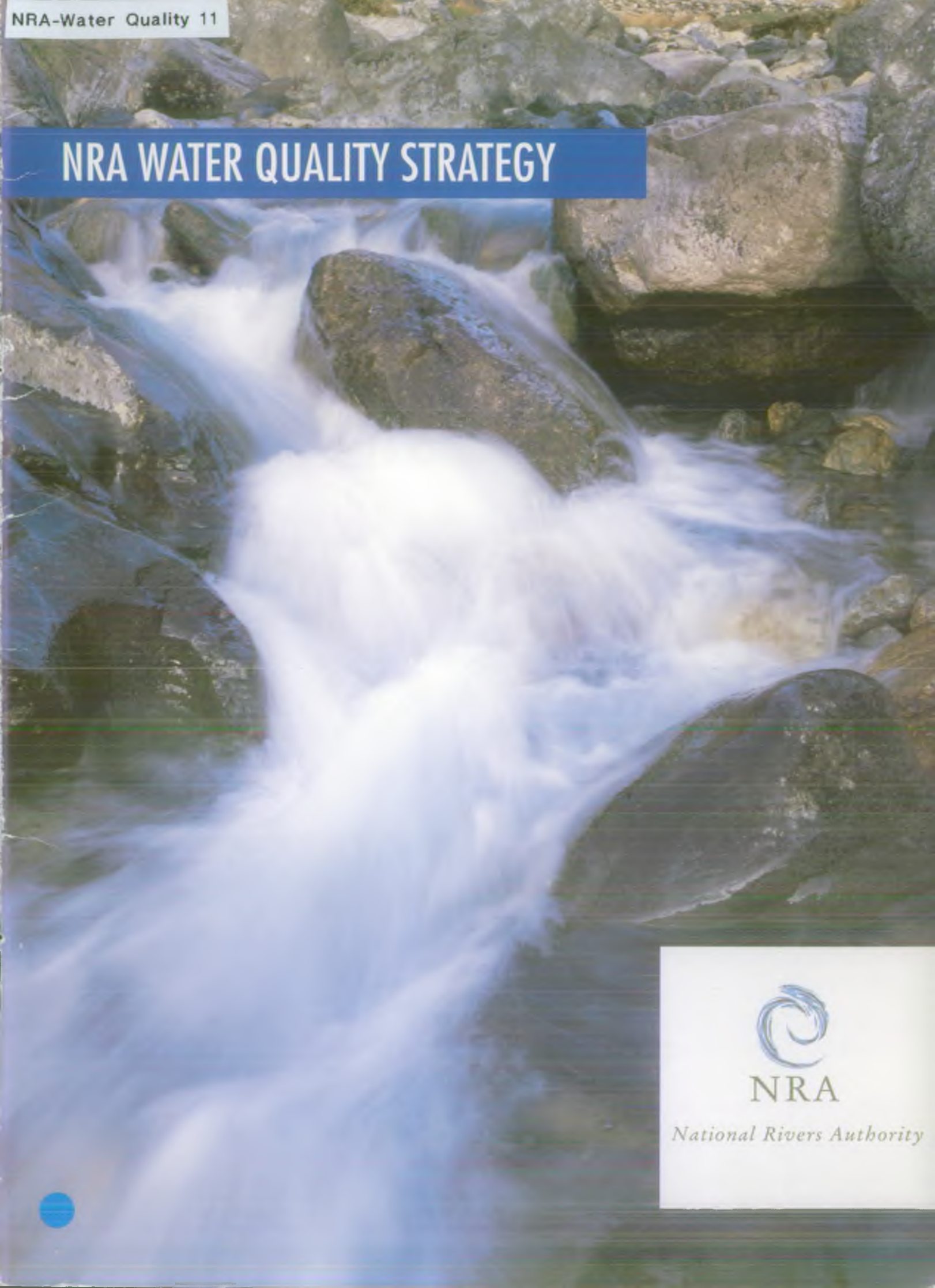


NRA WATER QUALITY STRATEGY



NRA
National Rivers Authority



For further information please contact:

Corporate Planning
National Rivers Authority
Rivers House
Waterside Drive
Aztec West
Almondsbury
Bristol BS12 4UD

Tel: 0454-624400

Fax: 0454-624409

© National Rivers Authority 1993

First Published 1993

ISBN 1 873160 46 1

All rights reserved. No parts of this publication may be reproduced, stored in a retrieval system or otherwise transmitted, in any form or by any means, electronic, mechanical, photocopying, recording or otherwise without the prior permission of the National Rivers Authority.

This document is one of a series, the others in the series are:

NRA Water Resources Strategy
NRA Flood Defence Strategy
NRA Fisheries Strategy
NRA Conservation Strategy
NRA Navigation Strategy
NRA Recreation Strategy
NRA R&D Strategy

Other publications are available from the NRA. These include the following:

NRA Annual Report and Accounts
Policy and Practice for the Protection of Groundwater
Water Quality Series
Low Flows and Water Resources
Annual R&D Review
Conservation & Fisheries Technical Handbooks

Publication catalogues are available from all the NRA Offices.

The addresses and telephone numbers for all NRA offices are listed on the inside back cover of this document.

This document has been printed on totally chlorine free paper from a sustainable source.

This document was designed by:
Stott Meredith Limited
14 Frederick Place
Clifton, Bristol BS8 1AS

and printed by:
The Pheon Press Limited
Western Drive
Whitchurch, Bristol BS14 0AF

NRA WATER QUALITY STRATEGY

National Rivers Authority
Information Centre
Head Office
Class No
Accession No ALGIX.....

The Information Centre
National Rivers Authority
Waterside Drive
Aztec West
Almondsbury
Bristol BS12 4UD



ENVIRONMENT AGENCY

NATIONAL LIBRARY &
INFORMATION SERVICE

HEAD OFFICE

Rio House, Waterside Drive,
Aztec West, Almondsbury,
Bristol BS32 4UD

Due for return

24/2/95

ENVIRONMENT AGENCY



099538

MISSION AND AIMS

The NRA's mission is:

- "We will protect and improve the water environment by the effective management of water resources and by substantial reductions in pollution. We will aim to provide effective defence for people and property against flooding from rivers and the sea. In discharging our duties we will operate openly and balance the interests of all who benefit from and use rivers, groundwaters, estuaries, and coastal waters. We will be businesslike, efficient and caring towards our employees".

