

# **WATER PLANNING IN BRITAIN**

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Dennis J. Parker and  
Edmund C. Penning-Rowsell

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Volume 5

WATER PLANNING  
IN BRITAIN

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DENNIS J. PARKER  
AND  
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# **Water Planning in Britain**

Dennis J. Parker

and

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*Middlesex Polytechnic*

London

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*To all the girls back home:*

*Anna, Annabel, Jacky, Katie, Rachel and Susie*





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## *Foreword*

*The Resource Management Series* reflects the resurgence of interest in resource analysis that has occurred over the past twenty years in both the natural and the social sciences. This interest mirrors wide public concern about declining environmental standards, man's detrimental impact on the ecosystem, the spatial and temporal allocation of resources, and the capacity of the Earth to sustain further growth in population and economic activity.

Academic research should play a crucial role in policy formulation if informed decisions are to be made about resource use or about the nature and pace of technical and economic change. The need to assess the impact of technological developments on the environment is widely recognised; this cannot be done in physical terms alone but must involve social science research into the economic, social and political implications. Failing this, society may persist in trading off environmental gains for more easily definable economic advantages, an option which is particularly tempting in times of slow economic growth, high rates of inflation and rising unemployment. Furthermore, a planned approach to resource use makes the study of policy – its formulation and implementation – imperative; and this requires a sound understanding of the options available, the legal and administrative contexts, the decision-making behaviour of planners and managers, and the day-to-day realities of the decision-maker's environment.

Cost-benefit analysis, landscape evaluation, environmental impact assessment, systems modelling and computer simulation techniques have all advanced significantly in recent years as tools of resource analysis. Although none of these are without their deficiencies, they have undoubtedly improved our understanding of the effects of resource utilisation decisions and of the complex interrelationships that exist within and between the physical and economic systems. Moreover, their use has clearly indicated that effective inquiry in the resources field cannot be confined to any one discipline.

The *Series* has been planned as an interdisciplinary vehicle for major contributions from scholars and practitioners with a wide variety of academic backgrounds. The *Series* is unequivocally directed towards policy formulation and management in the real world, and it will not include contributions which merely describe an economic or physical resource system, or those which are entirely theoretical in nature. However, the subject area is defined widely to include the management of all natural resources, renewable and non-renewable, whether managed by private enterprise or public-sector agencies.

It is hoped that the books appearing in this *Series* will command the serious attention of all students, scientists, planners, resource managers and

concerned laymen with an interest in understanding man–environment interactions and in improving our resource decisions. Each book draws on substantial research or practical management experience and all reflect the individual views and styles of the authors. The editors and publishers hope that the *Series* will not only encourage further research but will also play an important role in disseminating the results.

In the first book in the *Series*, Dennis Parker and Edmund Penning-Rowsell explain and critically evaluate the water planning system in Britain. They have produced what is undoubtedly the most comprehensive analysis so far undertaken. They point out that, whilst an understanding of hydrological processes and technological possibilities is clearly of importance, water planning today is essentially about the deployment of scarce capital resources and the allocation of available water between competing users. Planning decisions depend not only on public preferences, but also on the established legal framework, political pressures, economic constraints, the organisational structure of management and on the training or professional bias of the decision makers. The book exemplifies the stance taken in the whole *Series* that assessments of resource problems must take into account the complexity of, and the interrelationships which exist between, the natural environment and man's economic, social and political institutions.

Throughout, the authors adopt a critical evaluatory approach. They are not content merely to describe the current water planning system, and they attempt to assess the extent to which it is capable of dealing with demand pressures and capital constraints in an efficient and equitable manner. Attention is also paid to alternative policies, practices and administrative structures which could be adopted to improve the efficiency of the system and to make it more accountable to the public.

Both authors have been engaged in substantive research projects concerned with various aspects of water resource development. Not only do they draw on the results of this research throughout the book, but they also include material derived from a comprehensive review of the literature. Undoubtedly, the book benefits from the authors' experience as teachers, which has helped them to produce a text that is understandable and useful to students in a wide range of disciplines.

