

Candidate Name

Centre Number

Candidate
Number



OXFORD CAMBRIDGE AND RSA EXAMINATIONS

General Certificate of Secondary Education

GEOGRAPHY SPECIFICATION C (1988)

2401/RB

RESOURCE BOOKLET FOR DECISION MAKING EXERCISE 2003

SPECIMEN

This Resource Booklet should be available to candidates for up to three working weeks prior to the exercise being undertaken

THE ISSUE

WATER - A RENEWABLE RESOURCE?

INSTRUCTIONS TO CANDIDATES

This resource booklet must be handed in to your teacher at the end of each lesson. **You must not write on the booklet**, apart from **writing your name** at the top of this page.

INFORMATION TO CANDIDATES

The following abbreviations may be used:

MEDC - More Economically Developed Country

LEDC - Less Economically Developed Country

EU - European Union which includes the United Kingdom

CONTENTS OF THE RESOURCE BOOKLET

- ***Resource 1** Fig. 1 A diagram showing uses of water in the home.
Fig. 2 A graph of rainfall in England and Wales (1981 - 1996).
Fig. 3 A graph of drought orders in England and Wales (1981 - 1996).
- ***Resource 2** Maps and a table of factors affecting water resources in England and Wales.
- ***Resource 3** A systems diagram of the water cycle and people's use of it. (See colour insert)
- ***Resource 4** Information on the organisation of the water industry.
- ***Resource 5** Information on the factors affecting water resources in the future.
- ***Resource 6** Photographs of problems and solutions of water supply in LEDC's. (See colour insert)
- ***Resource 7** A table of ways of managing water resources in the future.
- ***Resource 8** A diagram showing the contrasting views of what the stakeholders want.
- ***Resource 9** Information about the region served by Wetshire Water plc.
- ***Resource 10** A sketch block diagram of the Wetshire Water region.

This Resource Booklet consists of 12 printed pages and an Insert.

RESOURCE 1

Fig. 1 Using water in the home

This cartoon shows some of the many uses of water in the home and approximately how much water we need when we use them. Households with metered supplies pay about 0.07p per litre, depending on which part of the UK they are in. With these two pieces of information it is possible to get a rough idea of how much water we use and how much it costs.