Our aims are to:

- *Achieve a continuing overall improvement in the quality of rivers, estuaries, and coastal waters, through the control of pollution.*
- Manage water resources to achieve the right balance between the needs of the environment and those of the abstractors.
- Provide effective defence for people and property against flooding from rivers and the sea.
- Provide adequate arrangements for flood forecasting and warning.
- Maintain, improve and develop fisheries.
- Develop the amenity and recreational potential of inland and coastal waters and associated lands.
- Conserve and enhance wildlife, landscape, and archaeological features associated with inland and coastal waters of England and Wales.
- Improve and maintain inland waters and their facilities for use by the public where the NRA is the navigation authority.
- *Ensure that dischargers pay the costs of the consequences of their discharges, and, as far as possible, to recover the costs of water environment improvements from those who benefit.*
- Improve public understanding of the water environment and the NRA's work.
- Improve efficiency in the exercise of the NRA's functions and to provide challenge and opportunity for employees and show concern for their welfare.



CONTENTS

	Page
Foreword	1
An Integrated Approach to the Environment	2
The Environment - a Finite Resource Under Pressure	4
Legislative, Financial and Institutional Framework	7
NRA Strategy for Water Quality	10
Resources and Timetable for Achievement	15
Research and Development	17
Future Scenarios	18
Measuring Our Success	19
Glossary of Acronyms	20

FOREWORD

This document sets out the National Rivers Authority's strategy for water quality. It forms part of a series of published documents, covering all the NRA's main functions.

The documents are intended to make the NRA's approach to the integrated management of the water environment plain to all interested parties, whether their interest is private or professional. This is in recognition of the stake that individuals have in the environment, both as taxpayers and water users.

The strategies have been developed as internal drafts over a period of time with much constructive input from a wide range of interest groups, including those represented on our Regional Committees. This consultation demonstrates our commitment to working in response to and influencing public opinion.

The strategies have already served to direct the NRA's policy development over the last two years. Their publication at this point reinforces the essential inter-relationships between the NRA's individual functions, as

preparations for the Environment Agency continue. When considered together they present a strong case for the continuing integration of all NRA functions. This argument becomes still more convincing when applied to the management of water, land and air proposed for the new Agency.

The overriding aim directing the NRA's work is the protection and improvement of the water environment. We are determined to make a real and positive difference to the rivers, estuaries and underground and coastal waters of England and Wales. This resolve will be strengthened by the inclusion of the NRA's integrated approach into what promises to be among the most effective forces for environmental good in Europe.



Ed Gallagher
Chief Executive

AN INTEGRATED APPROACH TO THE ENVIRONMENT

Vision and Reality

When we think of the water environment, most of us would conjure up a vision of an unspoilt river in its natural state, meandering across open countryside, its banks rich with flora and fauna, its waters teeming with aquatic life.

In fact, very little of our water environment remains unaffected by human activity. Alterations to rivers probably started with forest clearances about 3000 BC. The subsequent development of water-milling, navigation and drainage and irrigation systems caused major and lasting changes to habitat, vegetation and the shape of rivers. With the onset of the industrial revolution and continuing population growth, areas of severe pollution appeared as rivers and estuaries came to be regarded as little more than effluent disposal channels, taking our waste out to sea and out of mind.

Sustainability - a Balancing Act

Happily, considerable progress has been made in controlling domestic and industrial pollution during the last 50 years. The challenge for the NRA as "Guardian of the Water Environment" is to continue to make progress into the next century, protecting and improving our rivers, estuaries and coastal waters in a sustainable and cost-effective way.

We make increasing - and sometimes conflicting - demands of our natural environment. These demands, working in concert with natural phenomena, can result in serious environmental problems. Water quantity, already reduced by abstraction, is further reduced by drought. Water quality, affected by low river flows, is at greater risk from pollution by industry and agriculture. Polluted water puts aquatic life and abstraction for public supply at risk.

Similarly complex interactions exist between river flow and flooding, channel morphology and navigation, and water quality and watersports. These demands and their interactions make the protection and improvement of the water environment, the

NRA's core business, an increasingly delicate balancing act. The use of economic cost-benefit analysis offers, amongst others, a rational approach to the balancing process.

The Answer - an Integrated Approach

The NRA believes that the best way of arriving at sustainable solutions is to take an integrated approach to river management. This treats a river, together with the land, tributaries and underground water connected with it, as a discrete unit or catchment.

This approach is not new - the NRA and its predecessors have laid the foundations for it over a period of time - but the means of achieving it is new.

The NRA's approach is called *catchment management planning*. Under this system, the major uses within a catchment - such as abstraction and discharge needs, recreation and navigation use, areas of special conservation interest or in need of flood protection - are investigated and a *catchment management plan* is devised in consultation with interested bodies and the public. These plans present catchment issues, address conflicting uses and identify actions needed by the NRA and others to ensure that use-related environmental objectives are met.

In this way, management decisions take individual catchment needs into account, balancing these with the national objective to protect high quality waters and restore those of poorer quality. This allows us to operate as a flexible national organisation, making real improvements at local level that meet the community's needs. This is a clear demonstration of our commitment to the principles of the Citizen's Charter.

Targeting the Resource

Increased awareness of these local needs puts the emphasis on the real world outcome of our work - the NRA has to be seen to be using money from taxpayers and industry in a cost-effective way, to make a tangible difference to the quality of our water environment. The

NRA's system of integrated catchment management will achieve this by targeting resources to areas where they are most needed.

The NRA's drive for efficiency and increased value for money will bring added benefits. Our review of activities to see whether there is further scope for market testing - the process of exposing in-house functions to competition from the private sector - forms an integral part of this efficiency drive.

Towards an Integrated Agency

This move towards closer integration of all our functions will be a cornerstone in our preparations for the Environment Agency. The new Agency's responsibilities will embrace air, land and water and will incorporate functions currently performed by NRA, Her Majesty's Inspectorate of Pollution and Local Waste Regulatory Authorities.

The Agency promises to be one of the most effective powers for environmental improvement in Europe and as strong a regulator as any in the world. These preparations will ensure a firm foundation for safeguarding the environment of England and Wales for future generations.

THE CHALLENGE FOR THE NRA
IS TO PROTECT AND IMPROVE THE
WATER ENVIRONMENT IN A
SUSTAINABLE AND COST-EFFECTIVE WAY.

THE ENVIRONMENT - A FINITE RESOURCE UNDER PRESSURE

Use of our Environment

The demands we make on our environment include:

- water abstraction for public and private water supply, industry, agriculture and navigation;
- effluent discharge from sewage treatment works, industrial processes and farms;
- development needs for housing, industrial parks and new infrastructure;
- waste disposal ranging from land-fill of domestic waste to the disposal of sewage/agricultural sludge;
- emissions to air from industrial processes and vehicle exhausts;
- mineral extraction from coal and other mineral and quarry workings;
- recreation in the form of walking, bathing, fishing and a whole range of other outdoor activities; and
- commercial harvesting of fish and shellfish.