RICHARD MUNTON and JUDITH REES  
March 1980

## *Preface*

This book is one product of a decade of water research at Middlesex Polytechnic. The 1970s began with flood hazard research, focussing eventually upon flood alleviation economics. This was followed by research in urban water pollution, together more recently with administrative and institutional, recreational and historical studies of water planning. Much of this work has a planning- and management-orientated social science context, exploiting the strengths of multi-disciplinary group effort. Research results have so far been communicated through papers, books, consultancy projects and training courses. The research has been funded by Middlesex Polytechnic, the Natural Environment Research Council, the Science Research Council and the Ministry of Agriculture, Fisheries and Food. The water industry itself has contributed directly through the Central Water Planning Unit, the Water Research Centre, the Water Authorities and British Waterways Board.

Within such a context this book examines, explains and evaluates the broad scope of British water planning. The 1974 'revolution' in water management in England and Wales, which generated much international interest, created a new environment for water planning. Changes in Scotland in 1975 followed a different course but have attracted much less attention.

Water provides many essential public services. The effective management and planning of water is of vital national importance, especially as accessible clean water becomes scarce. Britain's water industry has a proud tradition of technical excellence based upon an engineering profession founded during the last century. Nevertheless the water industry faces great problems in the 1980s – problems of environmental protection, finance, public accountability and equity – all of which must be overcome to maintain and improve standards of service. How the new institutional arrangements – now more or less stable after more than five years of operation – help to solve these problems at a time of national economic difficulty and changing social goals and environmental conditions is fundamentally important to all concerned for public health, for the environment and for their water bills.

We begin by examining the basic influences on water planning. This conceptualisation views the water planning system – both its structure and processes – as operating at the interface between environment and society (Ch. 1). From this emerges a number of key evaluative questions, to which we return in following Chapters, and the need to analyse water planning institutions (Ch. 2). The subsequent four Chapters (Chs 3–6) each examine the resource base and social context of major functional areas of water planning, examining the planning systems and techniques relevant to each. The

dominant themes are environmental, social, economic and political and in each Chapter the evaluation of a number of central policies and particular plans and schemes contributes to understanding the processes of water planning in Britain today.

Throughout we develop a framework for critical inquiry and analysis and the final Chapter (Ch. 7) adopts a critical stance and asks more fundamentally 'who is water planning for?' and whether the structure and processes of the water planning system effectively serve social goals. Few books on water planning deal with both Scotland and England and Wales. Although Scottish sources and data are particularly scarce we have attempted to present a balanced coverage of Scotland while capitalising upon the insights which Scottish comparisons provide.

This book has been written for a broad audience. The treatment is comprehensive and the book should appeal to a wide readership in universities, polytechnics and colleges. The text is appropriate to courses in planning, geography, public administration and environmental science and management. Engineers may also find it provocative. Annotated selected readings for each Chapter provide a guide to further reading for teachers and students alike. Finally this book should prove interesting and useful for many professionals in environmental planning – particularly planners in the water industry and in local and central government – and for those 'amateur planners' in pressure groups with strong environmental and water interests.

