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managing WATER RESOURCES

ENVIRONMENT AGENCY

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ANGLIAN REGION

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Managing a Precious Resource

Water resources management is about reconciling the needs of those who use water with the needs of the environment. It is about protecting a precious asset.

The task involves safeguarding the diverse interests of water users and the environment by trying to make sure sufficient water is available at the right time and in the right place to meet the reasonable needs of those who want to abstract and use water, whilst protecting the environment.

Water is replenished naturally and most is returned to the environment after it is used. Although its availability depends on the amount of rain that falls, water, unlike some other natural resources such as coal, oil or gravel, does not have a limited 'life' after which it will run out. It is a sustainable resource; it can be supported and maintained to make sure it continues to be available to meet future needs. But this is not an easy task. Because of the often conflicting demands of abstractors and users, the management of water resources and the issues surrounding it are highly sensitive and often contentious.

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the Work of Water Resources

The management of water resources involves the following key activities:

- continuously measuring and monitoring rainfall, weather conditions, evaporation, flows in rivers and streams, and water levels underground;
- analysing this information to find out where the water is, how much is available and how reliable these sources will be in meeting demand;
- controlling the taking of water from rivers and underground by licensing abstractors and setting limits on the amount which can be abstracted at each licensed location;
- assessing likely levels of future demand for water and developing strategies and plans to meet the reasonable needs of users;
- working in partnership with abstractors, water users and other water interests to try to ensure that all reasonable demands are met at reasonable cost whether social, financial or environmental;
- promoting the wise use of water;
- ensuring the reasonable needs of the water environment - for example our rivers, wetlands and estuaries - are identified and met.

The Anglian Region

The Anglian Region is unique among the eight Environment Agency Regions in England and Wales. As one of the largest Regions it covers approximately 27,000 square kilometres of eastern England - about 18 per cent of England and Wales - stretching from the Humber in the north to the Thames in the south. It is also the flattest and driest. Demand for water has increased at well above the national average for the past 30 years. During this time the Anglian Region has been the fastest growing part of Britain economically and regional growth is forecast to continue well into the future.

Topography A fifth of the Region lies below sea level and the predominantly low-lying nature of the land results in rivers being slow moving and nutrient rich. This landscape is good for intensive farming practices. Four of the main rivers drain into the Wash, a shallow sea inlet; the remainder, mostly in the south-eastern part of the Region, flow directly into the North Sea.

Geology Chalk and limestone provide the main water bearing aquifers (rocks which act like sponges, absorbing and storing water) in the Region. The most important chalk outcrops run north-east to south-west across the central part of the Region and southwards along the hinterland of the north east Lincolnshire coast. The principal limestone aquifer stretches down the western part of the Region from the River Humber to Rutland Water.

Environment The Region has a rich and varied water environment; one which is significant nationally and, in respect of its wetlands, internationally. Although the environment is unnatural in that most of it has been altered by man, the area is home to high quality fisheries and important river estuaries for bird life.

Population and Public Water Supplies Nearly all of the six million people who live and work in the Region receive their water supplies from one of the five water companies in the Anglian Region. The Environment Agency is responsible for licensing the rivers and boreholes from which the companies take water, for saying just how much water can be taken and for monitoring the companies to make sure the amount is not exceeded. The companies are responsible for abstracting, storing and

treating the water and for the mains supply network which distributes it to their customers.

Industry Heavy industrial use of water is concentrated mainly on the two major estuaries in the Region - the south bank of the Humber and the north bank of the Thames - with their large scale refining, chemical, paint and plastics industries. Extensive canning and food processing sectors are also key water users in the Region, together with brewing, high technology and service industries. Additionally the holiday trade of East Anglia and the Lincolnshire coast has a significant impact on water demand in the summer.

Agriculture As the most intensively farmed Region in Britain, the Anglian Region is a heavy user of water for horticulture and crops such as sugar beet and potatoes. Half of the country's spray irrigation takes place in the Region. There have been large increases in irrigation over the last thirty years and a further increase is likely. On peak days in the summer the amount being used for this purpose can exceed the amount taken for public water supply.

