



The Water Resources Board: England and Wales' Venture into National Water Resources Planning, 1964-1973

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ABSTRACT: An era of technocratic national planning of water resources is examined against the views of a leading liberal economist and critics, both contemporary and retrospective. Post Second World War Labour Governments in Britain failed to nationalise either land or water. As late as 1965, the idea of public ownership of all water supplies appeared in the Labour Party manifesto and a short-lived Ministry of Land and Natural Resources, 1964-1966, had amongst its duties the development of plans for reorganising the water supply industry under full public ownership. However, instead of pursuing such a politically dangerous takeover of the industry, in July 1964, a Water Resources Board (WRB), a special interest group dominated by engineers, was set up to advise on the development of water resources. In its first Annual Report (1965) WRB claimed its role as "the master planner of the water resources of England and Wales". The WRB had a great deal of influence and justified its national planning role by promoting large-scale supply schemes such as interbasin transfers of water, large reservoirs and regulated rivers. Feasibility studies were even carried out for building innovative, large storage reservoirs in tidal estuaries. Less progress was made on demand reduction. Yet the seeds of WRB's demise were contained in its restricted terms of reference. The lack of any remit over water quality was a fatal handicap. Quantity and quality needed to be considered together. Privatisation of the water industry in 1989 led to a shift from national strategic planning by engineers to attempts to strengthen economic instruments to fit supply more closely to demand. Engineers have now been usurped as leaders in water resources management by economists and accountants. Yet climate change may demand a return to national strategic planning of engineered water supply, with greater democratic input.

KEYWORDS: Water resources planning, Water Resources Board, Cave report, England, Wales

INTRODUCTION

The aim of this paper is to examine a decade of technocratic planning of water resources in England and Wales from 1963 to 1974 as an illustration of a particular form of power: centralised national planning led by a special interest group. The performance of the Water Resources Board (WRB) is assessed against the views of an arch opponent of national planning in general; contemporary and retrospective critics of the WRB; and then contrasted with current water resources governance in England and Wales.

The creation of the WRB, staffed mainly by engineers, followed the passing of the Water Resources Act, 1963. The WRB was made responsible for advising Ministers and river authorities on the development and use of water resources throughout England and Wales (WRB, 1974). Without being bogged down with executive functions, such a special interest group was expected to provide expertise, strategic vision and leadership.

The WRB's performance as a special interest group may be examined against the critique of planning by Friedrich Hayek (1944), who is considered even now to be amongst the four most influential economists (Kaletsky, 2009) and who inspired those liberal ('small government') politicians who privatised the water industry in England and Wales in 1989.

Hayek feared that special interest groups would threaten liberty. In his view, narrow focus leads to enthusiasm and a desire for technical excellence which can be achieved only by sacrifice of other priorities. He recognised:

single minded idealists, all the men and women who have devoted their lives to a single task. The hopes they place in planning are not the result of a comprehensive view of society but rather of a very limited view, and often the result of a great exaggeration of the importance of the ends they place foremost... the very men who are most anxious to plan society are the most dangerous if they were allowed to do so – and the most intolerant of the planning of others (Hayek, 1944).

Each of these propositions: enthusiastic belief in planning, a limited view of wider social needs, and intolerance will be examined in assessing the contribution of the WRB and its sequels.

The scale of governance of water resources has ramifications both in technical outcomes and in the political priority given to investments. In England and Wales, interplay between national planning and local administration has seen many dramatic changes during the latter part of the 20th century culminating in the overall privatisation of water supply in 1989. National planning has now taken a back seat as private companies take initiatives whilst the government adopts a reactive, regulatory stance. Critical appreciation of the present is highlighted by looking back at the period 1964-1973 when a planned economy seemed the best option for development of water resources and a particular organisation, the WRB, was dedicated to this task.

Documentation of the WRB, including its Annual Reports and special regional reports, has been studied together with archival material which, after 30 years, has become accessible in the National Archive at Kew. Analysis of primary and secondary literature has been supplemented by interviews with former WRB staff, including the Deputy Director and two other of the most senior staff as well as other contemporary colleagues involved in water resources.

Background to the formation of the WRB

Successive post-War Labour Governments failed to nationalise either land or water (Hassan, 1994) even though, as late as 1965, the idea of public ownership of all water supplies still appeared in the Labour Party manifesto. However, this was politically dangerous because nationalisation might antagonise both private owners of water companies and municipal and local authority water undertakers.