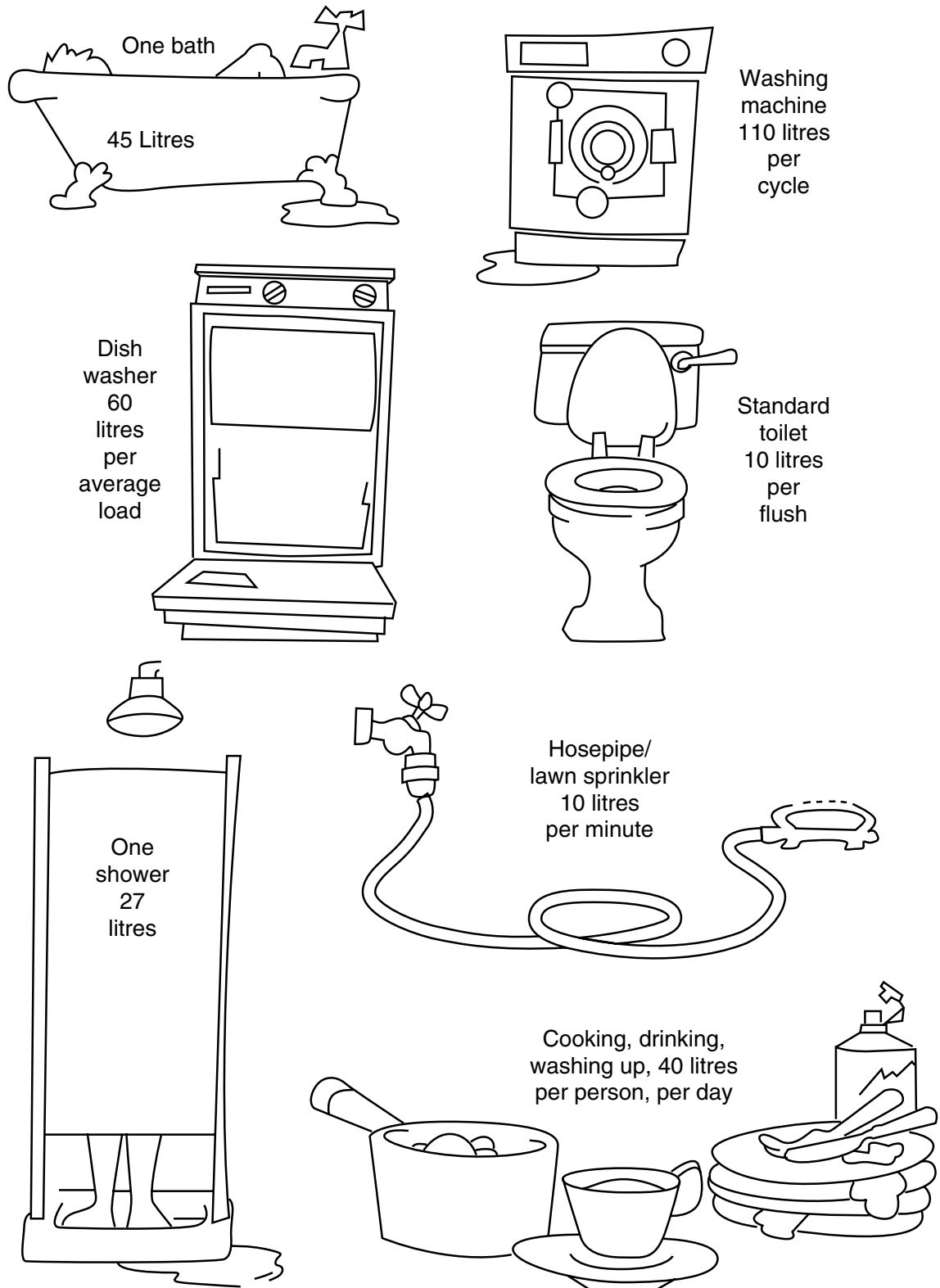


Fig. 2 Rainfall for England and Wales (1981 - 1996)

