years ...4 -6

Aim: To use recorded measurements to produce bar graphs for comparison of rainfall in the vicinity of both communities and understand some of the effects on the life of the people.

Resources:

Average rainfall for Freetown Sierra Leone
Birmingham England
Instructions to access own information on the 'web' if
considered appropriate from, e.g. www.bbc.co.uk
2 blank graph sheets.
Question sheet.
Sharp coloured crayons.

Teacher Guidelines:

Each child to be given above resources. Some experience of plotting bar graphs is assumed. Younger children may need help.

Note: Measurements are currently difficult to obtain for Bo. The position of Freetown by the sea may result in slight variation but the main monthly readings will be very similar.

Lesson Plan 08 (c) - Rainfall.

Age group: Years 5 and 6.

1. Look carefully at the charts showing the monthly average precipitation (rain) and use the figures to plot and draw block graphs for Freetown and Birmingham on the same grid (attached). *The rainfall figures in Bo are not as high as those for Freetown because of different local geography but the pattern is the same. At the time of preparing these questions, the Freetown measurements are the nearest reliable figures.*

[I.T.: If you want to access the information yourself from the Internet follow the instructions below. If you would then like to produce a Computer graph you could use the Excel programme for feeding in the measurements and producing either one or two graphs.]

Obtaining weather data from the Internet

Go to www.bbc.co.uk/weather

Select [World]

Select [Country Guides]

Click on [S] for Sierra Leone

Find *Freetown* in the text and click on it.

Can you find 'average precipitation'? (Precipitation is what the weather-man calls rainfall!)

Now using the same method, find the rainfall for Birmingham, U.K.

Extension:

Can you find out how to measure rainfall for yourself and carry out an experiment to measure the rainfall over the period of a month? Can you contact someone in Bo and get him or her to do the same and share your results with each other?

2. What does your completed graph tell you about rainfall? Look carefully at each month.
3. Which are the wettest months in Freetown Sierra Leone (where rainfall is very similar to Bo)? Do we have a similar or different pattern in England? Describe what you find out.
4. Which months in Sierra Leone would you say make up the 'wet season' and which months would be included in the 'dry season'? Do they have spring, summer, autumn, winter like us?

Extension:

During the dry season there is a wind called the Hamattan (Say: Ham-a-tan). Can you find out anything about this?)

5. Imagine yourself living in the wet season in Bo where rain falls in deluges and mainly in the afternoon and evening. What effect would these conditions have on your way of life? Think about the mud roads, your journey home from school, shopping errands when you arrive home, playing with your friends and your place for eating meals. Anything else?
6. Use the blank squared sheet and a scale of 2°C for one square starting at 0°C. Plot, using dots the average maximum and minimum temperatures for Birmingham and Freetown, and join the dots to make line graphs. Use different colours for Birmingham and Freetown. (Sample on page 6c.)

Lesson Plan 08 (c) - Rainfall.

I.T.

This is the data obtainable from www.bbc.co.uk/weather:

Sierra Leone - Freetown

Month	Average Sunlight (hours)	Temperature				Discomfort from heat and humidity	Relative Humidity		Average Precipitation (mm)	Wet Days (+0.25 mm)
		Average		Record			am	pm		
		Min	Max	Min	Max					
Jan	8	24	29	20	33	Medium	82	67	13	0.8
Feb	8	24	30	21	34	High	80	67	3	0.7
March	8	25	30	21	35	High	81	69	13	2
April	7	25	31	21	35	High	81	71	56	6
May	6	25	30	21	34	High	83	74	160	15
June	5	24	30	20	33	High	86	76	302	23
July	3	23	28	21	32	High	89	81	894	27
Aug	2	23	28	20	31	High	91	82	902	28
Sept	4	23	28	21	32	High	90	81	610	25
Oct	6	23	29	19	33	High	87	77	310	23
Nov	7	24	29	20	34	High	85	75	132	12
Dec	7	24	29	19	32	High	82	71	41	4