DENNIS PARKER and EDMUND PENNING-ROWSELL  
Middlesex Polytechnic  
January 1980

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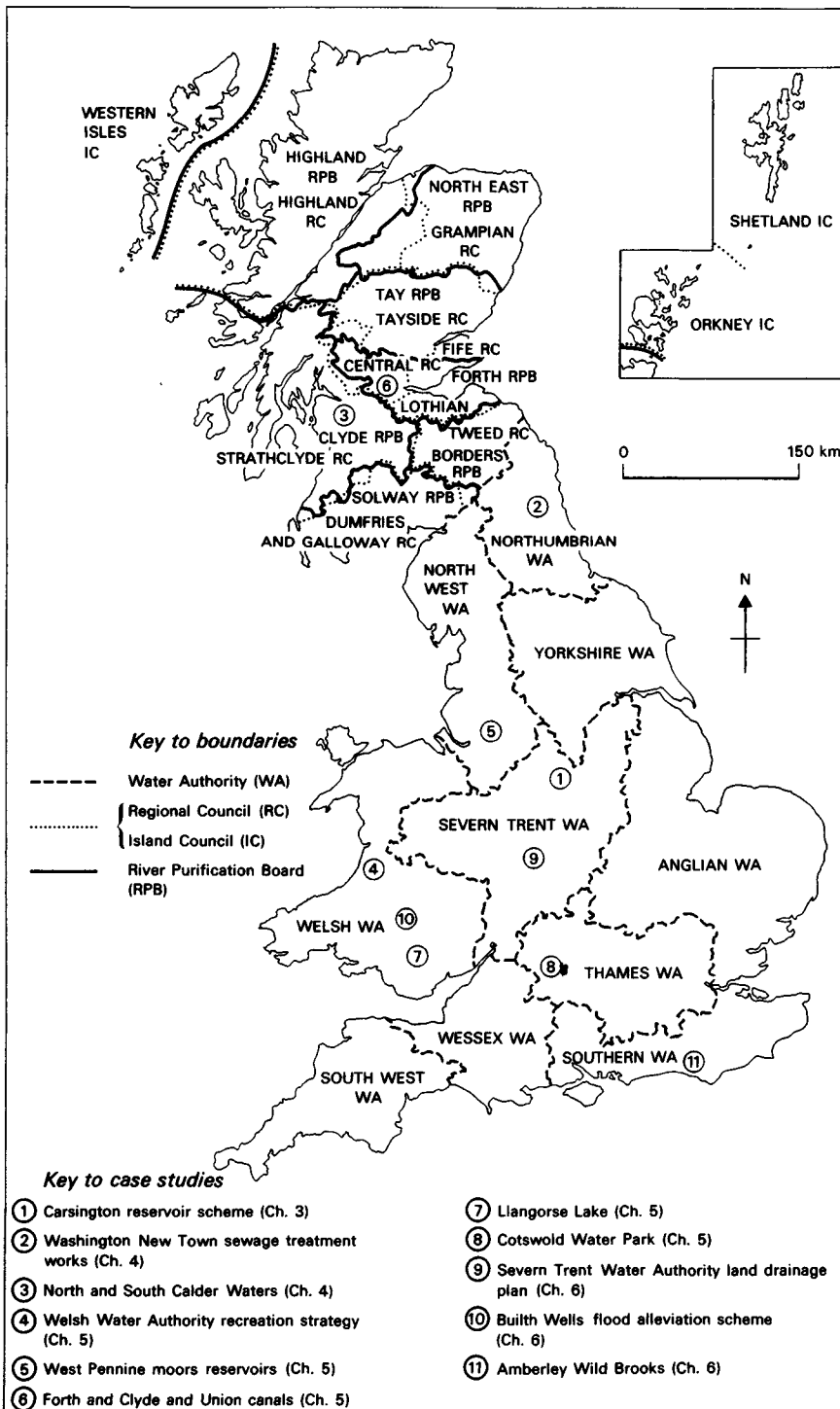
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# 1 *Water planning*

## **A rationale for water planning**

There is every reason to expect the use of water in Britain today to be planned. Water is a commodity essential to life, community welfare and the functioning of the economy and is, therefore, of truly national importance. Water use has become completely interrelated with all other activities, to the extent that we now depend upon water even when its use is not strictly essential. With steady intensification in the use of Britain's water and associated land resources, decisions about water impinge more and more upon the lives of everyone, from the householder to the farmer and to those concerned about environmental quality.

The characteristics and roles of water in society make its planning essential. Water is a renewable resource, but in specific locations at a given time the supply of fresh water is finite, imposing what can be a severe limit upon all activities. The flow of water is variable over time creating shortages and excesses which lead to uncertainties needing careful assessment and planning to prevent serious economic and social disruption. In addition water is a measurable resource with a measurable demand little affected by the whims of fashion and is, therefore, fundamentally susceptible to planning.

