

GUARDIAN OF THE WATER ENVIRONMENT



NRA

*National Rivers Authority
Anglian Region*

TD/BH/11



ENVIRONMENT AGENCY

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The NRA

The National Rivers Authority is a public body whose task is to protect and improve the water environment in England and Wales, and provide protection against flooding from rivers and the sea.

Created under the Water Act 1989 it is responsible for a wide range of regulatory and statutory duties including:

Water resources — The management of water resources to meet water demands of all kinds, both for abstraction and 'in the river'. This involves measuring rainfall, river flows, groundwater levels etc., allocating water resources by means of a licensing system and, where appropriate, the planning and implementation of augmentation works.

Environmental quality and Pollution Control — maintaining and improving water quality in rivers, estuaries and coastal waters; granting consents for discharges to the water environment; monitoring water quality; controlling pollution.

Flood defence — the general supervision of flood defences; the carrying out of works on main rivers; sea defences.

Fisheries — maintaining, improving and developing fisheries in inland waters including licensing, restocking and enforcement functions.

Conservation — furthering the conservation of the water environment and protecting its amenity.

Navigation and recreation — navigation responsibilities in three regions — Anglian, Southern and Thames — and the provision and maintenance of recreational facilities on rivers.

The NRA employs about 6,500 people.

MANAGEMENT

The central management of the NRA is based in London where a small policy unit of about 60 people, headed by a Chief Executive and a team of specialist directors and advisers, is responsible to the main board of the authority.

The Board comprises members appointed by the Government — the majority by the Department of the Environment together with representatives selected by the Ministry of Agriculture, Fisheries and Food and the Welsh Office.

The day to day operational work of the NRA is carried out by regional groups each one based on the area of a former regional water authority in England and Wales.



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THE ANGLIAN REGION

The Anglian region is one of 10 regions which make up the operational element of the NRA. Geographically the largest it covers more than 27,000 square kilometres of eastern England — nearly 18 per cent of the total of England and Wales. Its boundaries range from the Humber estuary in the north to the Thames in the south and from the Norfolk coast inland to Northampton. More than five million people live in the area.

The region is predominantly rural with a low density of population, but includes several important centres of population growth and industrial activity such as the M11 'corridor', Thameside, South Humberside and expanding centres like Peterborough and Milton Keynes.

The regional unit is responsible for over 5,800 kms of main river, 1,400 kms of embanked water courses and nearly 1,300 kms of tidal and sea defences. In addition it controls more than 960 kms of navigable

ivers, nearly 4,700 kms of coarse fishing water, and monitors the quality of 28 designated bathing waters.

In a region with a rapidly expanding population and increasing demands for water the unit monitors a total of 10,000 abstractions from rivers and underground sources.

Based in Peterborough in Cambridgeshire the regional unit is managed by a Regional General Manager who reports to the Chief Executive in London. He is supported by a management group of three regional managers responsible for, environmental regulation and fisheries; flood defence and operations; finance and common services.

About 1,000 employees are located in the region which for operational purposes is divided into three areas based on Lincoln, Bampton in Cambridgeshire and Ipswich, with operating districts in each area.





WATER RESOURCES

Water is vital to life. Making the best use of this essential resource, conserving it and balancing the competing needs of abstractors and of the water environment is a prime responsibility of the NRA.

This complex role includes:

- continuously measuring rainfall, evaporation, river flows, and groundwater levels at many locations.
- analysing these data to establish the availability and reliability of water resources.
- controlling abstractions from rivers and groundwater.
- predicting future water demands of all kinds.
- planning, and sometimes building and operating, works to augment water resources to keep pace with the ever-increasing demands.

Rainfall is the sole source of fresh water, and the Anglian region has less of it than any other part of the country — under 600 mm/yr on average, compared with 940 mm/yr in the rest of England and Wales.

Regional rainfall is divided equally between summer and winter, but evaporation is concentrated in the summer. As a result it is normal for the area to experience a 'drought' every summer, in the sense that evaporation exceeds rainfall, soils dry up, river flows reduce, and storage of winter water is necessary to maintain supplies.

Water is drawn in almost equal proportions from underground sources and by abstraction from rivers, and currently nearly 10,000 water abstraction licences have been issued and are monitored by the regional NRA. Most licences are held by private abstractors (e.g., farming and horticultural interests) taking and using water on their own premises for their own purposes.



