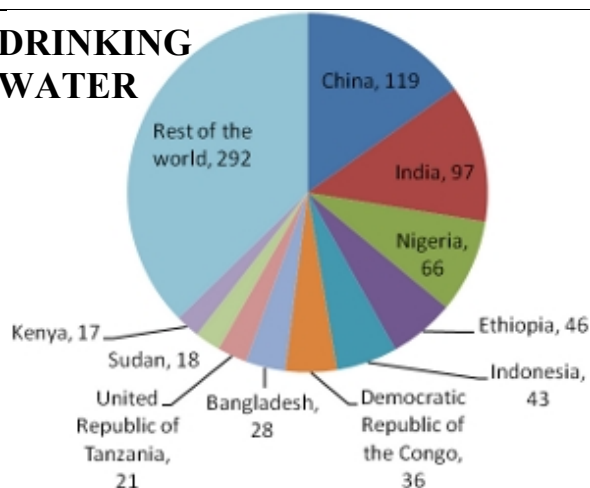


DRINKING WATER



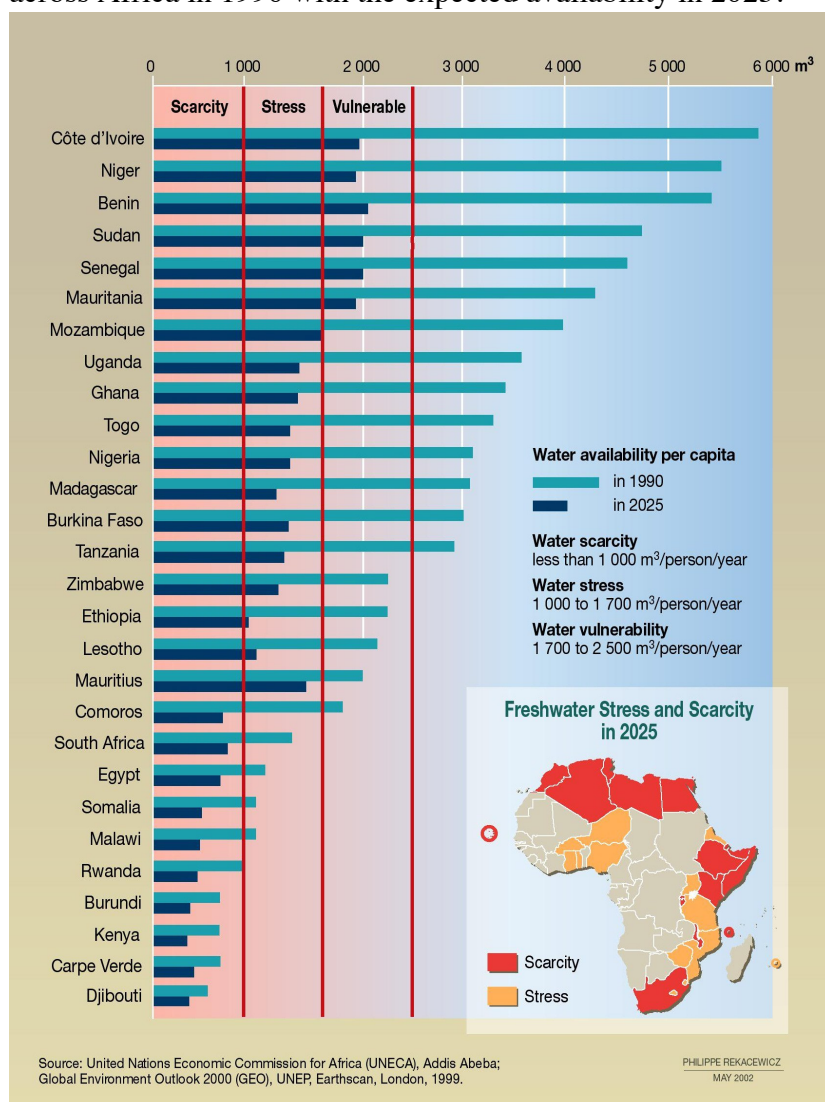
This United Nations Children's Fund pie chart shows the global locations of 783 million people who do not have safe drinking water.

The total world population in 2017 is 7.5 billion (7,500,000,000). What percentage of the world population is without safe drinking water?

The world population is forecast to rise to 8.2 billion by 2025. What percentage increase is this from 2017 to 2025?

The angle in the pie chart for China is 55° . How would you work this out? Calculate the angle in the pie chart for Nigeria.

The second chart compares water availability per person across Africa in 1990 with the expected availability in 2025.



Study this chart. What does it tell you?