Private enterprise provides some water services in Britain, such as some sport fisheries, and has an impressive record of providing public water supplies. However, the effectiveness of private enterprise in providing water services is limited in several ways. Some water services, such as recreational opportunities and environmental protection, are not fully marketable, having a public value beyond that measured by market prices. Others, such as flood protection, may be indivisible meaning that they cannot be marketed in discrete units. It is not normally possible to build a flood alleviation scheme to protect the land of a single owner. Others will benefit too making public guidance necessary.

The water cycle is characterised by physical interdependencies which favour public intervention and planning. Water has multiple-use potential but private enterprise often leads to single-purpose use ignoring interdependency of uses and producing sub-optimal social benefits. Developments at one location have important consequences at another: river water abstractions may reduce downstream navigation possibilities and effluent disposal may increase the costs of water treatment to a downstream industrial water abstractor. Public intervention and planning may have several other advantages over private enterprise. Private water developments may not be of

## 2 *Water planning*

sufficient size to capture economies of scale which a public monopoly may be able to achieve. Private enterprise cannot be relied upon to ensure that the distribution of fundamental water services in society is fair but equity can be sought through central guidance. All these factors favour public intervention and planning (Fox and Craine 1962, Craine 1969).

Water is a life-supporting medium not only for humans but for aquatic and terrestrial communities most of which we depend upon either directly or indirectly for our existence. Unless planned, the impact of waste disposal can be detrimental for such life-forms. Resolving conflict and calculating the consequences of alternative actions are fundamental parts of planning. When competing demands arise, as they often do, for example between the domestic water consumer and the industrial water user, these conflicts have to be resolved. A decision in favour of a particular use at the expense of another involves some people forgoing opportunities, and produces both losers and gainers in society.

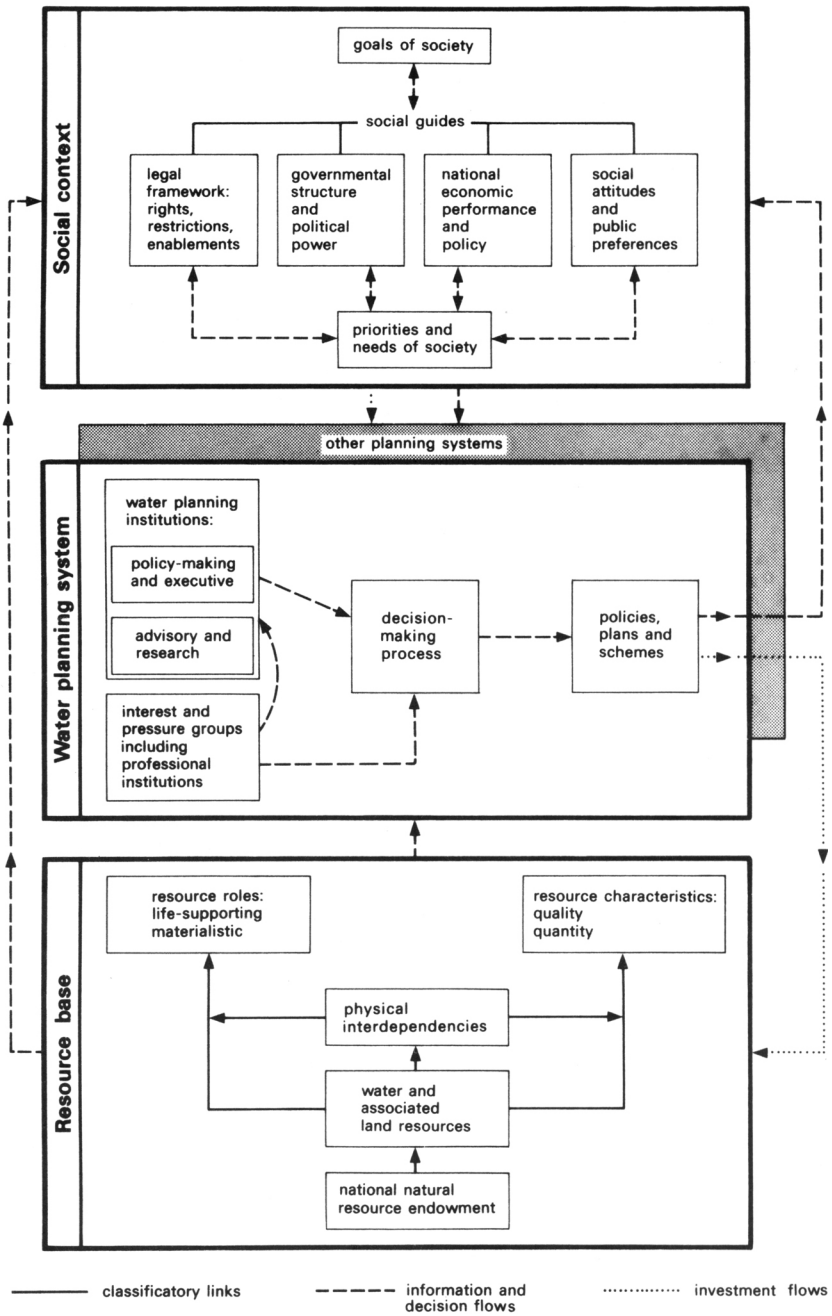
Some water policy decisions and projects are of national importance making central guidance essential. In achieving national goals water planning is an essential factor, for example in social and economic developments and in maintaining and improving the quality of the environment. Because there are competing demands for water and associated land resources, it is essential that national interests are identified and represented in decisions about the use of water, or in decisions about the use of other resources such as land, which may predetermine future use of water.