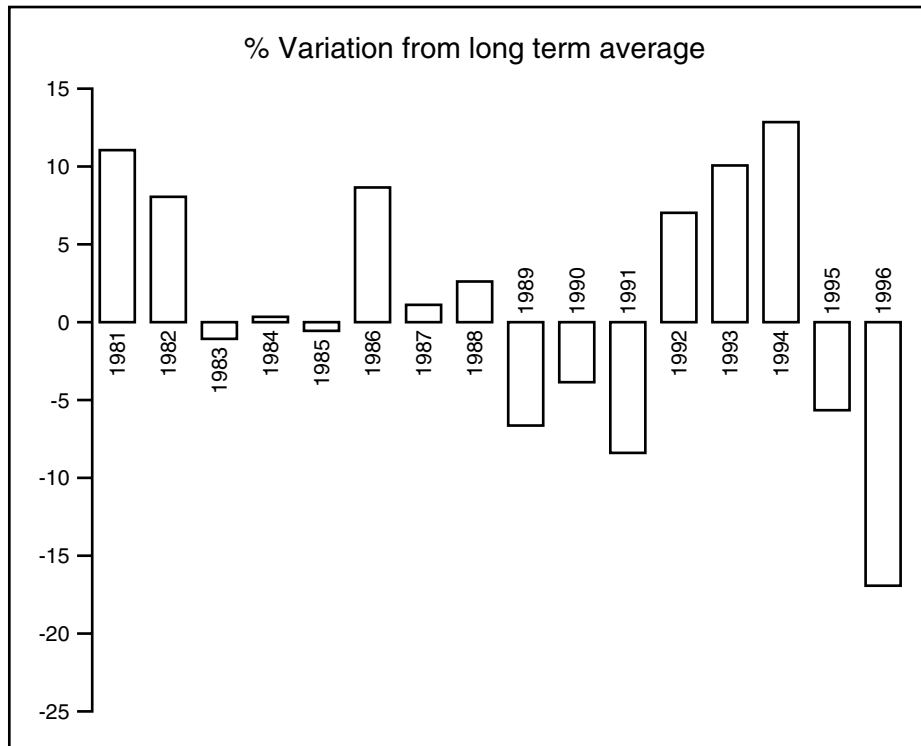
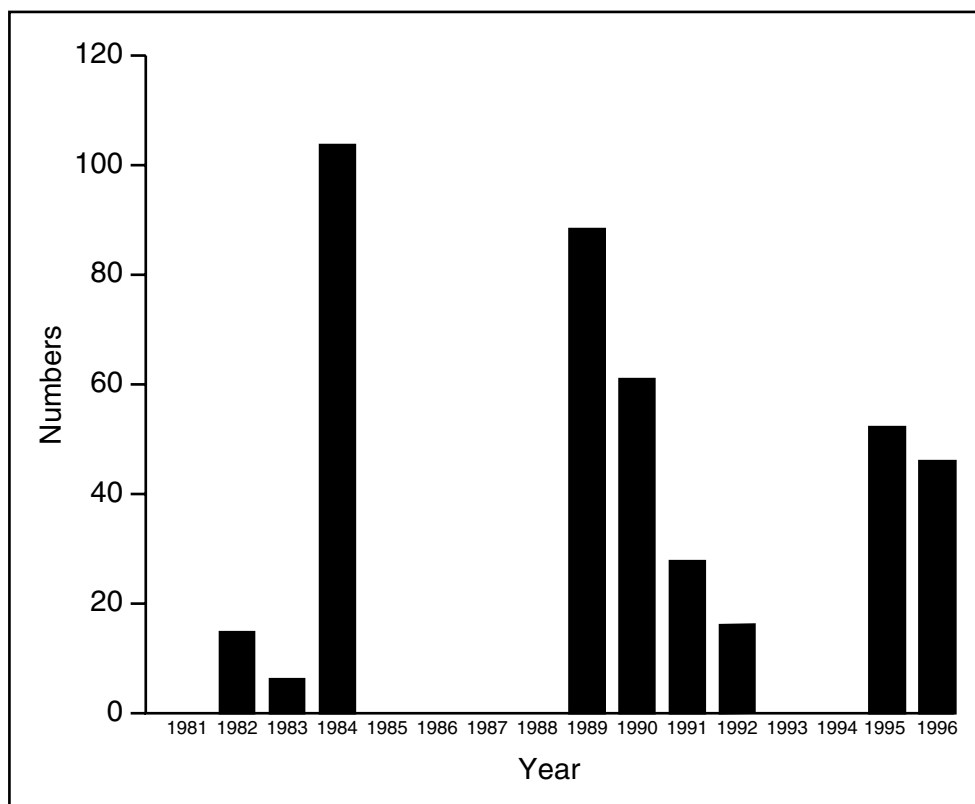
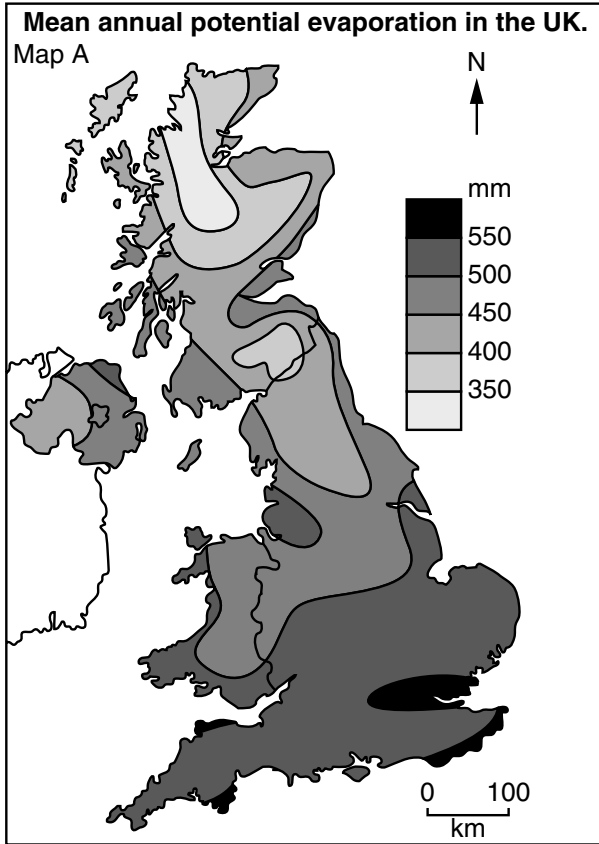