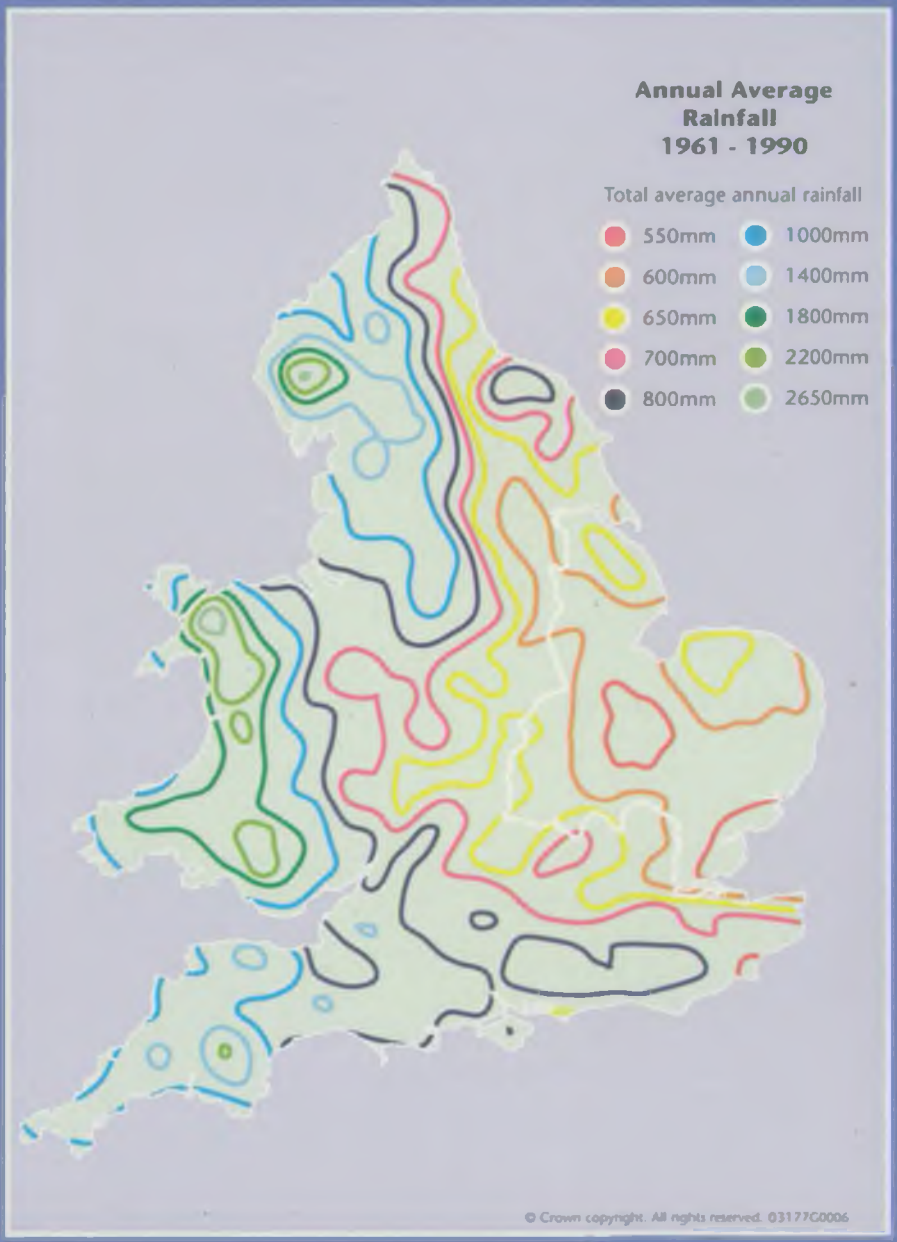
Regional Rainfall

Rain provides the water we need. Most of it falls on the western half of Britain. The result is that by the time weather fronts arrive in the Anglian Region, rainfall only amounts to about three quarters of the national average - under 600 mm a year compared to 798 mm in the rest of England and Wales. Normally even this reduced level of rainfall would be more than enough to meet the needs of everyone living and working in the area several times over but, naturally, it does not always fall in the right place at the right time.

What happens to the rain? Most of the Region's rainfall, about 448mm of total rainfall of 595mm, is taken up by plants, trees and the soil and then 'lost' back to the atmosphere through the natural process of evaporation. This leaves approximately 147mm of effective rainfall, that is the amount of rain that remains once evaporation has taken place.

In an average year, about 70 per cent of effective rainfall goes out to sea as river flows, mainly during the winter. This leaves around 30 per cent to soak into the ground to be absorbed by plants or to percolate deeper into aquifers, the rock equivalent of underground reservoirs.