These uses are legitimate and necessary for the continuance of our way of life. Sometimes they are of positive benefit as in the case of a properly treated discharge helping to supplement low river flows. However, the evidence of the pressures caused by our needs is clear:

- drinking water supplies in some areas are at risk from pollution by nitrates and pesticides;
- pollution incidents caused by careless management of polluting materials, unlawful discharges and run-off of farm waste may kill fish;
- aquatic life is under threat from bio-accumulation of toxic substances and loss of habitat;
- the aesthetic quality and hygiene of our environment is degraded by litter on our river-banks and sewage in our bathing waters; and
- the burning of fossil fuels for power produces acid rain which can damage fragile conservation areas.

Table 1 illustrates the use of our environment in general terms and highlights some uses of particular relevance to water quality.

The need to balance uses against environmental pressures will require the quantification and evaluation of a range of policies, projects and courses of action. Economic analysis will reveal the most efficient use of the increasingly scarce resources within an overall strategy for sustainable use.

Table 1 - Use of our Environment

GENERAL	
● Total Abstraction Licences in Force	48,000
● Total Water Abstracted	35,000 Megalitres/day
● Water put into Public Supply	18,000 Megalitres/day
● Approximate Number of Angling Licences Sold	1,000,000/year
● Estimated Number of Recreational Walkers	20,000,000/year
● Number of Farming Units	186,000
● Total Discharge Consents in Force	110,000
KEY WATER QUALITY STATISTICS	
● Biochemical Oxygen Demand (BOD - an indicator of polluting load, measuring the amount of dissolved oxygen used by microbes to digest polluting matter) of:	
- Clean River Water	<5 mg/l
- Untreated Human Sewage	350 mg/l
- Animal Slurry	30,000 mg/l
- Silage Liquor	60,000 mg/l
● Total Polluting Load Treated at Sewage Treatment Works (STWs)	1,500,000 tonnes BOD/year
● Sewage Sludge Disposed of onto Farmland	473,000 tonnes/year
● Sewage Sludge Disposed of at Sea	225,000 tonnes/year
● Sewage Sludge Disposed of into Landfill Sites	122,000 tonnes/year

Present Status of the Water Environment

Reason for Optimism

Despite the pressures on the environment, there is reason for optimism. Some 90% of surface freshwater in England and Wales is of good or fair quality. Although the NRA is not responsible for drinking water at the tap, it is responsible for the raw material in surface and groundwaters. In 1991, 98.7% of drinking water complied with the relevant standards. This compares favourably with conditions in other European countries.

In addition, while the number of *reported* pollution incidents - figure 1 - continues to rise, *major* pollution incidents appear to be decreasing; the former can be accounted for by increased public awareness and willingness to report incidents on NRA pollution "hot-lines".

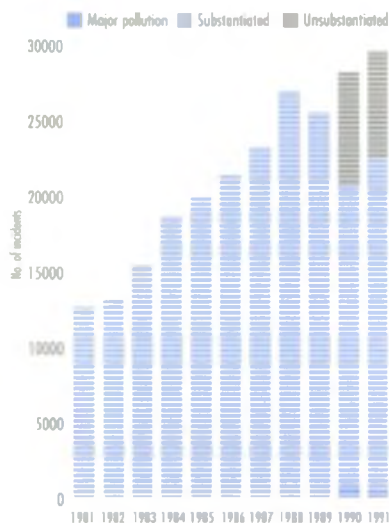


Figure 1 - Pollution Incidents Reported
(it is not possible to separate major and unsubstantiated data before 1990)

No Room for Complacency

Over the last thirty years, water quality has been shown to be gradually improving. Figures 2, 3, 4 and 5 show an increasing trend in the length of good quality rivers, canals and estuaries and a decreasing trend in bad quality waters. Figure 6 shows more recent improvements in bathing water quality.

What can also be seen from water quality data however, is that in recent years improvements have slowed down. In particular, the most recent survey of all waters in England and Wales, carried out in 1990, indicated that this improving trend may be reversing - although changes in assessment techniques over the period make this far from clear-cut; indeed, there is still a need to ensure that all future assessments are consistently based in terms of both chemical and biological characteristics.

This suggests that the environment requires continuing careful management to maintain the status quo and supply our legitimate needs. Further improvements will require positive and concerted action from a range of organisations and individuals. There is certainly no room for complacency.

SOME 90% OF SURFACE FRESHWATER
IN ENGLAND AND WALES
IS OF GOOD OR FAIR QUALITY.