Fig. 3 Number of drought orders in England and Wales (1981 - 1996)

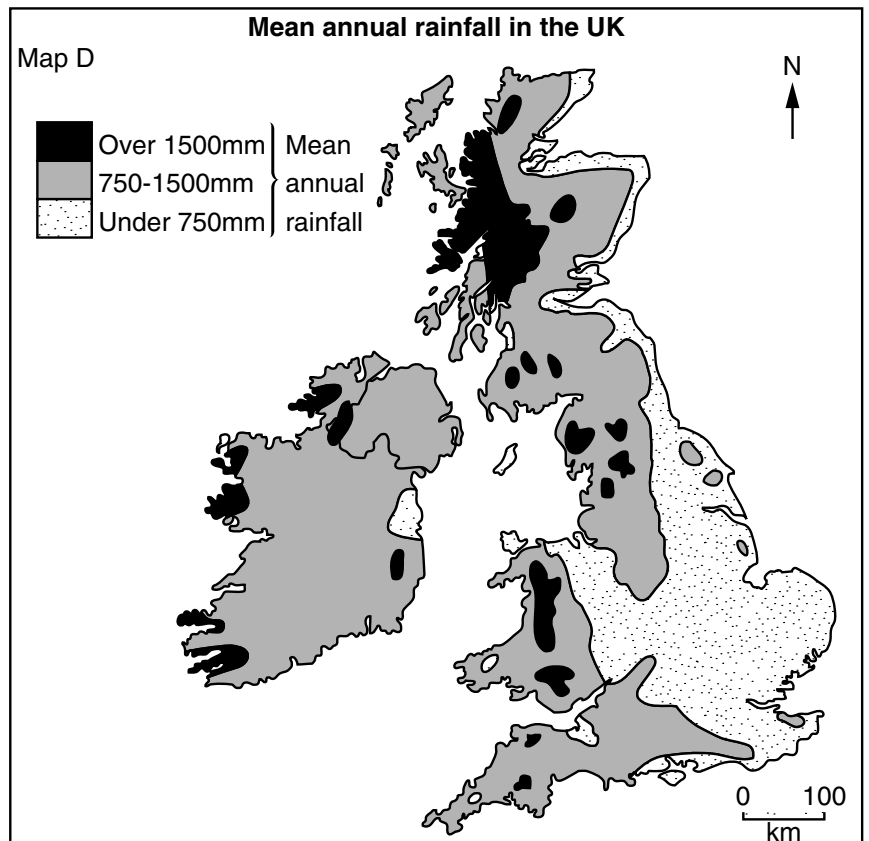
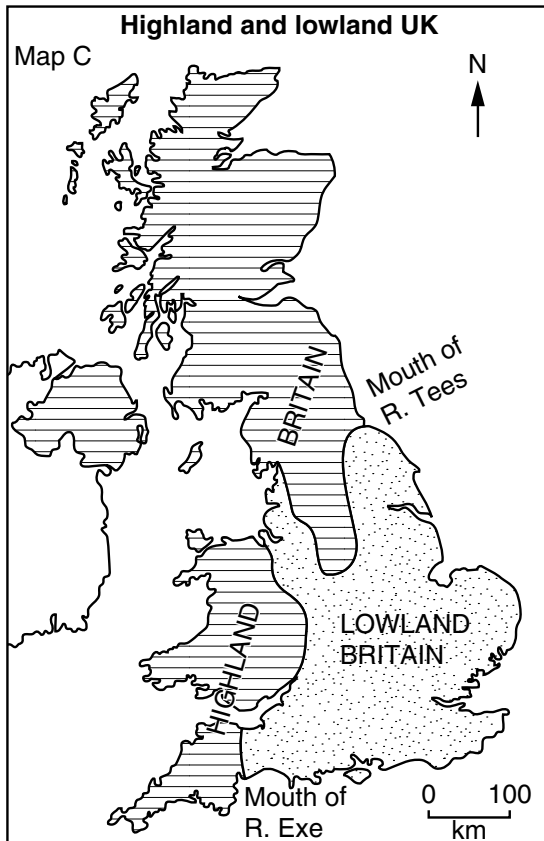
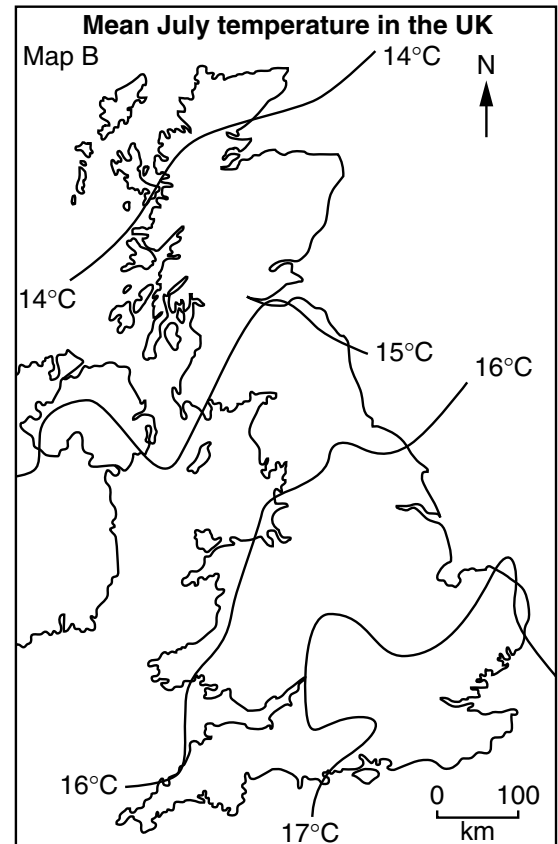