A major use of water is for public water supply, and with regional population growth well above the national average, this use is expected to rise to over 2,300 megalitres a day by 2011. The agricultural nature of the area means heavy demand for spray irrigation of crops during the growing season and half of the UK's spray irrigation takes place in the region.

The task of meeting increasing demands for water involves not only sensitive management of the water cycle but large scale engineering works to make water available when and where it is needed.

In the Anglian region this has resulted in the development of a number of schemes which conserve, distribute and/or augment water resources.



Chairman's Foreword



The Rt. Hon. The LORD CRICKHOWELL
Chairman, National Rivers Authority

September 1 1989 represented a turning point in the history of environmental protection in England and Wales.

On that date the National Rivers Authority took up its duties. Overnight the NRA became the strongest environmental protection agency in Europe, invested with extensive powers and responsibilities by Parliament.

The Authority comes into existence at a time when there has never been more concern about the damage mankind inflicts on the natural systems on which we all depend.

The responsibilities of the NRA are far reaching. Foremost amongst them is to control pollution and improve the quality of our country's river systems and coastal waters.

The NRA will do this by raising environmental awareness within industry, commerce, farming and among the public and enforcing strict standards of environmental control.

We have both the resources and the expertise to be effective, and to strike a balance between all the competing interests that use our rivers, while at the same time

providing the strongest protection for their plant and wildlife.

In carrying out its duties as a tough and effective regulator, the NRA will ensure that its standards take full account of European Community guidelines. We will operate openly by publicising our policies and publishing available information.

The existence of a powerful, impartial and independent organisation with a clear statutory responsibility to carry out its duties transforms the way in which our water environment is guarded. It is an immense improvement on the arrangements that have existed before.

The strength of the NRA goes beyond the authority invested in it by Parliament and the assurances of the Government that it will give us all the necessary support. It taps as well the vast reservoir of public opinion, with its strong feelings about the importance of the environment. In the years to come the NRA will use these strengths to ensure that the rivers, lakes, coasts and underground waters of England and Wales are protected and improved for the sake not only of this generation but of those to come.

Crickhowell

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CONSERVATION

Conservation with respect to rivers, estuaries and coastal waters is an important function of the NRA. The preservation and enhancement of wildlife habitats and the conservation of natural flora and fauna form the backbone of its environmental function.

In managing areas of land drainage, flood alleviation, river flow control and sea defences any work carried out by the NRA has a profound effect on the environment. Therefore when new projects and maintenance works are planned the various ecological systems which will be affected have to be taken fully into account.

In many instances this evaluation will be based on highly detailed surveys which have been carried out by NRA staff, often with the assistance of naturalist organisations, into the ecology of the region's rivers and coastal areas.

Extensive consultation is carried out with groups and organisations who have a direct interest in our national heritage with the aim of trying to strike an equitable balance between the various interests to secure a result which will conserve the most important environmental elements of any scheme.

In the past river maintenance, particularly dredging, was the greatest cause of contention with environmental groups. Today improved consultation is resulting in a growing number of schemes which have successfully blended the need to ensure the efficiency of the river systems with the desire of environmentalists to maintain rich habitats.

For example, dredging can be carried out with great care using a crane on a floating pontoon so that there is no damage to the banks; spoil from the river can be disposed of in such a way that it avoids adjoining damp low lying areas which are vital for the survival of many insects and breeding birds; trees can be pollarded rather than removed which is not only aesthetically more pleasing but also provides a habitat for insects and birds.

Equally important when carrying out any improvement work is the need to avoid creating a canal-like look to the river or producing a similarly unnatural appearance when river banks have to be strengthened to avoid erosion. This is done by using modern survey and river management techniques to retain much of the original appearance of the waterway, and also adopting new technology and materials to replace the former favourites of concrete and steel.

The prime concern is to find a suitable method of bank protection which will not inhibit the growth of natural vegetation and will provide habitats for riverside wildlife.

With its long and vulnerable coastline sea defences are vitally important to the well-being of the region. As winds, tides and wave action work to reduce the level of protection the NRA not only builds walls and defences to withstand the power of the North Sea but also designs projects which will lessen the erosion and destruction of natural barriers such as saltings and sand dunes.





Fisheries survey

Pollution accounts for about 30 per cent of fish deaths every year and fisheries teams in each area carry out rescue operations when such incidents occur.

Waters which have been particularly badly affected and are left with a severely depleted fish population are restocked.