Planning is fundamentally about deciding how to spend money. In Britain the water industry spends annually over £1800millions, reflecting the large-scale applications of technology and capital required to provide the nation's water services and indicating the importance of financial decisions. Within this budget the best value for given expenditure has to be gained, whether it is upon sewer renewal or water quality improvement. Achieving the best value for money requires careful comparison of alternatives, control of expenditure and meeting of deadlines, all of which require planning.

These reasons all add up to the need for a properly planned approach to the development of water services and the use of water. The purpose of this book is to examine, explain and evaluate water planning in Britain. To this end we consider the social context and the resource base of water planning and the water planning system. Here this system includes the water planning institutions, the decision-making process and the resulting policies, plans and schemes. These policies, plans and schemes are considered both through a discussion of overall water planning policy and through individual examples.

### **A conceptual framework for water planning**

Before particular aspects of water planning, such as the water planning system, water supply, effluent disposal, pollution control, water recreation



**Figure 1.1** The water planning environment: a conceptual framework.



#### 4 *Water planning*

and land drainage, are considered in detail, it is useful to examine the basic influences on water planning in Britain. This can be achieved through a conceptual framework which serves to identify important aspects of the water planning system and its resource base and social context, and to guide and structure an examination of water planning. In this conceptual framework water planning is viewed as an activity which occurs at the interface between society (the social context) and environment (the resource base), being affected by, and in turn affecting, both (Fig. 1.1).

Above all planning is a social activity with immense social implications: indeed planning is a prime mechanism for progress and social change. The organisation of planning cannot be divorced from the organisation of society and planning is 'an activity by which man in society endeavours to gain mastery over himself and to shape his collective future consciously by power of his reason' (Friedmann 1959). The planning of water is no exception to these conditions. It is clear, therefore, that the major characteristics of society provide a context within which the goals and priorities of water planning must be set. Society's aims alter over time as attitudes and needs change, and water planners should be sensitive to shifts in the social context of their work. This profoundly influences all forms of public planning. Although only water planning is shown in Figure 1.1 all forms of planning, whether they be housing, land or water planning, are interrelated and none can be performed in isolation from the others. Water planning cannot be viewed as self-contained but a growing criticism of it in some countries is that it tends to be partially isolated from the rest of society (Burke and Heaney 1975, Swainson 1976, Beaumont 1977). The critics argue that water planning is, to some extent at least, out of touch with society's changing needs and fails to reflect public preferences, as should be expected in democratic societies.