Water Quality Trends

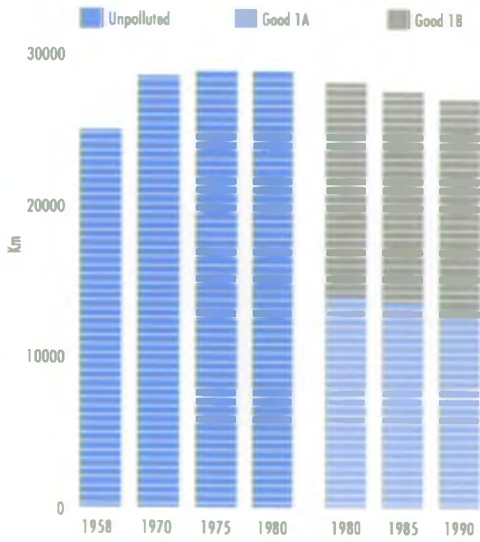


Figure 2 - Length of Good Quality Rivers and Canals

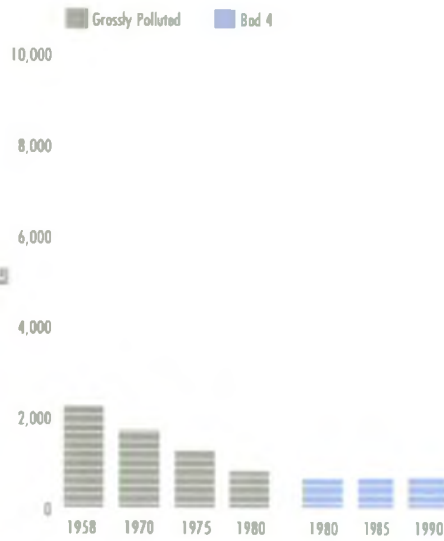


Figure 3 - Length of Poor Quality Rivers and Canals

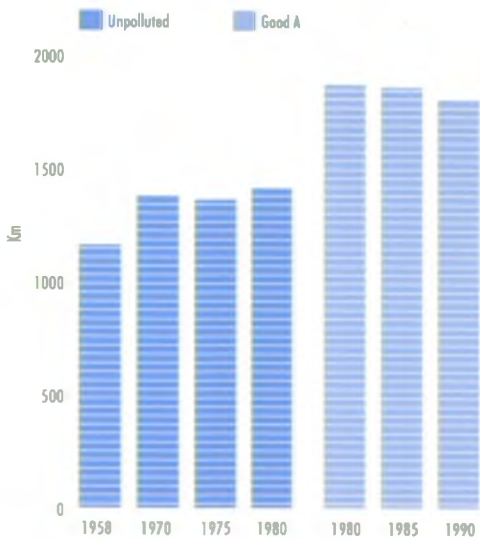


Figure 4 - Length of Good Quality Estuaries

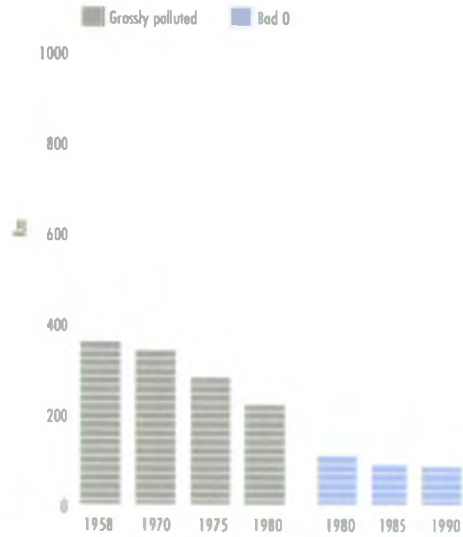


Figure 5 - Length of Poor Quality Estuaries

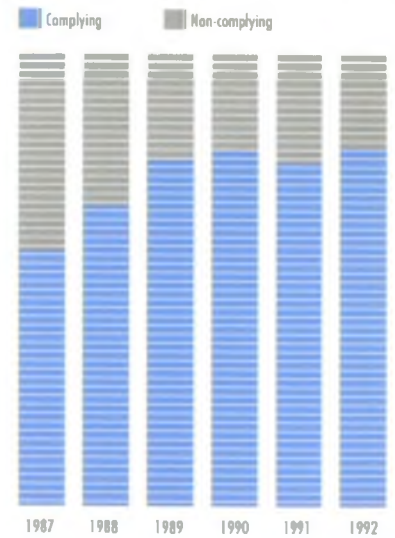


Figure 6 - Bathing Water Quality (beaches compliant with EC directive)

Notes:

1. In 1980, a new system of classification for rivers, canals and estuaries was introduced; as a result it is not possible to make exact comparisons between data before and after 1980 shown in figures 2 to 5.
2. More information is available from the following publications:
 - Figure 1: Water Pollution Incidents in England and Wales - 1991 (NRA September 1992).
 - Figures 2 to 5 inclusive: The Quality of Rivers, Canals and Estuaries in England and Wales - 1990 Survey (NRA December 1991).
 - Figure 6: Bathing Water Quality in England and Wales - 1992 (NRA June 1993).

LEGISLATIVE, FINANCIAL AND INSTITUTIONAL FRAMEWORK

Legislative Framework

The NRA's ability to act to maintain and, where necessary, improve the water environment is dictated by European Community (EC) and UK legislation.

At National Level

The NRA was formed as a result of the Water Act 1989. Those aspects of the 1989 Water Act which concerned the NRA were later consolidated into the Water Resources Act 1991. Under the Act the NRA has statutory duties and responsibilities relating to the quality of the aquatic environment which are both general and specific.

The NRA has general environmental duties, in relation to all of its functions, including the need to further conservation. The NRA also has a duty, generally to promote conservation and the use of inland and coastal waters and associated land for recreational purposes. Details of these can be found in the NRA's Conservation and Recreation Strategies. The NRA is also *specifically* responsible for water quality in all *controlled waters* which comprise surface freshwaters, underground waters and coastal waters to the three-mile limit in England and Wales. Separate arrangements are in place covering Scotland and Northern Ireland.

Other legislation gives the NRA an important role as a consultee in relation to waste disposal site licensing, applications for planning permission and the authorisation of industrial processes controlled by Her Majesty's Inspectorate of Pollution (HMIP). This means that NRA's views and advice on these applications are taken into account by the appropriate authority.

At European Level

The NRA also acts on behalf of Government as the competent authority for certain EC Directives in England and Wales. Examples include Directives for bathing waters and dangerous substances.

In addition, the NRA is the competent body for obligations placed on the UK as a result of inter-governmental agreements - largely relating to the control of pollution of coastal waters.

Legislation in Practice

The legislation imposes duties on the NRA that it must carry out. Other provisions take the form of powers that the NRA uses to fulfil its duties and meet its aims. This combination of duties and powers determines the broad allocation of effort and resource.

Table 2 shows that, in the main, activity relating to the regulation and control of effluent discharges is dictated by the NRA's duties. Precautionary measures to prevent pollution at source are generally provided for in the NRA's powers.

Financial Framework

The NRA is funded largely by a combination of Government grant-in-aid (GIA) and self-generated income from NRA charging schemes. For water quality, income is driven by the principle of "the polluter pays", with the emphasis on the recovery of costs incurred by the NRA as a result of the discharger's activity. The major source of water quality income arises from charges levied on dischargers - largely the water companies and heavy industry. The charge depends on the content and quantity of the discharge, as well as the type of receiving water. This provides a small element of incentive - a low volume, non-polluting discharge incurs a lower charge than a higher volume of a complex discharge containing potential pollutants.

Other income comes from the recovery of costs from those causing pollution incidents. This income is of course dependent on establishing the polluter's identity - not always an easy task. The application of the polluter pays principle is changing attitudes and behaviour, as well as reducing the amount of public money spent on water quality. This trend is likely to continue.

Institutional Framework

The NRA and Government

The NRA is a non-departmental public body, sponsored by the Department of the Environment (DoE). It also has important policy links with the Ministry of Agriculture, Fisheries and Food (MAFF) and the Welsh Office (WO).

Table 2 Duties and Powers

Classification of Water Quality

The Secretary of State for the Environment has the power to set up a system for classifying water quality and establishing Statutory Water Quality Objectives (SWQOs) for controlled waters. The NRA is then under a duty to use its powers to ensure that these objectives are achieved and must monitor the extent of pollution.

Pollution of Controlled Waters

Discharging effluents without the consent of the NRA or HMIP constitutes an offence in all but the most exceptional circumstances. The NRA is required to enforce these provisions and has the power to prosecute.

Issue of Discharge Consents

The NRA may issue consents for discharges to controlled waters. So that members of the public can make their views known, consent applications must be advertised, unless the discharge will have no appreciable effect.