The regional Fish Diseases Unit which is recognised nationally for its specialist expertise carries out health checks on fish which includes examination for parasites, fungi, bacteria and if necessary, viruses. Advice is given on treatment, therapy and the prevention of disease.

Regular checks are carried out on the health of all coarse fish and trout stocks being reared as part of regional fisheries improvements and immediate investigations are made of disease incidents using advanced techniques. Fish populations are monitored at suitable points throughout the region to establish general health levels as an aid to fisheries management.

The coarse fish production unit has facilities to artificially induce spawning in a variety of coarse fish and to raise both fry and young fish for stocking and the central fish ageing service provides information on age, structure and growth rates in fish production. Research and development is an important part of the work and has involved the development of a sophisticated computerised fisheries database for storage, analysis and retrieval of data.



Survey analysis

FISHERIES

The health of fish is a good guide to the quality of the water in the rivers in which they live and so the maintenance, improvement and development of fisheries in rivers and estuaries is integral to the work of the NRA.

Fishing is a major source of recreation and the Anglian region boasts some of the finest coarse fishing areas in England and Wales with nearly 4,700 kms of potential fishing water of which just over 800 kms is let to fishing clubs. More than 200,000 fishing licences are issued each year and the money from the licence fee pays for a wide range of fisheries activities.

Detailed advice is provided on the development, improvement and management of fisheries throughout the region. Applications to introduce fish into the region's waters are processed, relating to both trout and coarse fish, and consents for the removal of fish from Anglian region water are granted. Before allowing fish to be introduced they are examined to ensure their suitability, a task vital to preventing the spread of fish diseases.



Creating
natural
defences



Sea defence
work



SEA DEFENCES

The NRA is responsible for protecting nearly 1,300 kms of the most vulnerable coastline in England and Wales.

When the action of the sea results in erosion and loss of land, work to prevent this is usually carried out by the local District Council. However, when the land behind the coastline is low lying and therefore susceptible to flooding if the sea defences are breached, the major engineering works designed to prevent it are generally the responsibility of the NRA. These defences may take the form of natural sand dunes, shingle ridges, man-made embankments or walls built of concrete or steel sheet piling.

Replacing and repairing existing defences is costly and to ensure a co-ordinated and cost effective approach to its coastal works the Anglian region is developing a comprehensive long term strategy based on one of the most innovative coastal management studies undertaken in Western Europe. This project involves the collection, maintenance and development of a comprehensive computer based database which enables engineers an unparalleled insight into the workings of the coastline. The result will be that schemes can be developed to best serve the interests of the whole region rather than adopting the past practice of concentrating on specific projects and sites in isolation.

The coastline is under constant attack. Studies have shown that it is not only generally retreating but that beach profiles are steepening. This will be a major influence on the

design of sea defence schemes in the future as will the effect of any climatic change on sea levels.

The regional NRA is responsible for making sure that it not only maintains and refurbishes existing sea defences but also uses increasingly environmentally sensitive solutions to this aspect of its work. To this end it has undertaken a wide variety of schemes which seek to use natural defences rather than man-made structures.