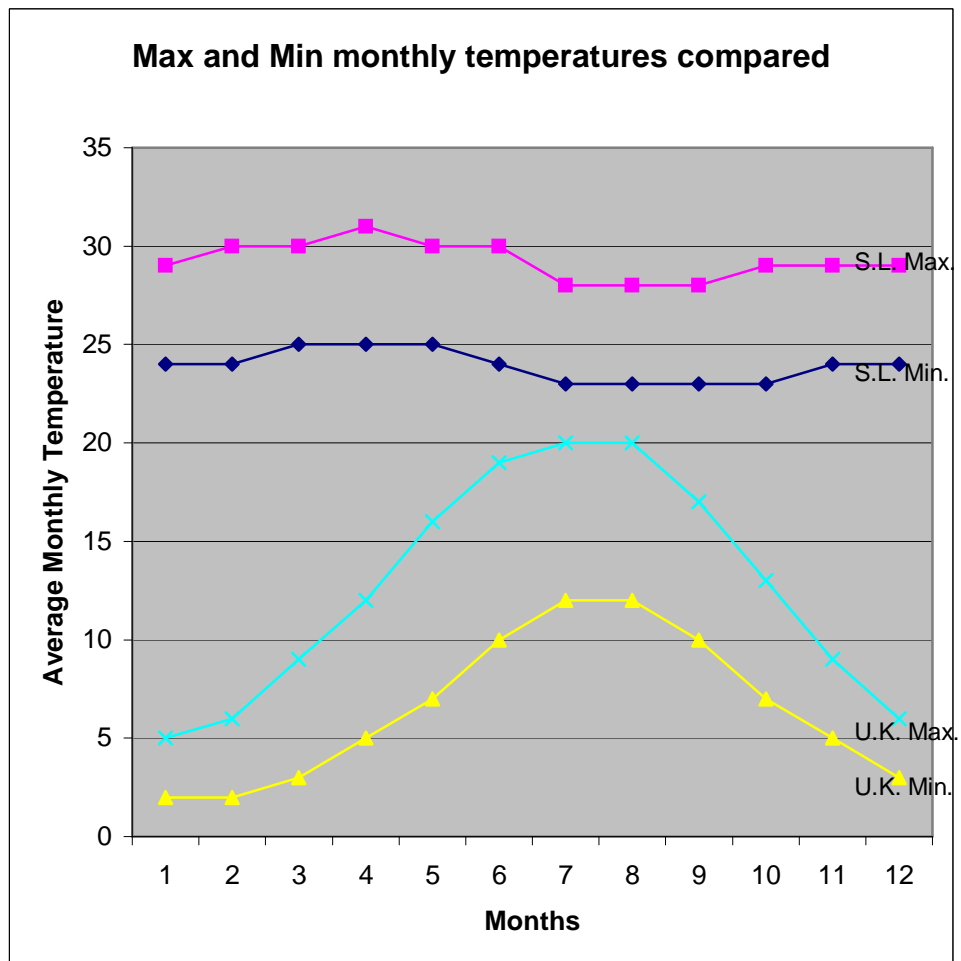
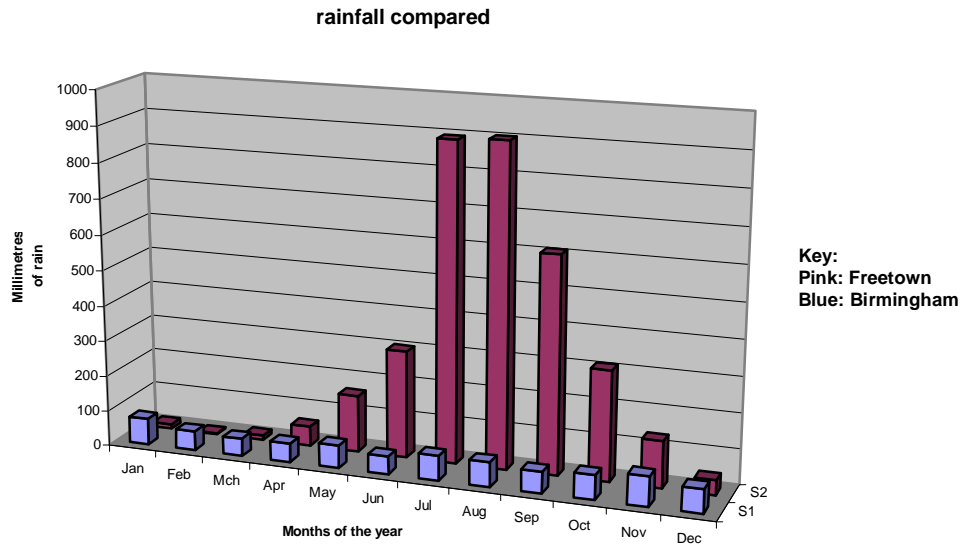
United Kingdom - Birmingham