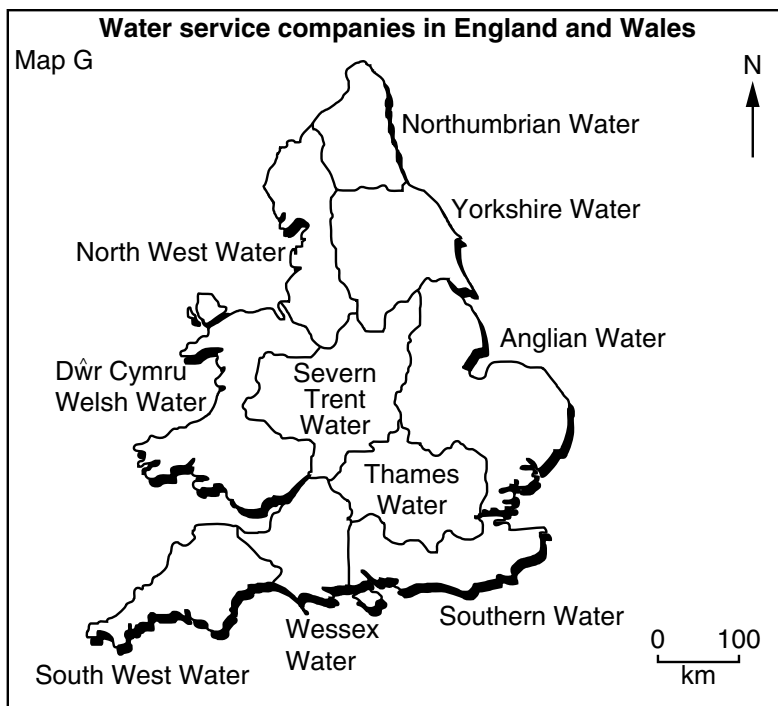
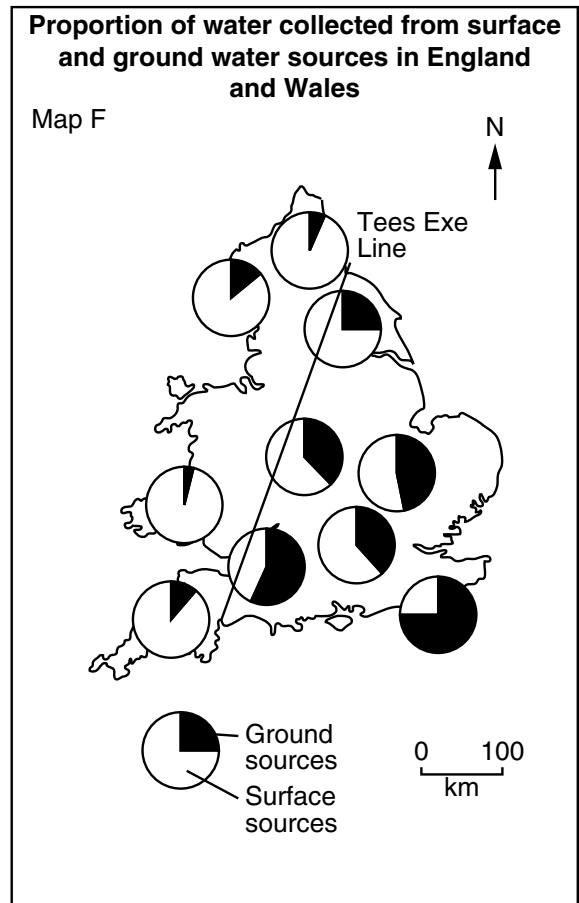
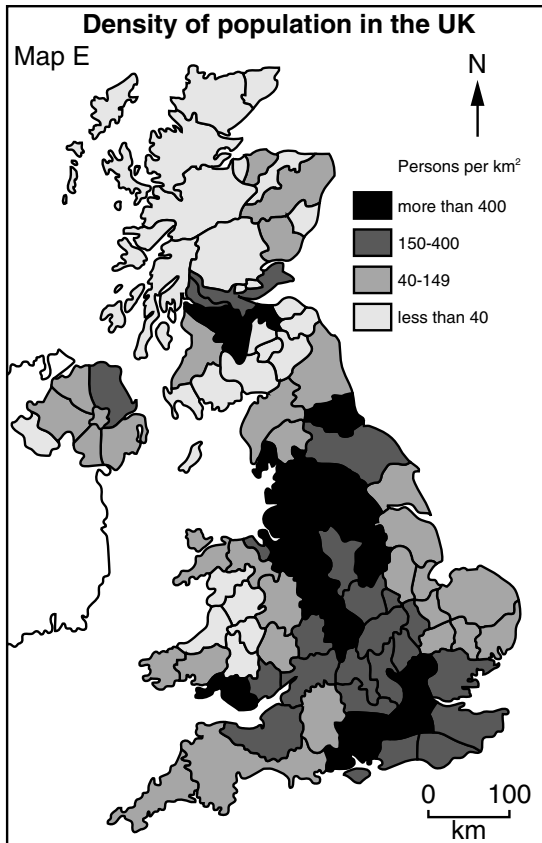
RESOURCE 2

Factors affecting water resources in the United Kingdom



Acknowledgement: Ward & Robinson Principles of hydrology,
Mcgraw-Hill International UK 1990





Projected increase in water demand by public water companies to 2021 (million litres/day) in England and Wales

Table H

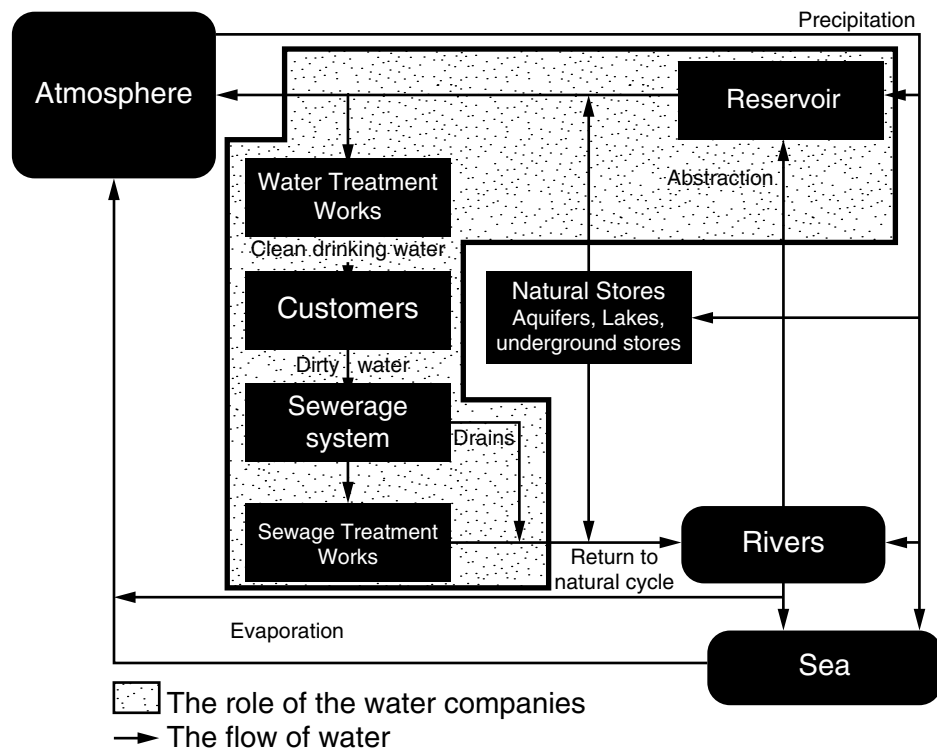
Region	1991	2021
Anglian	1764	2245
Northumbria	1106	1219
North West	2579	2577
Severn Trent	2411	2702
Southern	1220	1406
South West	499	632
Thames	3975	4238
Welsh	1299	1357
Wessex	901	1033
Yorkshire	1506	1621
England & Wales	17260	19030