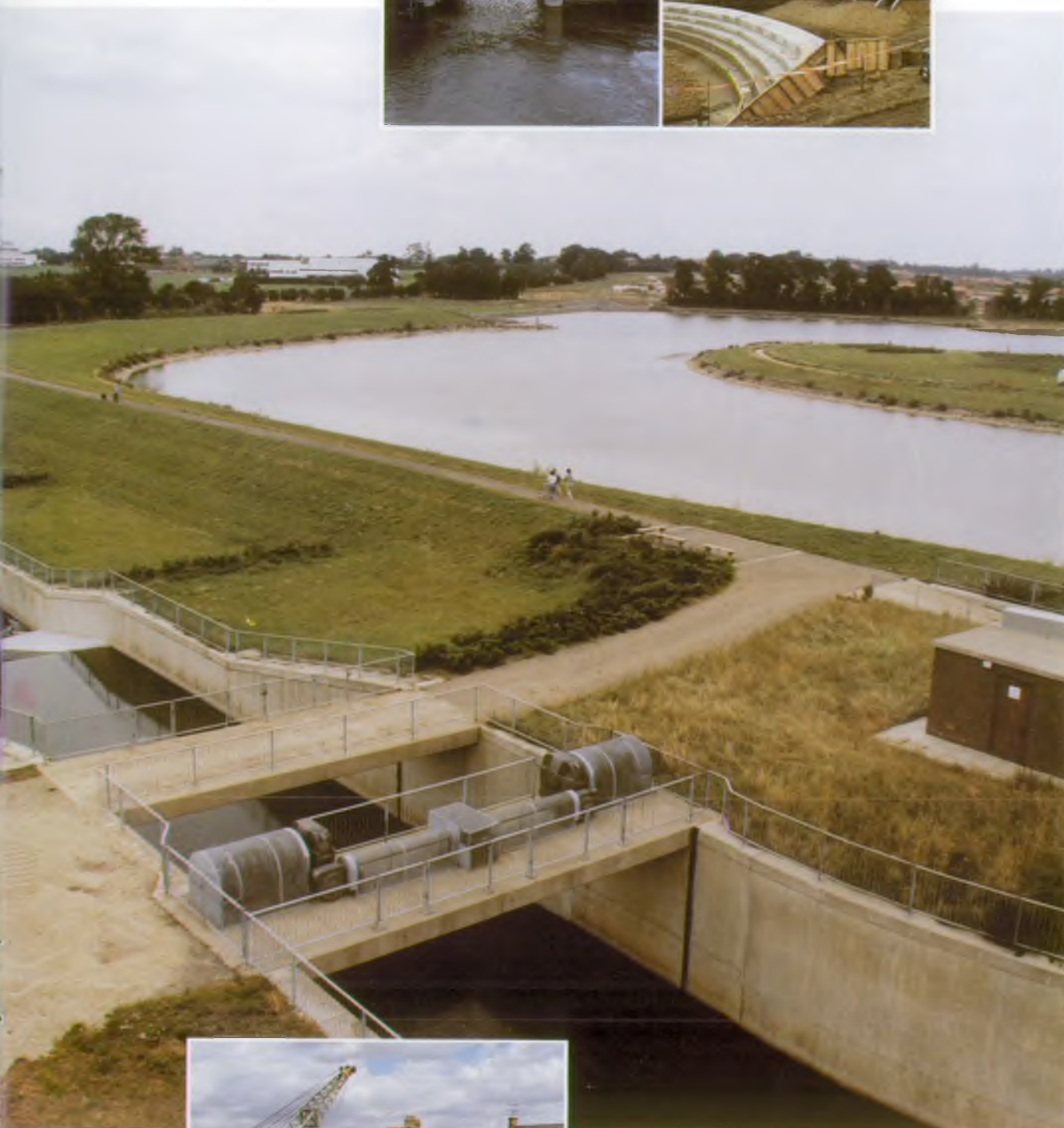
The danger

The most dangerous weather pattern for the Anglian coast is a deep depression which travels eastwards across the Atlantic, passes to the north of Scotland, and then runs southwards down the North Sea. The funnelling effect on the shallower southern part of the North Sea intensifies the degree of water surge down the coast.

Such 'surges' are short lived but are often up to two metres high, and can be much higher. When they coincide with the peak of a high tide serious flooding can result. The combination of these factors means that if care is not taken tidal defences which have appeared to be adequate for many years can suddenly be overwhelmed.

Incidents such as the East Coast flood in 1953 in which more than 200 people died in the eastern counties led to the development of a storm tide warning scheme, which is brought into action when storm weather in the North Sea coincides with high tides. This warning scheme is operated by the NRA in conjunction with local police forces.





River structures protecting against flooding



River
Maintenance

FLOOD DEFENCES AND LAND DRAINAGE

The NRA has responsibility under the Land Drainage Act 1976 for land drainage matters. This entails maintenance and works on main rivers, flood protection from rivers, protection from sea flooding in estuaries and the maintenance and provision of sea defences on the coast.

Fluvial (River) Flooding

Protecting the community from river flooding is a major responsibility in a region such as Anglian which is predominantly low lying and has many rivers and water courses.

Any river system, if left to itself will deteriorate through the action of nature. Erosion at one point may cause a build up of silt at another; blockages by weed growth, fallen trees and rubbish slow down the speed of the river water and encourage silting. Many of the activities of man, such as the building of inadequate culverts, dumping of refuse in river channels, or encroachment of development onto a flood plain, can contribute to the reduction of efficiency of a river system.

In a rapidly developing area like the Anglian region the building up of new roads, housing estates and industrial areas leads to greater amounts of water 'run-off' from the land into river systems. This places a much greater burden on the rivers in times of flood and therefore river systems require constant maintenance.