Provision of Public Register

The NRA must maintain and make available to the public, a register recording:

- applications for consents to discharge;
- records of consents given;
- samples of water or effluent;
- other related information.

Pollution Prevention

The Secretary of State can issue regulations (generally on NRA advice) obliging precautionary measures to prevent pollution to be taken by people in control of polluting matter. Their enforcement is an NRA duty once set. Examples include regulations on oil storage and silage liquor.

The NRA can also ask the Secretary of State to designate water protection zones and prohibit certain activities within them. Nitrate Sensitive Areas are an example of this.

Recovering Costs

The "polluter pays" principle applies in a number of areas, allowing the NRA to recover the costs it incurs in:

- issuing and enforcing discharge consents - this currently takes the form of a charging for discharges scheme;
- monitoring the nature of effluents and their impact on the receiving environment;
- carrying-out works to prevent pollution; and
- dealing with pollution incidents and restoring waters to their previous condition.

The Other Players

In addition to the NRA, there are many other bodies and organisations which have a role to play in improving the water environment. The NRA can influence their activities by its actions and vice versa. Effective liaison with the following organisations is key to the success of the NRA's strategy.

- **Commission for the European Communities (CEC):** The CEC sees environmental legislation as being of primary importance - pollution is no respecter of national boundaries. Much recent UK environmental law has been determined by EC Directives. The NRA is taking a more active role in influencing the science that lies behind EC legislation in its early stages.
- **Department of the Environment:** as sponsors, the Secretary of State for the Environment - and the Secretary of State for Wales - have ultimate responsibility for national policy on water quality.
- **Ministry of Agriculture, Fisheries and Food:** also a sponsoring Department and statutory consultee over consents for coastal discharges and for SWQOs. MAFF also has an important role in relation to other NRA interests - having ultimate responsibility for flood defence, fisheries and dumping at sea, and a significant role in relation to agricultural pollution.
- **Her Majesty's Inspectorate of Pollution:** a part of DoE responsible for Integrated Pollution Control (IPC) and the resultant

authorisations needed for certain industrial processes. Formal liaison takes place with NRA over discharges from these processes.

- **Office of Water Services (OFWAT):** body regulating the companies that supply drinking water and treat and dispose of sewage. OFWAT is mainly concerned with the protection of consumer interests, ensuring price changes reflect quality of service and investment levels.
- **Drinking Water Inspectorate (DWI):** part of DoE responsible for monitoring drinking water standards.
- **Water Companies:** there are 10 water and sewerage undertakers and 22 "water only" companies. The NRA regulates their discharges and protects their abstractions for public supply from pollution. Their collective interests are represented by the Water Services Association and the Water Companies' Association respectively. A £28 billion investment programme is underway to improve waste water treatment. NRA advice on this investment helps target money where it will provide the best value for money for the environment.
- **The NRA's Statutory Regional Committees:** these committees have many representatives from interest groups among their members and act as sounding boards for the NRA's policies with the public.
- **Local Authorities:** liaison with Local Authorities - and bodies such as National Park and mineral planning authorities - on planning developments and waste disposal is critical to the NRA's proactive role in the prevention of pollution. Environmental Health Officers also have a role in relation to bathing waters and water supplies
- **English Nature and Countryside Council for Wales:** examples - among others - of consultees involved in the long-term planning for SWQOs and the

protection of designated conservation sites. The voluntary sector - the Royal Society for Nature Conservation and local groups - are also influential.

- **Industrial and Trade Associations:** articulate and influential groups such as the Confederation of British Industry and the National Farmers' Union represent industry and water users. They can act as a valuable route for the dissemination of NRA policies to their members, improving working practices to alleviate pollution risks.
- **Angling Organisations and Water Recreation Groups:** act as vital watchdogs. Their collaboration and support is essential.
- **The Media:** the media can readily influence public opinion. Their interest in news - good and bad - must be focused to ensure that the NRA's point of view and policies are placed before the general public in an objective and clearly understood manner.
- **Pressure Groups:** many national groups - Friends of the Earth, Tidy Britain Group, Marine Conservation Society, Greenpeace - as well as local ones, influence public opinion on environmental matters and help produce the climate in which the NRA operates.
- **The Public:** millions of people enjoy using, and have a great interest in, the water environment. People are often the NRA's eyes, reporting pollution to local offices of the NRA and using our pollution telephone help-lines.

All of the above interested parties have a stake in the water environment. The NRA's strategy for water quality is set out in the following pages. Its successful implementation will require co-operative action from some, support from others, but - most importantly - the commitment of all if we are to maintain and improve standards.

NRA STRATEGY FOR WATER QUALITY

The Broad Strategy

The NRA's principal aims in relation to water quality, within its duties and powers, are to:

- achieve a continuing overall improvement in the quality of rivers, estuaries and coastal waters through the control of pollution; and
- ensure that dischargers pay the costs of the consequences of their discharges.

To achieve these aims the NRA seeks to:

- maintain waters that are already of high quality;
- improve waters of poorer quality;
- ensure all waters are of an appropriate quality for their agreed uses;
- prosecute polluters and recover the costs of restoration from them; and
- devise charging regimes that allocate the costs of maintaining and improving water quality fairly and provide incentive to reduce pollution.

This requires an efficient balancing of costs and benefits within an integrated system of catchment management, taking the needs of all users and all NRA functions into account. NRA activity on a catchment level falls into four main areas and these are described below.

Effective Regulation

Statutory Water Quality Objectives (SWQOs)

The existing legislation allows the Secretaries of State for the Environment and for Wales to set Statutory Water Quality Objectives, acting on NRA advice. They may be set for all controlled waters, but SWQO introduction will begin with rivers. These will build upon the present system of informal River Quality Objectives (RQOs).

The NRA will:

- use catchment management plans to

introduce and subsequently achieve SWQOs, taking a balanced view of conflicting uses and priorities;

- provide advice to the Secretaries of State incorporating the results of local consultation;
- develop Environmental Quality Standards for all uses incorporated in SWQOs through the NRA's Research and Development Programme; and
- develop standard methods for SWQO monitoring and review.

Regulation of Continuous and Intermittent Point Sources of Pollution

Discharges from point sources account for a large proportion of the polluting load entering controlled waters. Thus SWQOs can only be achieved with adequate control of these discharges. A strong enforcement policy will be maintained. The NRA will continue to:

- press for regulations to require people in control of pollutants - eg fuel oil and pesticides - to take preventive measures;
- undertake a systematic review of all consents, taking into account SWQO requirements;
- develop procedures for controlling intermittent discharges, particularly storm sewage overflows;
- prosecute dischargers who significantly contravene their discharge consent conditions;
- take all possible steps to reduce or limit nutrient levels, using the guidelines in the EC Urban Waste Water Treatment Directive and Nitrate Directive to control and reduce eutrophication; and
- maintain links with other regulatory organisations - such as HMIP, MAFF, Health and Safety Executive, Waste Regulatory and Local Authorities - to ensure that point source pollution is controlled wherever possible.