Month	Average Sunlight (hours)	Temperature				Discomfort from heat and humidity	Relative Humidity		Average Precipitation (mm)	Wet Days (+0.25 mm)
		Average		Record			am	pm		
		Min	Max	Min	Max					
Jan	1	2	5	-12	13	-	89	82	74	17
Feb	2	2	6	-9	16	-	89	76	54	15
March	3	3	9	-7	21	-	85	68	50	13
April	5	5	12	-2	24	-	75	58	53	13
May	5	7	16	-1	29	-	74	58	64	14
June	6	10	19	3	31	-	74	59	50	13
July	5	12	20	6	32	-	75	62	69	15
Aug	5	12	20	6	33	-	80	64	69	14
Sept	4	10	17	3	27	-	84	67	61	14
Oct	3	7	13	-2	25	-	88	73	69	15
Nov	2	5	9	-4	19	-	90	80	84	17
Dec	1	3	6	-6	14	-	90	84	67	18

Lesson Plan 08 (c) - Rainfall.

I.T.(cont)

And if the data is input into Excel, graphs similar to these can be produced automatically



Lesson Plan 08 (d) – Clean water

Age group: Years.....

Aims:

- a) To appreciate dirty water is a health hazard.
- b) To understand what is needed to maintain a constant supply of clean water.
- c. To understand how both communities treat dirty water.

Resources:

General

- Severn Trent Water in the Science Curriculum (ESSENTIAL) (see Teacher Guidelines on the front page of these Water lessons)
- Information sheet and the CD of photos including SALWACO: Sierra Leone Water Co. (Primary Teachers Group – images sheet 5a)
- A visit to Severn Trent waterworks at Campion Hill, Leamington Spa

For each child

- Access to Severn Trent worksheet ‘What happens to Dirty Water?’
- Activity and question sheet
- Worksheet (see page 5) Teachers information sheet (page 6)

Teacher Guidelines:

- I.T: Surfing the internet for information on water-borne diseases and pit latrines in West Africa, e.g. using Google. www.google.com
- Severn Trent Water can be contacted at:
Severn Trent Water, 2297 Coventry Road, Birmingham,
B26 3PU

Lesson Plan 08 (d) – **Clean water****Activity and Question Sheet**

“Access to clean water is a fundamental human need and is therefore a basic human right”.

Kofi Annan, General Secretary, United Nations.

1. Why do we need clean water to drink and wash?
 - Group or class **discussion**:
 - Why can't we collect water directly from rivers, streams, lakes and other places for drinking? **Write down** your answer.
 - If possible look at pond or river water under a microscope. What do you see? **Write down** your answer.
 - The worksheet on –page 5- shows ways your family uses treated water. Can you complete all the uses? Can you add any more?

2. It is very expensive to treat all this water:
 - Use a coloured pencil on your worksheet to **colour in** the uses for which clean, pure water is essential.
 - **Put an X** next to the use that in your opinion is the most important. **Explain why** briefly at the bottom of your worksheet
 - **Think** about the future. Could we use untreated rainwater for some of our needs? Which ones? **Write down** your answer. How could you get untreated water?

3. River water is cleaned by Severn Trent at Campion Hills, Leamington Spa. Sewage is treated at local sewage works and returned as clean water to the rivers.
 - Have you ever seen or 'smelt' a sewage treatment works? Where are your local works? **Find out.**

4. Do you know what happens to all the dirty water when you pull the plug out of the sink or flush the toilet?
 - **Find** the answer on the Severn Trent sheet: 'What happens to Dirty Water?' **Write down** your answer.
 - **Copy** the diagram on Picture 2 and **label**:

Screening
Settling
Biological Filter
Effluent
 - What happens to the effluent?

5. Use the correct words to fill in the spaces below:

bowser Sewa electricity wells SALWACO chemicals

broken pipes barrels or tanks

Water

Most families and schools get a supply of clean safe water from

_____.

Some families can buy water brought round the town once or twice a week in a

_____.

In the rainy season, water is collected from roofs in _____.