Responsibility for carrying out maintenance and improvements to drainage systems in fields and other means of carrying rain water into main water courses is the responsibility of the land owners themselves.

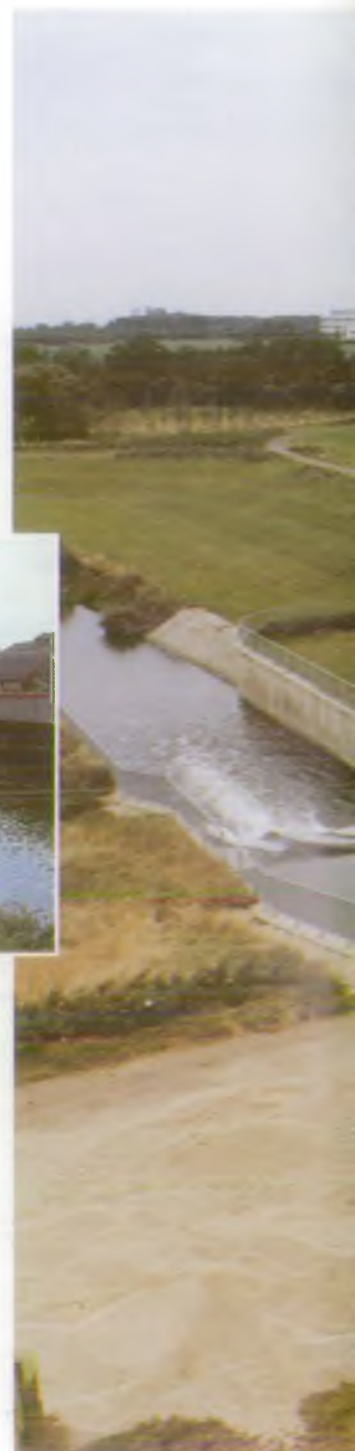
The NRA is responsible for maintaining and improving what are known as main rivers to ensure they are capable of handling the normal water flows draining from the land.

The task involves the dredging of rivers to improve their capacity and flow; the maintenance and improvement of their banks to retain the profile and mechanics of the watercourse and prevent them breaching; the clearance of weeds and obstructions and the provision and maintenance of control structures such as locks, weirs and sluices.



One third of the Anglian area lies either below normal river levels or below high tide levels. For example the rich agricultural land of the Fens is an average of one metre below sea level (dropping to a maximum of three metres below sea level) and this as far as 30 miles inland.

It is this factor, combined with a long history of flooding in East Anglia, which makes land drainage and the protection of people and property against flooding a major activity of NRA in the Anglian region.





Pollution victims



Reviving a river

Biological analysis

ENVIRONMENTAL QUALITY AND POLLUTION CONTROL



Biological Study

The biological study of organisms living in water provides information which enables the recent history of a particular stretch of water to be quite accurately assessed.

Pollution invariably changes the flora and fauna which would normally be found in unpolluted rivers. Different groups of aquatic animals and plants vary in their resistance to pollution. Each species thrives best within a narrow range of environmental conditions and this fact can be used to assess the quality of the water in a river. By monitoring the animal population of a stretch of water over a period of time a trend of stability, improvement or deterioration in the water quality will be seen.

Prevention and Control of Pollution

The law relating to control of pollution states that no discharge can be made to inland waters without the consent of the NRA, who can specify conditions governing the composition, quality and

temperature of the effluent. There is a similar control of discharge of waste water to underground strata (for example the disposal of effluent by soakaway) because the NRA is also responsible for preventing pollution of underground waters.

NRA inspection staff keep a close watch on the rivers under their control. They inspect sewage disposal and effluent treatment works and take samples from them, and conduct negotiations with local authorities, industrialists and farmers on the day to day problems of pollution control within their areas. Water samples and effluent samples are taken regularly by quality officers for analysis in the NRA's laboratories. Biological investigations related to pollution control and the management of fisheries are also carried out.

When a pollution incident occurs quality staff visit the site to trace the source of the problem and carry out remedial work to improve the condition of the river or watercourse. This can involve soaking up the pollutant on special absorbent mats; creating a boom to contain the pollution and pumping out the offending material or oxygenating the water with special equipment to breathe life back into the polluted stretch. Often these operations are carried out in conjunction with fisheries staff particularly where there have been fish deaths or there is a threat to a fishery.

Water quality staff sample the water to try to identify the pollutant, and the possible source of the contamination. Where necessary legal action is taken against the polluter.