Identification and Prevention of Diffuse Sources

Pollution from diffuse sources eg contaminated surface run-off and leachate from landfill sites, is less easily controlled. These discharges do not enter the environment at a single point and are often intermittent in nature. They cannot be reliably sampled by conventional means, although biological techniques may be more applicable. The NRA will continue to:

- take action where pollution risks exist, and seek to recover costs if preventive work is needed;
- develop a policy for the identification of Water Protection Zones to be designated under the Water Resources Act, including Groundwater Protection Zones, and take account of these in catchment planning;
- identify the activities to be prohibited or controlled, and develop enforcement procedures for protection zones;
- review the effectiveness of designated Nitrate Sensitive Areas and recommend other sites as necessary, particularly where required by the EC Nitrates Directive;
- explore the further use of Farm Waste Management Plans as an adjunct to farm visits, to prevent agricultural pollution;
- use the NRA Groundwater Protection Policy to identify sources and aquifers susceptible to contamination;
- liaise with Waste Regulatory Authorities, to ensure that landfill licensing takes account of the potential for water pollution and incorporates protection measures;
- seek to prevent potential pollution from the redevelopment of contaminated land through the Local Authority planning and development process;
- maintain links with local groups and national bodies to ensure watercourses are cleared of litter and then kept clean;
- develop biological surveillance techniques

as a more effective means of identifying intermittent or diffuse sources of pollution;

- seek further powers to influence land-use changes - eg afforestation - which may prove detrimental to water quality;
- seek to influence other processes with the potential to affect water quality - eg pollution from atmospheric emissions and deposition; and
- promote public awareness of the dangers of pollution.

Control of Developments

Many development schemes have significant implications for water quality. The NRA's role as consultee in planning applications and the requirement for developers to produce Environmental Impact Assessments (EIAs) and Statements both give the NRA an opportunity to prevent potential problems in a proactive way.

The NRA will continue to:

- maintain effective links with Local Authority planning departments to ensure an NRA input into planning applications and development plans;
- seek to prevent potential problems caused by developments by active involvement in determining the requirements of EIAs; and
- develop procedures and techniques (eg, modelling skills) to assess the implications of major developments and to allow audit of Environmental Statements.

An Innovative Approach to Monitoring

Quality Assessment and Reporting

The collection and analysis of samples may be undertaken for a variety of reasons, all of which are loosely referred to as monitoring. In NRA terms *monitoring* is regarded as an activity carried out to demonstrate compliance with standards or conditions, whilst *surveillance* is carried out to determine the general status of water quality.

Sampling activities are also carried out to assist in *investigations*.

Currently the NRA carries out monitoring to assess the compliance of waters with EC standards and to assess compliance of effluents with consent conditions. Surveillance work, such as the detailed 5-yearly river water survey, is also undertaken and investigations are carried out in connection with pollution incidents, EC Directive non-compliance and pre and post-scheme appraisals of water company capital schemes.

The advent of SWQOs will cause a shift in policy to ensure that sufficient monitoring data are available to assess SWQO compliance and identify the causes of non-compliance. The general tightening of consent conditions, and new EC Directives - particularly those on Urban Waste Water Treatment, Nitrates and Ecological Quality - will also cause changes to monitoring programmes. The NRA will:

- develop existing policy on monitoring and analysis to ensure SWQOs are met;
- further develop the use of biological techniques for assessing the overall quality of waters and to assist in determining pollution sources;
- investigate alternatives to conventional spot sampling techniques - such as continuous on-line monitoring, or self-monitoring by dischargers;
- further develop joint monitoring programmes with HMIP in relation to authorisations under IPC;
- review NRA monitoring programmes to ensure a cost-effective and consistent level of service for all controlled waters;
- ensure that new approaches for the control and reporting for EC Directives and other inter-governmental agreements are met;
- introduce automatic monitoring devices, including the use of hand-held meters to allow readily available and accurate data for pollution incidents and inspection work;

- develop instruments for data logging and transmission to allow faster access to stored data, and pursue their commercial manufacture;
- investigate the use of novel techniques, such as aerial and satellite observation to see how these can be used to identify eutrophic areas, track pollution incidents and provide land-use information for water quality management;
- make more effective use of sea-going boats to give rapid assessment of offshore pollution incidents, provide long-term monitoring capability to meet the commitments to PARCOM (Paris Commission) and NSTF (North Sea Task Force) and for monitoring SWQO compliance;
- improve data use by developing a national water monitoring and archive system (WAMS) and geographical information systems to provide clear, user-friendly presentations;
- develop the use of and implement mathematical models;
- ensure that user-friendly information is made available to the public through the Water Resources Act register; and
- publish reports on all aspects of water quality on a regular basis.

Development of Scientific Support Services

The emphasis here is on providing an efficient service to meet the needs of the organisation.

The NRA will:

- examine the potential to transfer routine measurements to field instruments, freeing laboratory capacity for more complex work;
- ensure the provision of a basic routine capability for chemical, biological and microbiological analysis, with areas of special expertise;
- acquire NAMAS accreditation of all laboratories to ensure that data provided meet internal, European and international

obligations and explore the accreditation of sampling;

- ensure that procedures are accepted by other regulators - eg HMIP;
- develop a network of specialised support services, eg in toxicity assessment, complex consenting, virology and marine biology; and
- apply new laboratory instrumentation and technology.

Day-to-day Operations

Emergencies

Procedures are in place for dealing with emergencies, but need to be continually reviewed. They involve the effective deployment of NRA personnel and equipment to the scene of an incident, generally within two hours of it being reported. The NRA also ensures effective liaison is maintained with other emergency services such as the police, fire brigade, Marine Pollution Control Unit and Local Authorities.

Alleviation of Pollution Incidents

The NRA has powers to carry out work to alleviate the effects of pollution and recharge the costs if the polluter is identified. However, many incidents cause significant damage before they are identified. The NRA strategy in this area will be directed towards preventive measures, advising on good practice and early identification of incidents. The NRA will:

- maintain strong links with Government and regulators (MAFF, HSE, HMIP) to promote legislative control of activities and materials which could cause pollution;
- maintain links and inputs into major trade and regulatory organisations such as BASIS (British Agrochemical Standards Inspection Scheme) to recommend action to prevent the accidental escape of pollutants from stores;
- improve campaigns to educate potential polluters on the dangers of pollution;

- investigate the use of automatic detection and alarm systems in sensitive areas;
- seek to develop public awareness of pollution incident procedures and provide effective communication facilities - such as pollution "hot-lines" - for them to use.