The social context of water planning, and other forms of planning, is as complex as society itself and is almost completely pervading. The identification of the need for planning, for organisational arrangements, legal duties and powers and support for planning, all of which make planning possible, are derived from the social context. Water planning needs to be legitimised by society for water planners to exert power and execute decisions. It must seek public support for decisions and actions. The extent of legitimisation may vary but is achieved through mechanisms such as public consultation, the employment of independent consultants, through public inquiries and by the adoption of professional standards and planning practices (O'Riordan 1976a). Water planners must also be accountable to society for their decisions, although in practice planning systems vary considerably in their degree of accountability. In Britain, ensuring accountability involves fitting into the concept of democratic organisation and adopting organisational arrangements and methods which are responsive to social needs. Organisational arrangements may be rendered obsolete by the fast pace of social development and the planning system may be altered to suit society's new requirements. Society's attitudes towards wealth generation and its ability to create

wealth to provide sources of finance, without which the effectiveness of planning is limited, are further fundamental social influences on water planning.

The resource base represents that part of the environment which is recognised and evaluated by society, aided by water planners using specialised evaluation techniques, as having utility. As attitudes, needs and technology change over time society's evaluation of the resource base alters, sometimes with organisational ramifications. For example, the growing recognition of the importance of lowland river sources for drinking water is related to our growing water needs. However this recognition emphasised the importance of lowland river pollution control which led in part to the reorganisation of water management in Britain in 1974 (Chs 2 and 3). The resource base provides society with opportunities and limitations which water planners seek in turn to maximise and to overcome.

Water planning seeks to make adjustments to both the social context and the resource base in order to sustain the yield of the resource base and to provide for society's needs. Water plans may involve adjustments to the resource base, such as installing manmade storage capacity, and adjustments to the social context by, for instance, providing incentives for economy in water use and thereby changing attitudes.

This view of water planning, at the interface between the social and resource environments, emphasises the dependence of water planning upon the social context, and in turn the dependence of society upon the opportunities and limitations presented by the resource base. These relationships are elaborated below in relation to the overall analytical framework (Fig. 1.1).

### *The social context*

The **goals of society** are its aims in general. These goals are complex and may be explicit or implicit and multiple and changing. They evolve continuously from a complex interplay of social and political forces and may be articulated for example in terms of public opinion, election and referendum results and ministerial statements. Society often fails to support a particular goal unanimously and competing interests in society articulate their views thereby attempting to influence public opinion, making goals the subject of endless debate. The goals of society are not predetermined by planners but rather planners should assist society to identify and clarify its goals, to make them more explicit and to work towards them. One important perception of the major goals of British society has been outlined by the Royal Town Planning Institute (1976) (Table 1.1). These goals form a framework within which water planning could identify its more specific goals and objectives.

The goals of society are influenced by, and in turn influence, **social guides**. These are the major forces and elements in the structure and working of society which direct and guide social activities, including all forms of planning. They include the legal framework, governmental structure and

## 6 Water planning

**Table 1.1** One view of the major goals of society.

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To respect the values of life and eliminate the causes of unnecessary physical and mental suffering
To foster personal freedom and reconcile it with the need for collective freedom
To increase personal involvement in decision making on economic and environmental issues
To safeguard the long-term interests of society and its environment against exploitation for short-term gain
To reduce inequalities, not merely of opportunity, but of material conditions of life
To reduce dependence on wasteful forms of production, development and living
To develop greater social responsibility by government, private institutions and individuals alike

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*Source:* Royal Town Planning Institute 1976.

political power, national economic performance and policy and social attitudes and public preferences. All of these social guides interact with each other, although for simplicity's sake this is not shown in Table 1.1.