The name of the Water Treatment Works outside Bo is the _____.

The supply of treated water from the works can be unreliable because of

1. lack of _____ 2. lack of _____

3. _____.

The water treatment centre obtains water from the River _____.

Health related to dirty water is a concern worldwide.

What can we do about it? Discuss.

Our water cleaning and sanitation In England uses most large amounts of water, electricity and chemicals.

- What are the advantages and disadvantages of our system?
Think about the use of the earth's resources.
- Do we value our clean water enough?
- How can we appreciate it more?

Learn more about water and sanitation in Bo by filling in the blanks.

Water and Sanitation

Sanitation

Use the correct words to fill in the spaces:

compost pit latrines the bush fertiliser decays

The majority of people do not yet have flush toilets and use _____ or _____ or streams and swamps for their toilet.

What happens to human waste since there is no sewage system? In the pit latrines and bush it _____ and turns to _____.

Sometimes the contents of the latrines can be left a long time and used as _____.

Resources : Information sheet and CD slides of Water in Bo

www.tilz.tearfund.org Then go to **Publications**

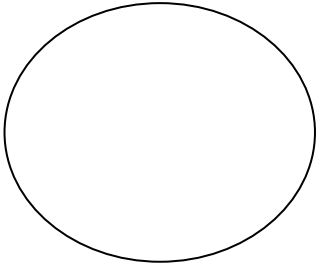
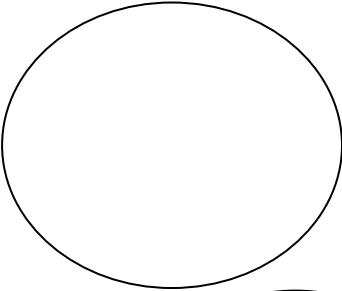
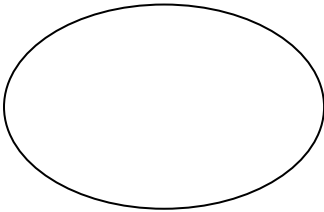
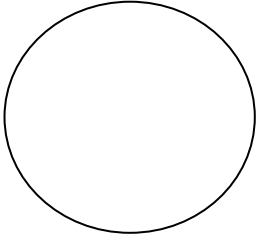
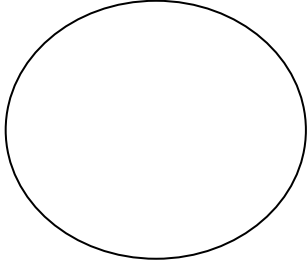
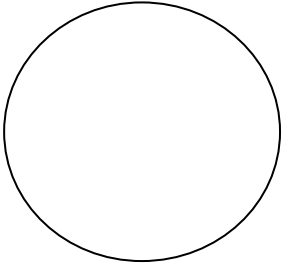
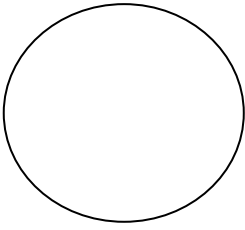
_Search for 'pit latrine ' There are several titles including:

Planning a pit latrine

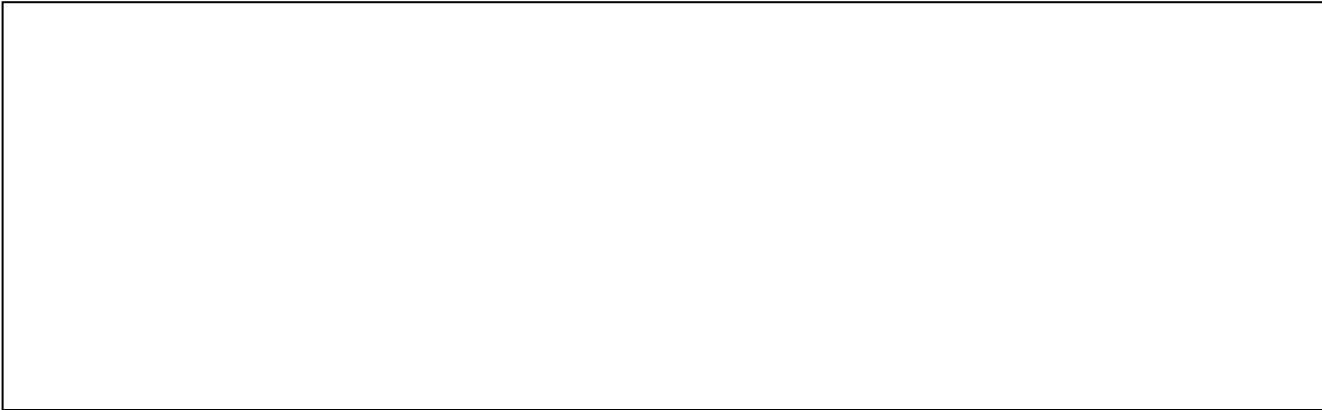
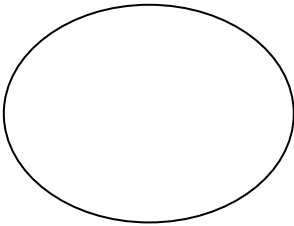
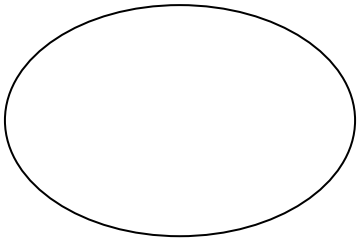
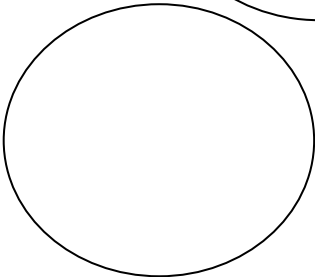
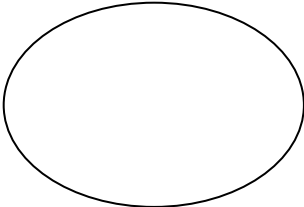
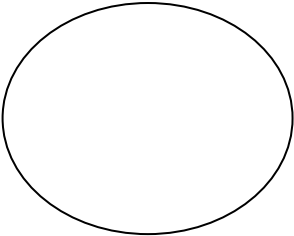
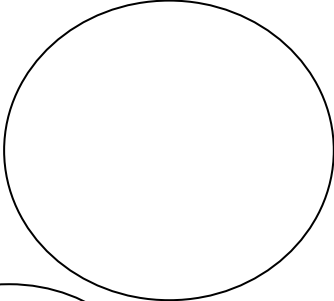
Building a pit latrine