The nearest the government got to nationalising water was the setting up, in 1964, of a short-lived Ministry of Land and Natural Resources (MLNR) which had amongst its duties the development of "plans for reorganising the water supply industry under full public ownership". Unfortunately, the functions of the MLNR overlapped with those of the senior, longer-standing Ministry of Housing and Local Government (MHLG), which retained statutory responsibility for questions of water distribution, minimal acceptable flow in rivers, abstractions, river pollution and sewerage. This clash led to the speedy demise of the MLNR in 1966. The touchy subject of nationalisation of water supply was once again avoided.

Before the 1963 Water Resources Act was implemented (a necessary clarification was added in a 1971 Water Resources Act), controversies over the construction of reservoirs were referred to Parliament for resolution. The debates were prolonged both in Select Committees¹ and in the House. Members of Parliament (MPs) often felt out of their depth as well as resentful of the increasing amount of valuable time taken up by the debates. MPs called for technical advice so that they could balance local planning issues against national priorities. The latter included a need to bolster the competitiveness of British manufacturing industry by meeting its growing demands for water supply. Heavy manufacturing plants, such as iron and steel and chemical industries, were vital for Britain's post-war recovery and took up to 80% of water supply in industrial areas such as Teesside. Farming and food

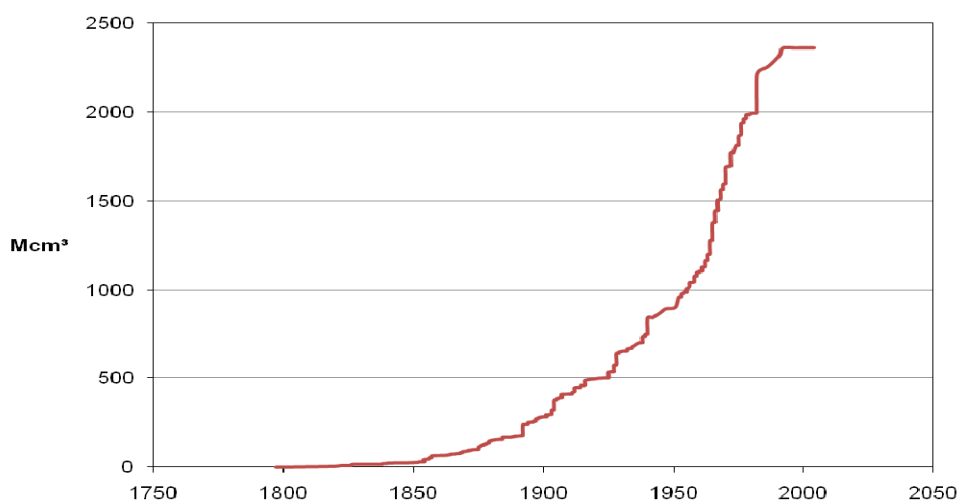
¹ Select Committees of MPs scrutinise the work of the government by holding inquiries and producing reports on matters of public policy.

security was another issue: irrigation was negligible, although there was a fear that spray irrigation would grow in importance but there was a desire to protect agricultural land in an age before surplus production of food crops. Other national issues included a desire to preserve nature reserves and Sites of Special Scientific Interest and to further recreation, such as walking and angling, in rural settings.

Developing a national strategy for water resources development against which individual projects could be assessed was called for many times by MPs dealing with Private Bills to promote reservoir schemes during the 1950s and early 1960s; they feared they were being thrust into making decisions without adequate preparation. How important was loss of farmland drowned by reservoirs? Was loss of amenity or damage to the natural environment significant on a national scale? Were innovative but little tried technologies such as desalinisation and water reuse viable alternatives? Would industrial growth be harmed should the price of water be raised to encourage development of resource-saving technology? Should infrastructural projects be state-funded to stimulate industrial growth in areas of unemployment? How far should water supply developments be left to market forces? Such questions were raised many times in debates over water supply.

Reservoir construction in England was growing exponentially during post-war recovery (see figure 1) and many feared the associated damage to amenity and loss of farmland if this upward trend were to continue unabated. Yet, the drought of 1959 reinforced fears that storage was insufficient (Downing, 2004). Parliament wanted professional advice.