Finance

It is expected that grant-in-aid (GIA) will always be an important source of finance under the present system governing the NRA's water quality work. However, the proportion of GIA-funded work will decrease as the costs of individual water quality activities are attributed to - and recovered from - polluters and beneficiaries alike. The NRA will:

- operate the existing Charging for Discharges Scheme until March 1994 and introduce a new one from April 1994, both operating on a cost recovery basis because development of a more incentive based scheme will require legislative change;
- continue to operate a recovery scheme for the transfer of monies between NRA and HMIP for IPC work;
- maximise cost recovery for pollution alleviation work to ensure that polluters bear the costs of their pollution; and
- develop a policy for charging for analytical or advisory work done for other regulators.

Economic Aspects of Pollution Control

The NRA will come under increasing pressure to argue the benefits of its improvement proposals in economic terms, and to have regard to their wider economic consequences.

The NRA will therefore continue to develop economic instruments and models to assess how best to combine economic strategy with environmental objectives. This includes co-operation with DoE on developing incentive charging mechanisms to complement those based solely on cost recovery practices.

Towards an Improved Environment

Much of the NRA's work is directed at maintaining the status quo and applying the principle of no deterioration in the face of increasing demands on the water environment. The importance of this maintenance should not be underestimated, nor should its resource needs. There are however certain areas that are key to securing longer-term improvements.

Influencing Investment

One of these areas is the influence the NRA brings to bear on industry investment. The NRA will:

- liaise with OFWAT and the Water Utilities to ensure the requirements of legislation and best practice are incorporated into their investment programmes for 1995-2005 and that value for money in improving water quality is obtained through the companies' asset management plans; and
- advise industry and agriculture on best practice to ensure capital investment will result in compliance with discharge consents and prevent accidental pollution.

Contaminated Land and Abandoned Mines

This is a current and potential future source of major pollution. At present its full extent and impact are unknown. The NRA will:

- identify and prioritise the principal sites of contaminated land and abandoned mine-workings and develop methods to estimate their relative effects on water quality; and
- clarify the legal responsibilities for contaminated land and abandoned mines and seek action by the appropriate body.

Public Awareness and Education

Significant longer-term benefits will be seen as a result of the NRA's proactive approach to influencing public awareness and education, particularly for children. The NRA will:

- develop a national public education programme for pollution awareness and prevention.

RESOURCES AND TIMETABLE FOR ACHIEVEMENT

A Flexible Resource

The achievement of our strategy is dependent on a highly flexible, yet specialised resource. The NRA has:

- well-trained water quality staff, committed to the environment, working as pollution inspectors, laboratory scientists and an increasing proportion of multi-functional staff to maximise flexibility;
- a network of chemistry, biology and virology laboratories, strategically placed to combine fast response for local needs with best use of specialist knowledge;
- a fleet of survey vessels to sample offshore waters and undertake marine survey work;
- automated instrumentation comprising continuous water quality monitoring stations placed at key locations, and hand-held monitors to take rapid, accurate measurements in the field.

The NRA will make all staff aware of the Water Quality Strategy, as an integral part of ensuring that NRA resources are directed towards its achievement.

Efficient Use - Better Value for Money

The cost of deploying this resource is some £80 million per year; of this some £40 million is on consenting and compliance monitoring; £12 million on pollution prevention; £12 million on incidents and emergencies; £12 million on EC Directives and some £4 million on other work. NRA charges levied on beneficiaries and polluters pay for 52% of this. The remaining 48% is paid by Government from tax revenue.

While costs for the foreseeable future will rise only in line with inflation, additional work will be funded by improving the efficiency of existing operations. The emphasis now and in future is firmly on making best use of current resource to deliver the right level of service, keeping NRA charges as low as possible.

Innovation is at the heart of efficient resource use. Improvements are being generated by:

- a network of centres of NRA expertise, which makes best use of specialised knowledge by concentrating it in one location;
- extending use of automated instrumentation to free laboratory capacity for more complex work and allow pollution inspectors to put more emphasis on prevention work; and
- pioneering aerial survey techniques to gain a complete picture of the state of all coastal waters of England and Wales.

The Timetable for Achievement

Improvements to environmental and water quality are not achieved overnight. The planning and implementation of major programmes can often stretch over a period of years. There may be a further lag before the real effects of any programme can be demonstrated.

The broad timing of the NRA's major initiatives to maintain and improve water quality are given in the chart below. Their

implementation is supported by business plans. These management documents detail the components of each initiative, their relative priority, outputs, timing and resourcing. Short to medium-term milestones in the achievement of the overall strategy are set out in the NRA's annual Corporate Plan and reported on in the NRA's Annual Report and Accounts. Achievement of these initiatives is in many cases dependent on action by others to the same timescale, as documented in catchment management plans at local level.



RESEARCH AND DEVELOPMENT

Research and development (R&D) makes an essential contribution to the NRA's work. It provides new knowledge and techniques which allow us to fulfil our duties better and provides useful outputs for our staff.

Strategic R&D in support of the NRA's water quality work addresses a number of key issues.

SWQOs

R&D will provide a firm scientific base for the development of water quality classification schemes and their associated standards for rivers, estuaries and coastal waters.

Examples of projects include:

- developing environmental quality standards for substances of concern to the NRA;
- developing and trialing classification schemes for rivers, estuaries and coastal waters; and
- understanding the process in estuaries and coastal waters.

Discharge Control

Research is designed to improve consenting techniques and assist in the development of a consenting manual. There is particular emphasis on understanding the impact of discharges on receiving waters. Techniques under study include the use of alternative determinands, toxicity-based consents, mathematical models for consent determination and new approaches to consenting intermittent discharges.

Examples of projects include:

- demonstrating the benefits of minimising industrial waste water at source;
- providing methods for translating consents from a spot sampling basis to one of continuous, possibly self-monitoring; and

- undertaking a pilot implementation of toxicity based consents for discharges where the effluents are complex.

Pollution Prevention

Research in this area assesses the extent and effect of diffuse sources of pollution and studies rural land use, contaminated land, waste disposal, water protection zones and eutrophication and related algal problems.

Examples of projects include:

- assessing the impact of lowland afforestation;
- remedial methods for cleaning up contaminated land; and
- developing effective land management techniques for improving the quality of adjacent water courses.

Monitoring

Monitoring research aims to devise new approaches to designing monitoring strategies. It also provides more accurate, cost effective instrumentation and improved analytical, data analysis and presentation techniques.