Planning, including water planning, is both facilitated and constrained by society's **legal framework** which consists of rights, restrictions and enabling legislation. In Britain legislation is passed by Parliament with reference to the constitution and the goals of society. English law, and the Scottish equivalent which is different, form the legal basis for all planning, including water planning.

Unwritten common law, which has evolved over centuries, is a part of the constitution which influences water planning. Under English common law all land belongs to someone including land covered by water so that, for example, the bed of a river to the centre line belongs to the owner of the adjacent bank. Whilst this common law has protected the rights of landowners in the past it has also restricted the control of water planning agencies over water resources.

Statute law includes written enactments, passed by Parliament, which can override any part of the common law. Through new statute laws water agencies in England and Wales have, for instance, gained more control over water resources by altering common law rights (Ch. 3). Byelaws are local laws needed because local conditions vary. They may be made by local authorities, water agencies or by the central government. Legislation enables planning agencies to be established as well as altered and also provides planners with tools for planning. Through the Water Act 1973, for example, the administrative structure of water planning in England and Wales was changed, thereby establishing a new water management structure with extended responsibilities (Okun 1977). The Control of Pollution Act 1974 enables water management institutions to enforce certain conditions upon water polluters which hitherto did not exist (Ch. 4). An important role of planning is thus to enforce rules democratically made.

For social progress to occur society needs a **governmental structure** which

has the power to help identify and set goals, to review courses of action, to mobilise resources and to coordinate action. Through the British concept of democratic organisation a process has evolved whereby decisions are made by Parliament and local government. These decisions are the result of a complex synthesis of views, compromise, bargaining and concession-trading and the distribution and exercise of **political power** determines the outcome. Three main groups are involved. The electorate is represented by Members of Parliament who are responsible for articulating the views of their constituents or the public as a whole. In practice the electorate's views may be poorly represented if it chooses to be passive or is so through ignorance.

Specialised interests are articulated by groups within society which seek to influence policy in the direction of their own interests which often do not coincide with the public interest. Whilst some groups in society only have a marginal interest in water planning, others are more directly involved and may even become internalised into the water planning system, provision being made for their systematic involvement in policy making. Finally, policy advisers such as civil servants, and members of central or local government who are ultimately responsible for decisions and their implementation, also have their influence upon policy (O'Riordan 1976a).

Water planning is profoundly influenced by **national economic performance and policy**. The nature, effectiveness and speed of water planning is dependent upon the amount of money available to finance both the planning process, in that staff are required for this, and the subsequent policies, plans and schemes. The availability of money for water planning is itself heavily dependent upon the performance of the national economy and government finance policy. During periods of economic stringency, such as the mid-1970s recessions, public sector spending may be 'squeezed' by the government which may impose a ceiling upon water agency expenditure or a moratorium upon new schemes and plans to appoint more planning staff. Government anti-inflation measures involving 'freezing' charges for water services may also reduce the real income of water planning agencies. Poor national economic performance also constrains change and the government might, for example, be reluctant to impose extra pollution control costs on firms. National economic performance also affects the demand for water services which may not continue to grow or may even fall during a recession.

On the other hand, economic circumstances or government economic policy may increase the amount of money available for water planning, for instance during periods of economic progress more money may be available to accelerate the implementation of policies to improve river water quality. Central government also uses the flow of money through the nationalised industries, including the water industry, to try to regulate the national economy.

Public opinion may well affect national economic policy, and therefore water planning. Public opinion on private enterprise, nationalisation of industry, social inequality or the problems of lagging regions, have all

## 8 *Water planning*

influenced British government policy and the financial allocations for water planning in the past. For example, Scottish economic development policy since the 1930s has increased the amount of money available there for water services.