Figure 1. Growth in reservoir capacity in England and Wales.



Source: Author. Data from World Register of Dams, 1998 (International Commission on Large Dams) with update to 2008 provided by the Environment Agency.

The MHLG was so busy with short-term executive functions that it failed to produce a strategic vision. Separate consideration of each individual application for reservoir construction sometimes led to inefficient schemes. On the local scale, Sheail (1986) describes rivalry between competing water undertakers leading to duplication of reservoirs, pipelines and other inefficiencies.

There were fears also that England and Wales were falling behind in research and development of alternative means of meeting the increasing water demand. National water and land use planning called for uniformity of data. Walters (1936) claimed that "the drought of 1933-4 again brought to the fore the question of a survey of the nation's water resources. This has been talked of for the last fifty years and has been belaboured by many Royal Commissions and recommended by scientific societies". At long last, eight decades later, the time had come for action.

Faith in planning at a national level, so strong at the end of World War II, had not yet evaporated. It was not just engineers and Parliamentarians who thought that national planning of water resources was desirable and would be beneficial. The Nature Conservancy (NC), the Council for Nature and other bodies advocated national planning. Their stated purpose was to prevent "ill thought-out *ad hoc* schemes" (NC, 1957a). The NC hoped that national planning would:

1. prevent high-grade potable water being used for low-grade industrial uses;
2. promote purification of rivers to favour direct abstraction from the lower river without storage and to restore fish;
3. increase the water-holding capacities of upland catchments biologically by arresting peat erosion, by preserving sponge-like sphagnum bogs, and by planting of trees and other vegetation (NC, 1957a).

However, in 1957, the time was not yet ripe for a national policy. When making such a suggestion, the Director of the NC was snubbed by the Cabinet Office: "Ministers are not prepared, for the present at any rate, to accept the proposition that there should be an overall national water authority". There was thought to be a need to safeguard "a modicum of local autonomy" (NC, 1957b).

Unfortunately for the NC and other ecologists, the national planning body, the WRB, which eventually emerged 8 years later, did not fulfil their hopes and even acted on occasion against the interests of the NC, as when a reservoir scheme threatened a Site of Special Scientific Interest. Moreover, the WRB made little effort to modify industrial water demands, had no jurisdiction over pollution and lacked competence, or indeed interest in, biological control of water. The Hayekian conflict between the enthusiasts for ecological conservation in the NC with the water planners in the WRB was one in which the realisation of the dreams of either party would have been dangerous for society as a whole. On the one hand, construction of unlimited reservoirs in sites of environmental beauty and scientific interest would have been damaging. On the other hand, attempts to preserve vast land areas as nature reserves would have displaced all development to lands needed for agriculture or other human purposes and would have stimulated a backlash against land nationalisation. Both organisations needed another, democratic, assembly to arbitrate on their contribution to the more general social good.

THE RISE AND FALL OF THE WRB

The setting up of the WRB on 1 July 1964 with its duty to advise on the development of water resources in England and Wales followed the passing of the Water Resources Act, 1963. The WRB was funded to advise the river authorities, central government and the Secretary of State for Wales on the planning of the conservation and redistribution of water on a national scale. The WRB's first Annual Report (WRB 1965) claimed its role as "the master planner of the water resources of England and Wales". Yet, with the British taste for compromise, the WRB was limited to an advisory function and confined to considerations of water quantity.

These limitations did not dim the enthusiasm of the engineers given new prominence in this quasi-autonomous body. The WRB, from 1964 to 1973, was a unique experiment in self-governance of water engineers by water engineers. Emerging from their customary position in the background, engineers were allowed centre stage to proclaim their ideas of rational planning at regional and national scales. The supposed political neutrality of engineers facilitated their entry into central government in the guise of specialists (Maloney and Richardson, 1995).

Rydz, Director of Planning in the WRB, recalls:

There was a great ferment in river water management in the late 1950s, 1960s, and the WRB grew out of this. It was a worldwide phenomenon really, a lot changed in Europe, a lot changed in North America at

that time. People were beginning to think of the management of rivers, of aquifers and water supply as an integrated business (B. Rydz interview, 2001).