Examples of projects include:

- developing an integrated method for assessing water quality, fisheries and conservation status of the water environment;
- the production of automatic monitors and field kits; and
- an approach for assessing biological water quality.

Impact of NRA Water Quality Strategy

The one certain prediction that can be made is that the water environment will be subject to a great many changes in the future. Some are within the NRA's sphere of influence, many others are not.

Looking ahead, the NRA's consenting strategy will ensure that water uses are protected. Improved land-use management will reduce the risks of future pollution of ground and surface waters from diffuse sources. NRA influence on industry investment in pollution control should ensure that money is used to greatest environmental benefit. The outlook for a better general quality of rivers, lakes and marine waters seems promising.

An Uncertain Future

Potentially large problems for water quality lie in store from past activities however. Applying the polluter pays principle long after the event in the case of abandoned mines or sites once occupied by heavy industry is not always a viable option where site ownership has changed. And yet the clear-up of these problems has to be paid for.

Responsibility for this work also needs to be clarified. It is the NRA's job to catalogue and prioritise these sites, and in some cases undertake remedial work. The promised Urban Regeneration Agency may also have a major role to play. Wherever responsibility for the clean-up of existing sites lies, future problems can and must be avoided by legislative change.

The European Influence

Much of the impetus for environmental legislation has come from the EC. The NRA will continue to use its technical expertise to influence the science underlying new and revised EC Directives. The recently established Network of EC Environment Enforcement Authorities will provide a forum to share information and experience with equivalent organisations. The proposed

European Environment Agency is likely to prompt further liaison between EC regulators.

The Public

Public attitudes will continue to exert a large influence. The debate so far in the UK water industry seems to centre on what the public is prepared to pay for cleaner drinking water. NRA activity will widen that debate, taking all needs into account through its consultation on catchment management plans and SWQOs.

This debate requires robust techniques for assessing the economic and social benefits of environmental improvement. It will inevitably be influenced by the state of the economy, as fluctuations adjust the public's priorities.

The Environment Agency

The future of the environment in England and Wales will be influenced by the success of the proposed new Environment Agency. Areas of particular importance include:

- the meshing of the NRA quality objective approach with the HMIP and IPC emission standards approach - effort must be invested in making them work together, rather than as two mutually exclusive approaches;
- the nature of the regulatory regime - whilst there is no doubt scope for increasing the extent of self-monitoring by industry (and this is consistent with the polluter pays principle), the right balance between regulation, market mechanisms, economic incentives and auditing must be struck; and
- the relationship between Government and the new Agency - public confidence in independent enforcement of standards will only be retained by an "arm's length" relationship. The fair attribution of NRA costs to polluters and beneficiaries is also important here - to ensure that public funds are spent where they should be, namely on work carried out on behalf of the Government and the nation.

MEASURING OUR SUCCESS

The success of the work of the NRA and, in due course, of the Environment Agency, will be most clearly shown by real improvements in environmental quality. Our progress in maintaining and improving water quality will be monitored using the following key indicators:

- length of river, canal and estuary in each water quality class as measured through a new General Quality Assessment Scheme;
- compliance with the requirements of all EC Directives which set conditions and standards for water quality;

- achievement of SWQOs;
- compliance of discharges from industry and agriculture with consent conditions;
- reductions in the quantity of hazardous substances discharged into the North Sea; and
- reductions in the number of substantiated pollution incidents.

These and other measures will be monitored and published regularly, as an important part of our remit to report to Government and the public on the state of the environment.

THE NRA'S STRATEGY WILL ENSURE THAT
WATER USES ARE PROTECTED.
THE OUTLOOK IS PROMISING.

GLOSSARY OF ACRONYMS USED IN THIS DOCUMENT

BASIS	British Agrochemicals Standards Inspection Scheme	NAMAS	National Measurement Accreditation Service
BOD	Biochemical Oxygen Demand	NRA	National Rivers Authority
CEC	Commission for the European Communities	NSTF	North Sea Task Force
DOE	Department of the Environment	OFWAT	Office of Water Services
DWI	Drinking Water Inspectorate	PARCOM	Paris Commission
EC	European Community	R&D	Research and Development
EIA	Environmental Impact Assessment	RQO	River Quality Objective
GIA	Grant-In-Aid	STW	Sewage Treatment Works
HMIP	Her Majesty's Inspectorate of Pollution	SWQO	Statutory Water Quality Objective
HSE	Health and Safety Executive	WO	Welsh Office
IPC	Integrated Pollution Control	WAMS	Water Archive and Monitoring System
MAFF	Ministry of Agriculture, Fisheries and Food		

NRA REGIONAL OFFICES

HEAD OFFICE

Rivers House
Waterside Drive
Aztec West
Almondsbury
Bristol
BS12 4UD
Tel: (0454) 624400
Fax: (0454) 624409

LONDON OFFICE

Eastbury House
30-34 Albert Embankment
London SE1 7TL
Tel: (071) 8200101
Fax: (071) 8201603

ANGLIAN

Kingfisher House
Goldhay Way
Orton Goldhay
Peterborough PE2 5ZR
Tel: (0733) 371811
Fax: (0733) 231840

NORTHUMBRIA & YORKSHIRE

21 Park Square South
Leeds LS1 2QG
Tel: (0532) 440191
Fax: (0532) 461889
Gosforth Office
Eldon House
Regent Centre
Gosforth
Newcastle Upon Tyne
NE3 3UD
Tel: (091) 2130266
Fax: (091) 2845069

NORTH WEST

Richard Fairclough House
Knutsford Road
Warrington WA4 1HG
Tel: (0925) 53999
Fax: (0925) 415961

SEVERN TRENT

Sapphire East
550 Streetsbrook Road
Solihull B91 1QT
Tel: (021) 7112324
Fax: (021) 7115824

SOUTHERN

Guildbourne House
Chatsworth Road
Worthing
West Sussex BN11 1LD
Tel: (0903) 820692
Fax: (0903) 821832

SOUTH WESTERN

Manley House
Kestrel Way
Exeter EX2 7LQ
Tel: (0392) 444000
Fax: (0392) 444238
Bridgwater Office
Rivers House
East Quay
Bridgwater
Somerset TA6 4YS
Tel: (0278) 457333
Fax: (0278) 452985

THAMES

Kings Meadow House
Kings Meadow Road
Reading RG1 8DQ
Tel: (0734) 535000
Fax: (0734) 500388

WELSH

Rivers House/Plas-yr-Afon
St Mellons Business Park
St Mellons
Cardiff CF3 0LT
Tel: (0222) 770088
Fax: (0222) 798555





NRA

National Rivers Authority