Which countries will be vulnerable in 2025, having just enough water, that is more than 1700 cubic metres of water per person per year, but being at risk of shortages.

Use the red lines in the chart to find how many countries had plenty of water in 1990, how many were vulnerable, how many were stressed and how many had water scarcity?

What are the corresponding numbers expected for 2025?

Why do you think that the problem of water shortage is getting worse?

Write a short report on this problem.

You might find out more from these websites:

UNICEF <https://www.unicef.org/wash/>
Lifewater <https://lifewater.org/>
The Water Project <https://thewaterproject.org/>
Charity Water <https://www.charitywater.org/>

UNITED NATIONS <http://www.unwater.org/water-facts/scarcity/>
UNICEF <https://www.unicef.org.uk/what-we-do/water-and-sanitation/>
Evidence Action <https://www.evidenceaction.org/>
Water Aid <http://www.wateraid.org/uk/what-we-do/statistics>
Wikipedia https://en.wikipedia.org/wiki/Water_scarcity_in_Africa

PARTIAL SOLUTION

783 million as a percentage of 7.5 billion = $(783,000,000 \div 7,500,000,000) \times 100$
= 10.44%

To work out the angle in the pie chart for China take the number 119 as a fraction of 783 and multiply by 360 to get $(119 \div 783) \times 100 = 54.7^\circ$ or 55° to the nearest degree.

The angle in the pie chart for Nigeria is $(66 \div 783) \times 100 = 30.3^\circ$ or 30° to the nearest degree.

The countries that will be vulnerable in 2025 are Cote d'Ivoire, Niger, Benin, Sudan, Senegal, Mauritius and Mozambique.

The numbers of African countries experiencing water shortages in 1990 compared to expectation for 2025				
	Plenty of water	Vulnerable	Stressed	Scarcity
1990	14	5	5	4
2025	0	7	11	10

NOTES FOR TEACHERS

Why do this activity?

Many school curricula aim to educate learners in citizenship by making them aware of social, economic and environmental issues. This activity gives an opportunity for critical analysis and the development of ideas of citizenship. Learners are asked to analyse and interpret graphs relating to environmental and socio-economic issues, to discuss the graphs, ask their own questions and to write about the issues. References are given so that learners can find out what is being done to provide water for people and to improve this situation.

Learners could collect data about water consumption in their own households for a mathematics project involving the complete data cycle of posing a question, collecting, organising, representing, analyzing, interpreting data and reporting on the data.

Intended learning outcomes

- Revision of calculation of percentages.
- Development of ability to interpret data.
- Development of critical analysis of data.
- Development of awareness of environmental issues.

Possible approach

You could give the learners copies of page 1 and talk briefly about how water shortage is a problem that affects many people in countries around the world. Ask them to discuss the graphs in pairs and then lead a preliminary discussion based on what the learners say about the graphs.

Then review with the learners how to work out percentages and give them some practice in calculating some of the angles for the pie chart.

Then ask the learners to study the second graph and answer the questions. You could ask the learners to find out more information in groups and make posters about water shortage. You may like to raise the question about the increasing population and how this contributes to the water shortage problem.

You may also want to relate this lesson to learning about volume and capacity and to introduce the facts that 1 litre = 1000 cubic centimetres and 1 cubic metre = 1000 litres. The class might estimate how much water they use per day using these guidelines:

Type of use	Estimated number of litres
Using water from a tap	5.5 litres per minute
Shower	9.5 litres per minute
Bath	190 litres
Toilet	13 litres per flush
Low-flow toilet	6 litres per flush
Clothes washing machine	110 – 130 litres per cycle
Dishwasher	95 litres per cycle

Possible extension

This could also lead to individual or group projects based on collecting data about water consumption in their own homes involving the complete data cycle of posing a question, collecting, organising, representing, analyzing, interpreting data and reporting on the data. See Chapter 19 in the AIMSSEC Mathematical Thinking in the Lower Secondary Classroom book

<https://aiminghigh.aimssec.ac.za/organising-workshops-for-teachers/>

References

- Wikipedia https://en.wikipedia.org/wiki/Water_scarcity_in_Africa
 UNITED NATIONS <http://www.unwater.org/water-facts/scarcity/>
 UNICEF <https://www.unicef.org.uk/what-we-do/water-and-sanitation/>
 UNICEF <https://www.unicef.org/wash/>
 Evidence Action <https://www.evidenceaction.org/>
 Lifewater <https://lifewater.org/>
 Charity Water <https://www.charitywater.org/>
 The Water Project <https://thewaterproject.org/>
 Water Aid <http://www.wateraid.org/uk/what-we-do/statistics>