From initiation, WRB built up to a staff of 160 with a modest research budget (15% of the annual budget of £2 million² by 1974; see Evans, 1993) but conceptually its influence was far greater than its size or budget might suggest. Data collection was a priority. For the first time, national groundwater and surface water resources were considered together in research and development programmes, including conjunctive water use (Mather, 2004). Without the WRB, and the financial arrangements endorsed by the 1963 Water Act, water resources development in England and Wales would have been very different. Large, expensive water storage and water transfer schemes involving regional scale planning were facilitated by this novel and ambitious planning body.

National planning of water resources

National planning has appeal, particularly to specialists seeking to further their own interests (Hayek, 1944). Planning by specialists involves centralisation of decision-making by élites who define and restrict the inputs which they consider legitimate in their strategies. But national planning of water resources requires justification. In England and Wales, supplied by many rivers, the case for national planning was not obvious. River catchments appear to be more suited for management purposes because of the hydraulic relationship between water flowing from the tributaries into the principal rivers, on the way to the sea. Even Rydz, Director of WRB Planning, conceded that large areas of England and Wales were best served by local planning of water resources (Rydz, 1971). In his view, shown in figure 2 below, all areas which were unlikely to benefit from interbasin water transfers or construction of large reservoirs were excluded from WRB national planning. The map also shows the locations of large water deficits predicted by WRB for 2001; most of these predictions were subsequently undermined by a decline in heavy manufacturing in the 1970s.

The WRB was inspired by the thought that on a national scale, contrasts between wet, relatively impermeable, sparsely populated, uplands in the North and West, suitable for reservoirs, and drier areas in the highly populated Midlands and South East, served by productive aquifers, suggested that coordination between the regions could make best use of resources.

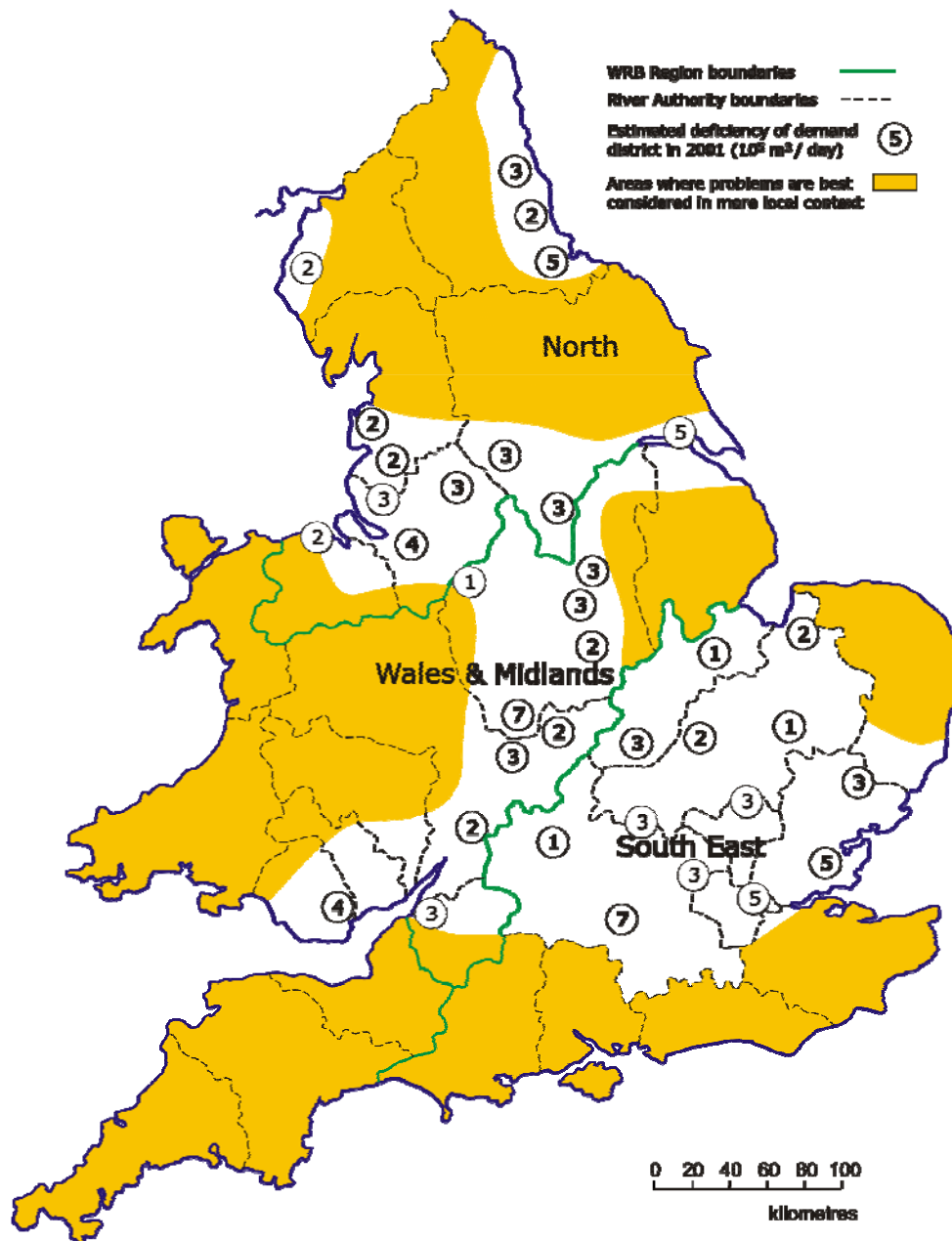
Apart from the 'natural' advantage of catchment planning based on hydraulic connectivity, remote decision-making about control of nature at a national level proves problematic for environmentalists who believe that the best decisions for symbiotic relationships between society and nature are made by people with close ties with their locality, thus humanising technology and protecting diversity. The WRB was faced with a challenge to reconcile local issues with national policy, based on persuasion rather than authority.