Since the Anglian climate is so dry, evaporation exceeds demand during summer months, soils dry out, and river flows diminish. In effect, there is a 'drought' every summer. To meet all water needs, the Region has to rely on the effective rainfall which falls in the winter months to get through the rest of the year. This is done by the natural 'storage' of water in aquifers or on the surface in man-made reservoirs. This means the Anglian Region is highly vulnerable to the slightest variations in either rainfall or evaporation.


Annual Average
Rainfall
1961 - 1990
Total average annual rainfall
550mm
600mm
650mm
700mm
800mm
1000mm
1400mm
1800mm
2200mm
2650mm
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Where our water comes from

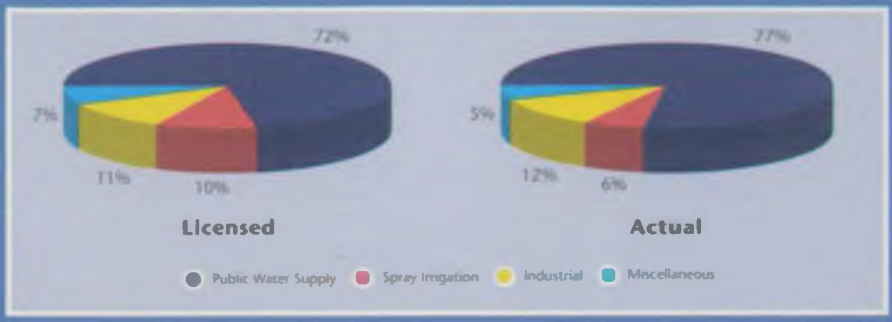
About half the water abstracted in the Anglian Region comes from rivers (surface water sources). The rest is drawn from sources underground (groundwater sources).

Water from underground is utilised in two ways. The first involves the natural flow of the water through the ground to the surface through springs and then into the streams and rivers, where it may be abstracted. The second involves drilling boreholes into the ground and pumping the water direct to the surface.

Rivers provide almost all the water that is stored in man-made reservoirs. The vast majority of the water is pumped into these reservoirs in the winter when river flows are at their highest. The Region has several major water company reservoirs - including Rutland Water in Rutland, Grafham Water in Cambridgeshire and Abberton and Hanningfield reservoirs in Essex. In addition there are many farm reservoirs which store river water in the winter for the purpose of crop irrigation during the summer.

The predominantly rural nature of many parts of the Region means that in addition to normal daily abstractions for public water supply there are also several thousand private boreholes which are used for domestic water supply.

The quality of water in rivers or underground can also influence the availability of supplies. Generally surface water requires more sophisticated treatment by water companies and industry before it can be used. Groundwater is generally of higher quality and needs less treatment. In both instances, the Environment Agency carefully monitors water quality in the environment and introduces special measures to protect the quality of that water.



Where the water goes

The demand for water comes from the whole community - it is needed for human consumption and industrial processes, to protect wetland nature reserves and maintain fisheries.

Virtually everyone who wants to abstract water from rivers, streams or underground sources has to be licensed to do so and each of the 10,000 licences issued in the Anglian Region by the Environment Agency sets a limit on the amount of water which can be taken. Every day it is possible for licensed abstractors to take nearly four and a half million cubic metres of water from their licensed sites - enough to fill an Olympic-sized swimming pool more than 1900 times.

The single most important use of water is public water supply. Demand has doubled in the last 30 years and now accounts for more than 70 per cent of total annual licensed abstraction. Industrial use ranks second (just over 10 per cent) closely followed by spray irrigation of crops (nearly 10 per cent). Fish farming and water cress growing, cooling water for power stations, and supplies for general agricultural use are other significant uses.

Another vital user of water is the environment itself. In the Region's rivers it provides protection for the general ecology, fisheries, amenity, and navigation; in wetlands and estuaries it maintains the balance necessary to ensure the richness and diversity of some of the most internationally famous conservation areas in Europe.

Water where it is needed

The people who live and work in the Region could not do so without their water supply being maintained by the transfer of water between areas.

This raw water transfer system, one of the most complex and extensive of its kind in Britain, has been developed during the last 30 years to meet constantly increasing demand for water, stemming from both rapid regional growth and the need to combat recurring 'drought' conditions caused by the uniquely dry nature of the Region.