Source: NRA (1992) Forecasts

RESOURCE 4

The water industry

Fig. 1 A flow diagram of the water cycle including the role of the water companies



Acknowledgement: Thames Water

Fig. 2 Estimates of water abstractions (million litres/day) in England and Wales 1995

Region	Public water supply		Private water supply		Industry		Mineral washing		Spray irrigation	
	surface	ground	surface	ground	surface	ground	surface	ground	surface	ground
North West	1442	241	0	0	383	97	5	26	4	2
Thames	2665	1378	0	29	25	56	0	59	6	9
Welsh	1452	134	1	1	466	30	1	1	9	2
England & Wales	11838	5508	23	75	1630	695	43	218	196	155

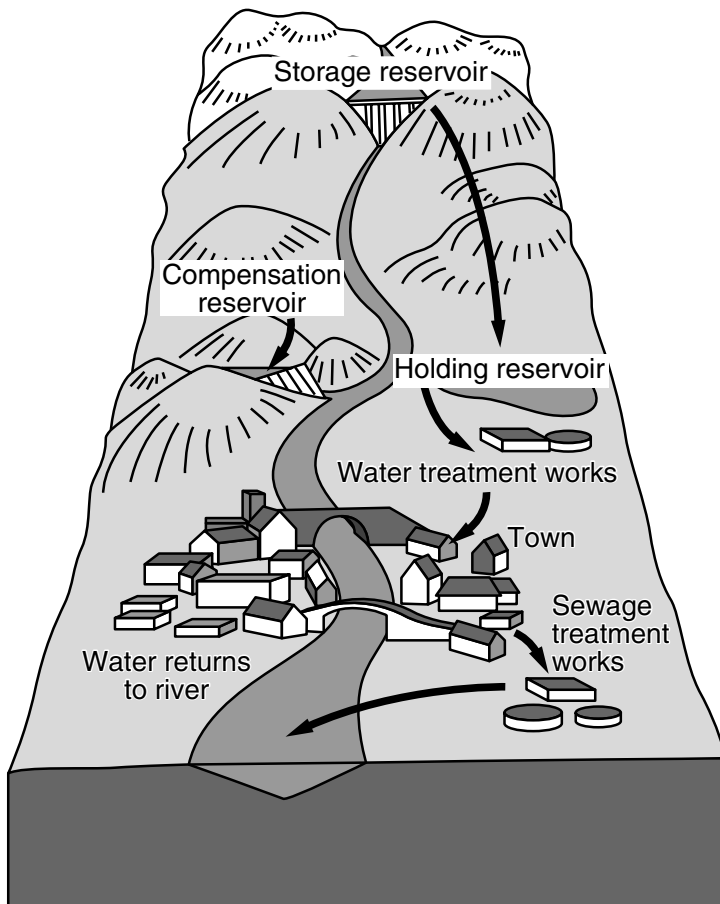
Region	Agriculture*		Fish farming		Electricity supply		Other		TOTAL	
	surface	ground	surface	ground	surface	ground	surface	ground	surface	ground
North West	0	5	159	3	414	0	0	1	2407	375
Thames	0	6	315	54	79	0	0	0	3090	1591
Welsh	0	7	301	2	4301	2	90	0	6621	179
England and Wales	16	87	3892	376	8206	18	135	85	25979	7217