A contemporary critic of the implications of the 1963 Water Act understood its far-reaching implications, which were enabling for the water planners but which held dangers for environmental sustainability. F.D. Corbin wrote regretfully to N. H. Calvert in the MHLG, after the Act was published:

It will be within the knowledge of the Ministry that there are among abstractors and would-be abstractors, many perfectly sincere people, who, having very properly concentrated on their own particular functions, have never had the opportunity to study the organic nature of river systems and do not realise that a river is not merely a conduit of liquid, to be tapped at will, i.e. "mined" as one mines coal or oil, but something of a living nature which must be "farmed" and cropped (MHLG, 1963).

² Equivalent to approximately £30 million in 2007.

Figure 2. Strategic demand patterns (redrawn by R.J.G. McCulloch from Rydz, 1971). Predictions of water deficiencies made in 1971 for 30 years in the future (2001) are shown in the circles.



He also noted that the new Act offered less protection to rivers than the old Common Law rights, which required riparian owners to return water without significant diminution in quantity or quality to the river for downstream owners. He anticipated that omission of any statutory responsibility for river authorities and water boards to maintain the ecological balance of their rivers would lead to difficulties in safeguarding rivers against increasing abstraction. But Calvert, who was later to serve as Secretary of the WRB, missed the point. Further correspondence showed that ecology, in his view, was still to be treated as a trivial, minority interest rather than appreciated for its role in maintaining water in rivers in a healthy state for all the life forms supported.

The big ideas of WRB

With its senior staff of hydraulic engineers led by the Director, Norman Rowntree (later Sir Norman Rowntree) the bias of WRB strategy towards structural solutions was not surprising. The engineering majority of the executive staff was not counterbalanced by a more diverse composition of the supervisory Board³ which acted as a shield from direct operational interference from central government, although the Board submitted reports and funding requests to the MHLG. Downing (2004) remarks on WRB's surprising degree of independence "It operated more or less in the manner of a private company".

The absence from the Board of a biologist or an economist allowed the development of technocratic plans untrammelled by ecological doubts or much consideration of economics. Protected from interference from above, together with its distance from local politics, the WRB seized the opportunity for water planning on a grander scale than had ever been contemplated before in England and Wales.

Rowntree, believed "maintenance of our standards of life depends on expanding industrial, commercial and agricultural activity" and the "maximum development of natural resources". "The solution of water supply problems... will require the construction and operation of large works and highly-developed technical control". "Enthusiasm and fervour" should be added to the water engineers' "cold calculations of safety yield and cost" (Rowntree, 1962).

The water engineers were not always as cold and calculating as Rowntree described. Large-scale schemes such as interbasin transfers of water or even establishment of water grids on the model of the electricity grid aroused enthusiasm and fervour and served to justify regional planning by the WRB. Water grids had been discussed in theory since the 1930s but the support of WRB was needed to achieve even regional-scale schemes.