By transferring water between river systems and across the Region the Environment Agency protects both existing supplies and the water environment.

The two largest Agency transfer schemes are :

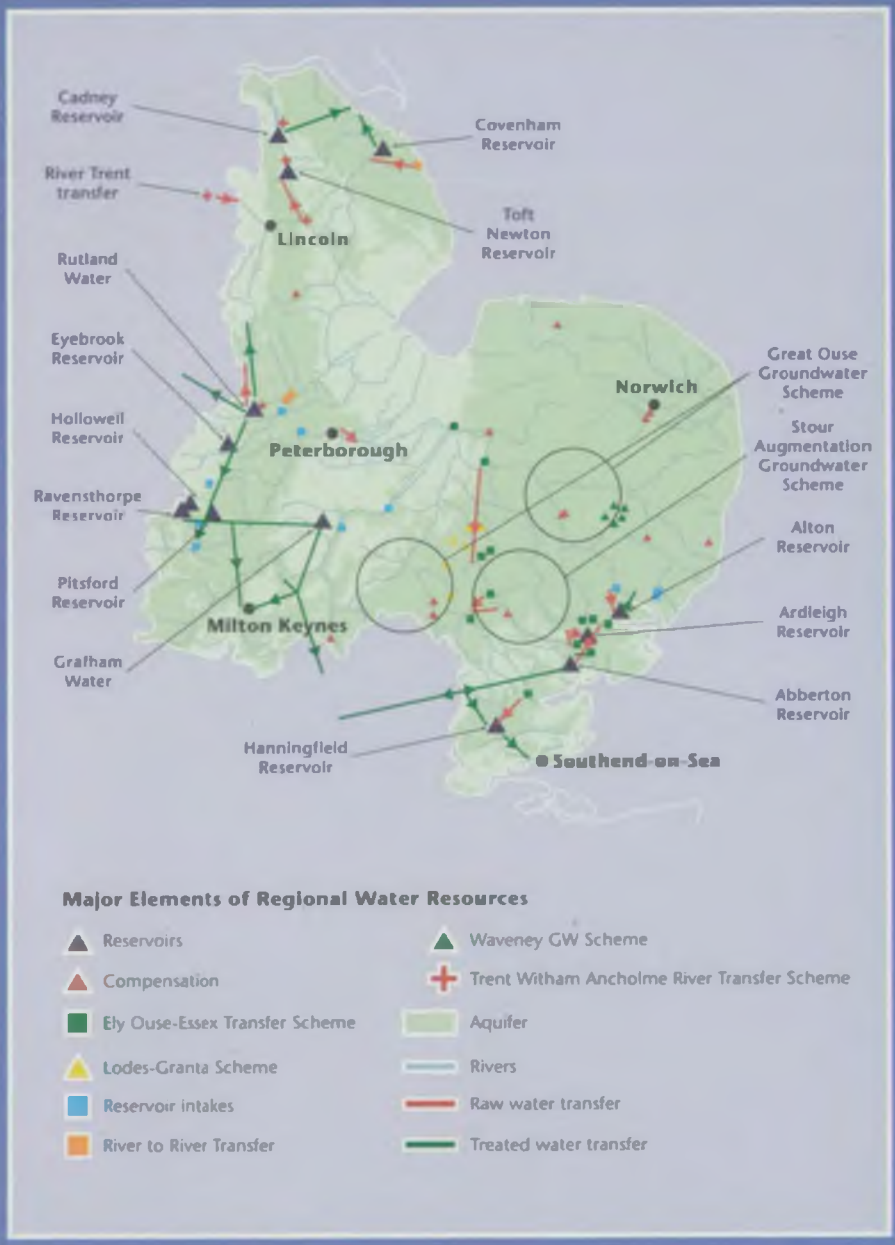
Ely Ouse - Essex

Water flowing towards the Wash from the River Ely Ouse is diverted back inland. It is then pumped through tunnels and pipelines from Norfolk into Essex where it is put into local rivers for eventual abstraction to meet the needs of the most densely populated part of the Anglian Region.

Trent-Witham-Ancholme

Water from the River Trent in the Midlands is pumped into the Fossdyke Canal in Lincolnshire and on into the Rivers Witham and Ancholme to meet the water needs in the northern part of the Region and, in particular, the industrial belt on the south bank of the Humber estuary.