*Excludes spray irrigation

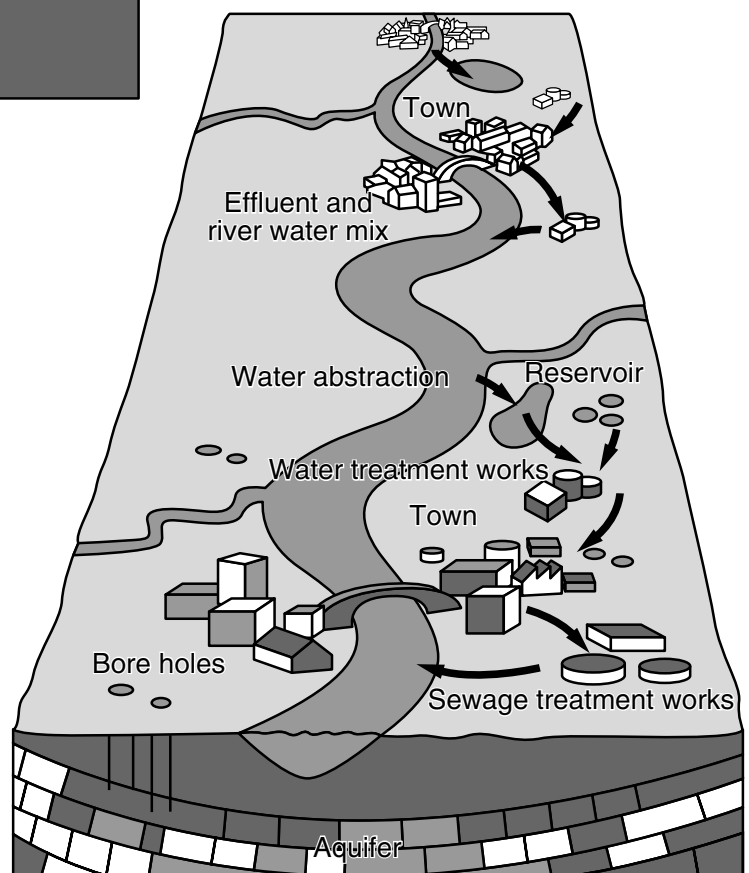
Acknowledgement: Adapted from *Digest of Environmental Statistics DETR 1997*

Fig. 3 Block diagrams of the organisation of a water company.

Northern and western UK



Southern and eastern UK



Acknowledgement: Thames Water

RESOURCE 5

Fig. 1 Water resources in the future

Scientists forecast scorching summers for Britain by middle of next century

Tim Radford
Science Editor

At present only one British summer in the last 90 years has had temperatures of over 36 degrees centigrade. However by 2050, one summer in three could be a scorcher.

According to the latest computer models, overall temperatures are likely to rise by 1.2°C to 1.6°C as greenhouse gases build up in the atmosphere. The south and east of the UK will get warmer and drier, rainy days could drop by 4 per cent and summer rainfall by 6 per cent.

On the other hand Scotland can expect wetter weather in both winter and summer but the number of very hot days will increase from an average of 12 to 20 days a year and the number of days with frost could go down from 42 to 18.

However there is no certainty about these forecasts. Recently a US scientist warned that global warming could alter ocean currents such as the Gulf Stream, leaving the British Isles with near Arctic temperatures, but for now the view is that temperatures here will rise.

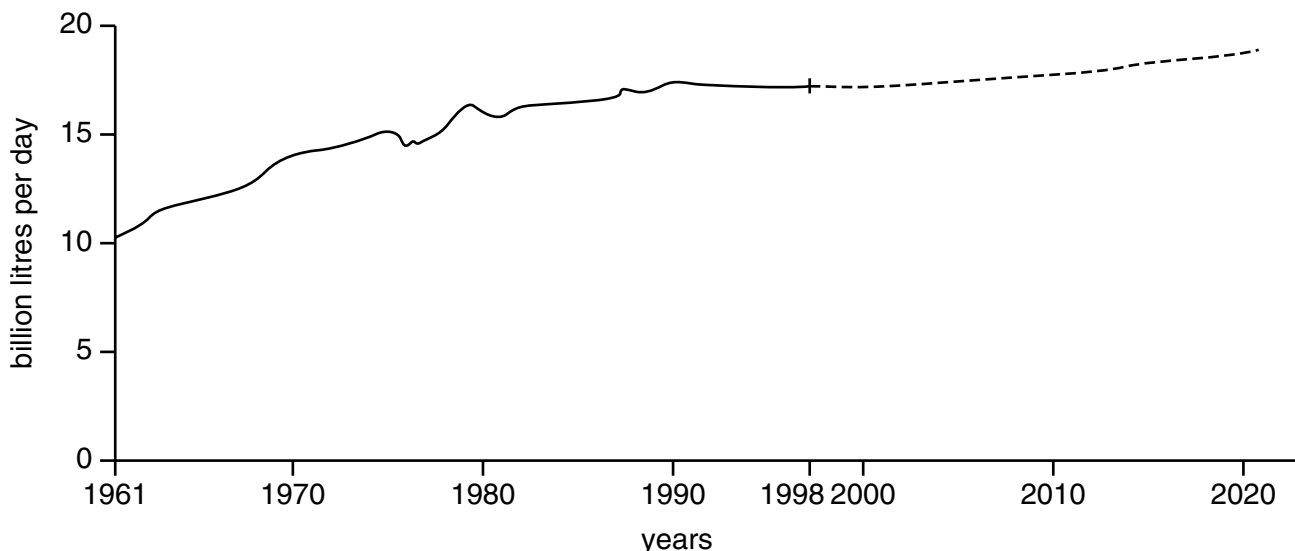
The Met Office has confirmed that January 1997 was the driest for 200 years: only 15 mm of rain fell in the whole month. January 1998 was quite different. At least 15 mm of rain fell on the first day of the month and 60 per cent of the average rain for the month fell in the first week.