Belief in top-down planning was reinforced by advances in technological skills of dam building and tunnel construction using powerful machinery. Tunnels could penetrate through watersheds to transfer water into those rivers to be augmented. With the possibility of cheap water treatment near the point of use, rivers rather than expensive pipes could be used to convey water from reservoirs. These regulated rivers would carry the water to densely-populated urban centres downstream whence it would be distributed to service reservoirs and piped to users. This policy relied upon the regulated rivers being relatively free of pollution. Heavily polluted rivers such as the Trent and the Mersey had to be avoided and sewage disposal into regulated rivers discouraged but WRB could not enforce restrictions.

The WRB's advocacy of the regulated river implied imposing rationality on previously capricious rivers. By regulating flows with storage during floods and release from reservoirs, or augmentation from wells, at the time of low natural flows, rivers could have a more uniform flow throughout the year, controlled by engineers. Rivers clearly demarcated by blue lines on maps could now be experienced as perennial, uniform rivers on the ground. The WRB called such rivers improved. Aspirations for such regulated rivers implied a lack of imagination about the potential value of subtle variations in flow, chemistry and wildlife and a diminution of the inspiration arising from the lively, constantly changing natural river.

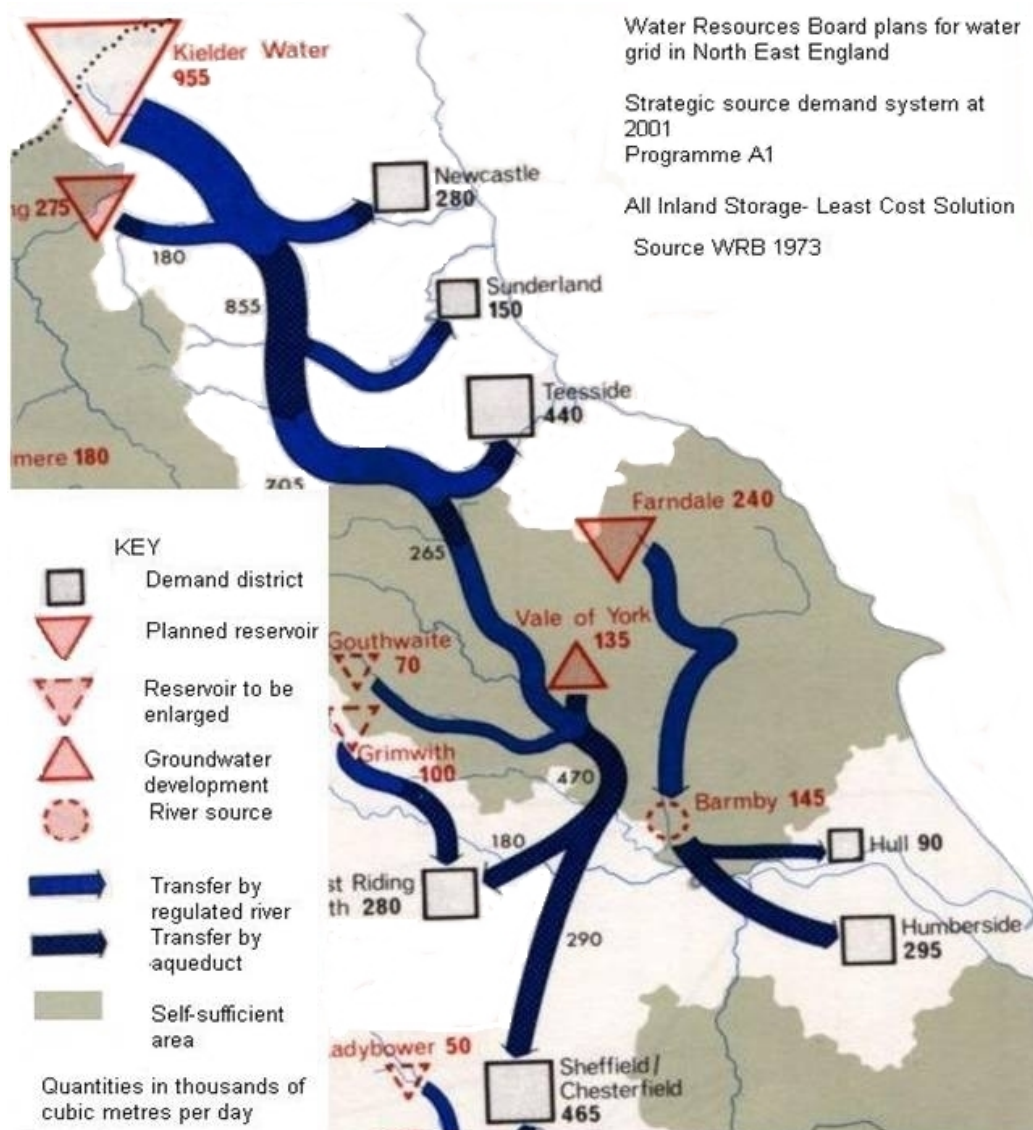
The WRB benefitted from a sympathetic political environment, favourable financial arrangements and technical innovations. The WRB worked as a catalyst drawing together engineers in regions to consider the benefits of planning on a larger, more ambitious scale and giving authoritative approval to the subsequent schemes to obtain the necessary funding: large schemes which involved regional-scale