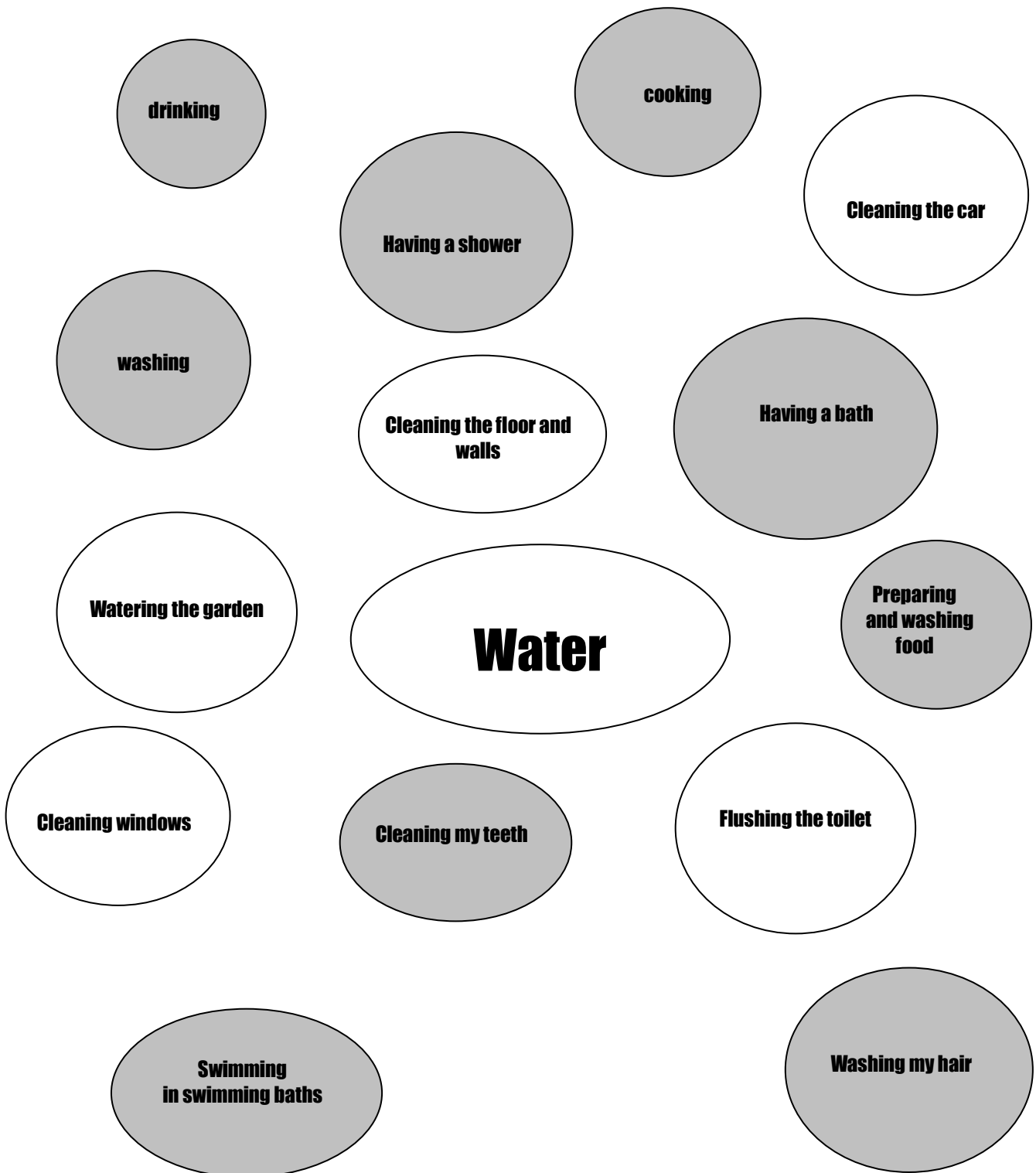
Simple low-cost improvements for latrines

drinking



Water





Key – Essential – shaded areas
Not essential – white background

Information Sheet

In Bo

Water used for washing or washing up is thrown outside the house or on the street.

More modern houses have bathrooms, but there is no system to get rid of the used water. It has to drain away underground.

Toilets are mainly pit latrines which are deep holes in the ground, usually lined with bricks or a concrete mixture to a depth of approximately 0.5m.

The better designs have a concrete slab to squat on with a hole in the middle. They are enclosed in a shed or simple structure.
(See photo - Schools 2/2 –toilets at St. Francis School)

If pit latrines are not available people use the 'bush' (nearby countryside), streams or rivers (?) as toilets.

Water from the River Sewa, 7 miles outside of Bo is used by the Water Treatment Works SALWACO.

Water is piped to Bo when the machinery works and when there is an electric supply and chemicals for killing micro-organisms are available.

Sometimes pipes leak and money is scarce for repair.

Water is collected from the Water Treatment works tanker. Lorries called Bowers which go around Bo once a week when everything is working.

Water related disease (next)

Dirty Water and Sanitation in Bo

The Water Treatment Works SALWACO on the River Sewa, 7 miles outside Bo, is not for sewage but for treatment of river water.

Often there are problems such as lack of the necessary chemicals, the electricity has been cut off, or there is a breakage in the pipes and no money or materials available. This stops any piped water to Bo.

The people of Bo manage their waste and used water without having a sewage system like us in Leamington Spa.

Used water from washing pots, clothes or themselves is thrown away on unused land away from the home.

Some people wash their clothes in streams because carrying water is heavy.

There are few flush toilets in the homes and buildings, though they have been fitted in some areas. There is however, no sewage system to take away the waste even if people use buckets of water to flush after use.

For the vast majority of people the pit-latrine or 'bush' is where they relieve themselves. More and more homes and schools are getting simple pit latrines and some people have improved versions.

A pit latrine is basically a deep hole in the ground with a lining in the top half to about 0.5m depth. The lining is made of bricks constructed from cement. This lining supports a squatting slab. Ideally they have a tight fitting cover made out of wood or cement and this reduces the problem of flies.

The latrines are enclosed in simple shelter as those shown on the slide 2/2 - St. Francis School.