**Social attitudes and public preferences** influence the goals of society and guide the judgement of political representatives. Social attitudes towards water and planning are conditioned by social values, education and previous experience. Policies to increase water charges substantially might well generate an unfavourable public response which might be conditioned by society's traditional view of water as a basic necessity, by insufficient appreciation of the true costs or scarcity of water and by a history of cheap water supplies (Ch. 3). Although social attitudes and public preferences may well influence water planning in this way, the links between public attitudes and preferences and policy making may not always be as strong as the theory of the democratic organisation of society suggests. Public opinion is often vaguely expressed. People are often indifferent to policy issues unless they are directly affected. Only where common interests appear to be threatened are preferences explicitly articulated, commonly resulting in sectional viewpoints. In addition, methods for gauging public opinion and for involving the public in decision making may be poorly developed (O'Riordan 1971).

**Table 1.2** Ministerial guidance on water planning priorities given to Water Authority chairmen in 1973.

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First priority	Public health and safety
Second priority	New housing development
Third priority	Industrial development
Fourth priority	Control of pollution for improvement of water quality in rivers and estuaries
Fifth priority	First-time rural sewerage for existing houses

In assessing the priority of need for any particular scheme the above priorities were to be taken into account

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*Source:* North West Water Authority 1978a.

Society's **priorities and needs** are formed by this complex matrix of social guides, including legal, governmental and political, economic and public opinion guides. The planner must identify the social guides and synthesise the flows of information and decisions emanating from them. Sometimes, as in 1973, the government may give explicit guidance upon water planning priorities (Table 1.2). Policies, plans and schemes should be formulated to reflect society's priorities and needs expressed in this and other ways.

### *The resource base*

It is not the purpose of this book to explain the hydrological cycle and its

workings in Britain: such explanations are given elsewhere (Rodda, Downing and Law 1976, Smith 1972, Ward 1975). Although we recognise the fundamental importance to water resource planning of understanding and measuring hydrological processes, we concentrate here upon identifying and classifying the main qualities and functions of the resource base (Fig. 1.1). In the Chapters which follow, for the areas of water planning including water supply, effluent disposal and pollution control, recreation and amenity and land drainage, we provide a detailed explanation of the principal features of the resource base appropriate to each.

The **national natural resource endowment** includes land, minerals, water and air resources. Water planning is very closely related to land use planning because most modifications and uses of the hydrological cycle have land use implications and because water planning often involves raising the value of associated land resources. On the other hand the construction of a new reservoir in an upland area may lead to the loss of agricultural land through flooding (Ch. 3). A reservoir which is to be used for water sports can hardly be so used without adjacent land also being used for access and land-based facilities (Ch. 5). Land drainage, including protecting land from flooding and improving soil drainage for agricultural purposes, is an important part of water planning with more emphasis on enhancing land than water resources (Ch. 6). Britain's water planning agencies are in fact important landowners in their own right and they effectively have to plan both **water and associated land resources**.

Apart from the interrelatedness of water and associated land, the resource base is characterised by other important **physical interdependencies** which reflect the nature of water and the hydrological cycle and which must be recognised by society and the water planning system if resources are to be successfully utilised. The first interdependency is that at a particular site water has a multi-purpose potential which can produce positive or negative consequences. For example, a reservoir built to provide water supplies may also automatically provide possibilities for controlling floods and for recreational development. Alternatively, one use of water may have a detrimental impact on others, as in the case where enlargement of a river channel to reduce flooding damages fisheries and destroys bankside vegetation which supports wildlife, so conflicting with angling and nature conservation interests. During its passage from source to sea, river water also has re-use potential and may, for instance, be used many times for industrial cooling, navigation and recreational purposes.

A second interdependency arises from the nature of water as a fluid which, under gravity, moves from high to low ground and which circulates in the hydrological cycle. Uses of water at one place have important physical and economic consequences elsewhere. For example, extraction of groundwater for water supplies at one place may lead to diminished stream flow and therefore reduced navigation opportunities at another, because the underground and surface water systems are a single hydrological unit.