The Region has also developed a number of groundwater schemes which are designed to help to sustain and support river flows which are potentially vulnerable at times of heavy demand for water; to augment public water supplies and to support the environment in wetland areas. Some are extensive, highly sophisticated schemes covering comparatively large areas; others are designed simply to protect a specific site or habitat.


Cadney Reservoir
Covenham Reservoir
River Trent transfer
Lincoln
Toft Newton Reservoir
Rutland Water
Eyebrook Reservoir
Great Ouse Groundwater Scheme
Norwich
Holloweil Reservoir
Peterborough
Stour Augmentation Groundwater Scheme
Ravensthorpe Reservoir
Alton Reservoir
Pitsford Reservoir
Ardleigh Reservoir
Milton Keynes
Grafham Water
Abberton Reservoir
Hanningfield Reservoir
Southend-on-Sea
Major Elements of Regional Water Resources
Reservoirs
Compensation
Ely Ouse-Essex Transfer Scheme
Lodes-Granta Scheme
Reservoir intakes
River to River Transfer
Waveney GW Scheme
Trent Witham Ancholme River Transfer Scheme
Aquifer
Rivers
Raw water transfer
Treated water transfer

Future demand

Demand for water for public water supply is set to fall in the short term due to improved leakage detection and more efficient use of water. In the longer term, once these savings have been made and that "saved" water used, demand is likely to increase again, but at slower rates than before. The situation differs for spray irrigation, estimated to continue to rise in the future. Industrial growth in the East of England is set to be relatively high. However, changes away from manufacturing towards high technology and service sector industries, and more efficient use of water, means that industrial water demands may not change much overall.

Droughts in the late 1980's and 1990's raised the issue as to whether future resources and demand would be affected by possible changes in the climate. It is now accepted that human activities are changing the global climate. In Anglian Region it is likely that this will be reflected in increased winter rainfall and winter riverflows, but little change to water infiltrating into aquifers. In summer, however, rainfall will probably decrease whilst temperatures increase, putting greater stress on the environment when water is in greatest demand. The Environment Agency keeps the matter under constant review so that it can be flexible in the way it responds to any emerging information.

Meeting the challenge

In managing the Region's water resources in a sustainable manner, the Environment Agency has to look for ways in which resources can be developed to meet existing needs without compromising the ability of future generations to be able to do the same.

This involves developing a flexible mix of water resources management policies designed to produce maximum benefits for existing and future water users whilst at the same time identifying and minimising any potential threats to the availability of water and to the water environment itself. The Agency is continually reviewing current practices to ensure all users of water, including the environment, are protected. In particular, the Agency is investigating existing abstraction licences where they may be having an adverse effect on their surrounding environment. Where an impact is confirmed, the Agency will seek measures to put right any detrimental impact. All applications for further abstraction licences will be thoroughly examined to ensure they do not cause damage to the environment.

The complex task facing the Environment Agency over the next 25 years is to manage water resources to meet the future needs of both abstractors and the environment. The dry nature of the Region means most normal water management practices are already well established and widely used. The Agency is, however, committed to a twin-track approach whereby water demand management options should be fully implemented whilst initial studies are made in parallel for possible new sources in case these become necessary. That is making the most of the water currently available before developing new sources.

The Environment Agency will continue to encourage and monitor water demand management practices and look to new ways of developing water resources, through:

managing demand by supporting greater use of domestic water meters and pressing water companies to do as much as possible to reduce leaks in their distribution systems;

encouraging greater co-operation and collaboration between water users to find mutually beneficial solutions to obtaining the supplies which will be needed;

investigating ways in which demand can be met by existing methods of water resource management; for example identifying further ways of moving water around using existing river transfer schemes and, wherever practicable, the efficient management and therefore greater use of existing sources;

persuading people to use water wisely by stressing the financial, social and environmental benefits of water conservation including the promotion of improved water efficiency by industry, commerce and agriculture;

supporting the introduction and use of more water efficient domestic appliances such as washing machines and dishwashers.

Safe, secure, sustainable

The Environment Agency is committed to developing water resource management policies and practices which will bring the widest benefits possible to all water users, including the environment. It is a commitment to:

- improving the overall quality and performance of water resources management to produce a better water environment;
- making sure there is enough water to meet existing and future needs - a secure supply;
- taking positive action to protect and support the continuing 'life' of water as a sustainable resource.

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