Monitoring water quality

In addition to their unavoidable use as a place for the disposal of unwanted used water and surface water, and for recreation and amenity, rivers are also a vital source of water supply in many areas. This means high standards of sewage and industrial effluent treatment are needed to maintain river water quality.

There are two methods of measuring the water quality in rivers — chemical analysis and biological study:

Chemical Analysis

Samples of river water are taken at regular intervals from a large number of survey points throughout the region and routine laboratory analysis is carried out on all of them. They are checked for suspended solids, the biochemical oxygen demand and dissolved oxygen, ammonia and nitrate, nitrogen and chlorides. Tests are also carried out to establish the hardness of the water, its conductivity, and to determine the level of sulphates, phosphates and detergents in it. A percentage of the samples are examined more closely and checked for evidence of more poisonous materials such as heavy metals (copper, nickel, zinc, cadmium, chromium, iron and lead), sodium, potassium, boron and silicon, etc.

NRA laboratories are equipped with sophisticated equipment and instruments which have been especially developed for tracing oil pollution, pesticide residues, and the identification of chemical waste materials.

ENVIRONMENTAL QUALITY AND POLLUTION CONTROL

The NRA is responsible for monitoring and improving water quality in rivers, estuaries and coastal waters and for controlling discharges of pollutants to them.

This involves monitoring river, estuary and coastal water quality, the granting of permission to discharge effluent to the water environment and, monitoring compliance with consents.

One of its primary regulatory functions is issuing discharge consents in respect of sewage treatment works and private discharges and enforcement action in the case of non-compliance.

In the Anglian region there are over 1,000 public sewage treatment works (more than in any other NRA region) and more than 20,000 other discharges. Principal pollution incidents occurring in rivers and groundwaters, estuaries and coastal waters average 1,500 cases a year of which the majority relate to oil. Farm waste pollution in another significant sector and the NRA maintains strong links with industrial, commercial and agricultural organisations to increase awareness of the environmental impact of pollution and reduce incidents through better operating practices.



The regional NRA also has a sophisticated network of high technology systems to monitor the condition of its rivers and their quality. These enable staff to gather up-to-the-minute information about the physical state of the river, for example its flow rate, and to be alerted if water quality conditions change if there is a serious pollution. The electronic remote reading of specialist equipment at specific locations results in improved management of this part of the water cycle.

Pollution

Pollution is the act of destroying the purity of water. Whilst all natural waters are subject to a degree of natural pollution which arises from decaying vegetable matter and impurities washed out from the soil, the greater part of the pollution load imposed on rivers has its origins in the daily life of the community and the operations of industry. The domestic consumption of water is about 135 litres per head of the population every day and this water, which is delivered by the water companies, is discharged ultimately into the sewers as crude sewage. Industry uses large quantities of water, amounting to almost as much as the community's domestic requirements, and much of this water becomes polluted industrial effluent which is either passed to the sewers or purified for discharge to the rivers. Crude domestic sewage, together with industrial effluents which are discharged into the sewers, is treated at sewage treatment works and discharged into the rivers.





Monitoring the region's rivers



Drilling a borehole



Weedcutting
and clearance



Preserving habitats

NAVIGATION AND RECREATION



In three of its 10 regions in England and Wales the NRA controls and maintains the navigable rivers.

Within the Anglian region the boating fraternity can enjoy nearly 970 kms of varied waters while canoeists have more than 1,200 kms open to them.

The main waterways are the River Welland which is navigable for 56 kms from Stamford to Fosdyke Bridge near its outfall into the Wash; the River Nene which stretches 147 kms from the junction of the Northampton arm of the Grand Union canal to the sea; and the River Great Ouse from Bedford to the Wash (120 kms).

The regional unit is responsible for registering the boats and craft which use the waterways and levying the annual charges which river users have to pay. Income from the





Enjoying the water environment



navigation fees contributes towards the cost of maintaining river channels and structures such as locks. In addition staff carry out inspections of boats to ensure they meet construction and safety standards, and monitor the speed limits which are in force throughout the navigation.

Some of the finest areas for water based recreation in the country are located in the region and here the NRA works to develop amenities and facilities for the benefit of naturalists, sportsmen and the public. Wherever possible, and appropriate, access is provided to riverbanks and local riverside walks and elsewhere nature reserves are created. Many of these facilities are provided in conjunction with local authorities and naturalist and conservation interests.





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