In a speech to farmers in Oxford, the director of the Climatic Research Unit in the University of East Anglia said that 'most scientists believe the present projections but we should not be surprised by the climate's ability to surprise us'.

The Guardian, January 1998

Adapted from *The Guardian*, January 1998

Fig. 2 Supply and demand for water in the UK 1961–2020



RESOURCE 7

Managing water resources in the future

There are many different options for ensuring water supplies in the future. Some are more sustainable than others. Some involve increasing supplies to meet the needs of the customer (supply management). Others involve controlling the demand for water (demand management).

Supply management options	Demand management options
<p><i>Long distance transfer</i></p> <p>Moving water over long distances from regions or countries with surplus supplies</p>	<p><i>Metering and pricing</i></p> <p>Charging customers for the amount of water they actually use</p>
<p><i>Inter basin transfer</i></p> <p>Moving water across the watershed between neighbouring river basins</p>	<p><i>Leakage</i></p> <p>Repairing leaks to reduce demand on the treatment works</p>
<p><i>New surface water storage</i></p> <p>Building new reservoirs to store water in wet periods for use in drier periods</p>	<p><i>Publicity and education</i></p> <p>Reducing the demand for water by changing people's behaviour and attitudes</p>
<p><i>Desalinisation</i></p> <p>Producing fresh water by extracting the salt from sea water</p>	<p><i>Innovations</i></p> <p>Developing new water efficient products for use in homes, factories and offices</p>
<p><i>New groundwater supplies</i></p> <p>Extracting water from underground sources by sinking boreholes</p>	<p><i>Legislation</i></p> <p>Introducing new bylaws to require the fitting of water efficient devices</p>
<p><i>Artificial recharge of aquifers</i></p> <p>Pumping water in wetter periods into underground water bearing rocks for later use</p>	<p><i>Restrictions</i></p> <p>Introducing limits on the amounts of water people can use especially in the drier times of the year</p>
<p><i>Effluent re-use</i></p> <p>Re-cycling water after it has been treated in sewage works and returned to rivers</p>	<p><i>'Grey' water re-use</i></p> <p>Re-cycling water which has been used once in the home for purposes for which drinking quality water is not needed</p>

Adapted from: Sustainable Water Resource Management, Thames Water

RESOURCE 8

What the stakeholders want

Many different individuals, groups and organisations have an interest, or 'stake' in the way in which water is used. They are sometimes called 'stakeholders'.

Customers want:

Reliable supplies of water
Adequate pressure of water
High quality supplies
Fair prices
No restrictions
Enhanced service provision
Respect for the environment

Industrialists, agriculturalists and domestic consumers, including gardeners, all have different views.

Regulators want:

Fair and reasonable prices to customers
Secure supplies of water
High quality water
Investment in infrastructure
Respect for the environment.

Shareholders want:

Growth
Efficient and well managed business
Adequate returns on investment
Safe and secure investments.

Environmentalists want:

Preservation and enhancement of habitats
Maintenance of river flows
Access to wildlife areas
Maintenance of river water quality.



Government and EU want:

Favourable response from the public, pressure groups, opposition etc.

Recreationalists want:

Access to water sports
Adequate river flows and reservoir levels
Enhanced facilities.

Different interest groups have different requirements.

Birdwatchers require protected habitats for birds.
Fishermen require protected habitat for fish.

Acknowledgement: Yorkshire Water

RESOURCE 9

Information about the region served by Wetshire Water plc

Area 15 000 square kilometres

Population 4 750 000 (annual increase 0.5%)

50 000 new houses will be built in the near future but some heavy industries, which are a source of water pollution, and coal fired power stations which use a lot of river water for cooling are due to close.

Average rainfall 818 mm (1941–70)

Rainfall	1989	660 mm
	1990	778 mm
	1991	673 mm
	1992	830 mm
	1993	818 mm
	1994	885 mm
	1995	606 mm
	1996	627 mm
	1997	792 mm
	1998	850 mm

Water supplies

Upland storage reservoirs	45%
Abstractions from rivers	25%
Groundwater	30%

Total water extracted 3 400 million litres per day but 28% is lost through leakage from pipes.

20% of the rivers are classed as having poor or bad water quality, mainly downstream of the big towns. Some untreated sewage is still discharged straight into the sea and some existing sewage works are out of date.

The best quality rivers are found in the uplands, which rise to over 300 metres above sea level and are part of a national park. The estuaries provide winter feeding grounds for migrating birds and there are caravan sites along the coast. Groundwater supplies in the coastal lowlands are affected by agricultural chemicals.

The Wetshire Water Region