³The Board, which met monthly, was chaired by Sir William Goode, a barrister recently retired from the Governorship of North Borneo. Members were the General Manager of the Sunderland and South Shields Water Company (A. D. McLennan); a former Director of ICI, (R.A. Banks); a former employee of the National Coal Board who was also a former member of the Welsh Advisory Water Committee (Dr. Idris Jones); the Chairman of the Executive Council of the River Boards' Association (W.A. Muddell, CBE), and, as representative of the National Parks Commission, Professor Clifford Darby, a historical geographer.

planning usually required the injection of national (or, later, European) funds. The more ambitious schemes included not only large reservoirs, interbasin transfers and regulated rivers but even freshwater storage in estuaries. This latter policy was an innovation devised by the WRB to circumvent long and wearisome battles over the submergence of land below reservoirs (O. Gibb interview 2002).

An example of the regional plans developed by WRB is shown in figure 3 below. The Kielder Water Transfer Scheme was the apotheosis of WRB dreams. The Scheme involved interbasin transfers of water from a huge reservoir, at the time the largest in Northern Europe, through massive tunnels linking regulated rivers used as aqueducts. The transferred water was planned to supply industrial centres of Newcastle, Sunderland and Teesside eliminating predicted deficits. The plans even proposed that water from Kielder could cross further watersheds and be transported to supply as far south as Sheffield and Chesterfield two hundred miles away. This extension shown in figure 3 was never realised. Even before construction of the Scheme had begun, the chemical industry on Teesside was in decline and the dreams of expanding iron and steel manufacture in the North East had been shelved (McCulloch, 2006).

Figure 3. WRB’s plans for a water grid in North East England.



The WRB adopted what it considered to be a rational approach to planning. The Third Annual Report of WRB (1967) states: "The Water Resources Act 1963 with its emphasis on collection of data provides the incentive to apply scientific and engineering principles to achieve logical development, so that water can be made available in the quantities required where and when it is needed".

Supply "where and when it is needed" was the objective rather than adaptation of human developments to water availability. With this objective, the Board privileged quantifiable information. Their confidence in "logical development" allowed the rubbishing of opposing arguments, unless they were proved by hard data. For example, adverse reaction "to the exploitation of the water resources of an area for the benefit of water consumers far away" was deemed "irrational" (WRB, 1967).

Any hope that national planning would reduce the number of controversial schemes was dashed: instead, reservoir construction continued apace as shown above in figure 1.

Development was also encouraged by the financial arrangements introduced in the 1963 Water Resources Act: 1580 diverse organisations were subsumed into 29 administrative institutions, the River Authorities (1963-1974) (Porter, 1978; Evans, 1993). Cost-sharing and appeal to outside investment facilitated the planning of larger schemes. For example, in the case of the Kielder Scheme, funds were raised from the European Investment Bank, the National Loans Fund, grants from the UK Government and the European Regional Development Fund (Parliament, 1984-85). The downside of such cost-sharing in water resources provision was not appreciated at the time; it encouraged the promotion of grandiose, uneconomic schemes colloquially called "white elephants".

Yet contemporaneous criticisms were emerging. Craine (1969), an American observer, wondered whether plans prepared by WRB for large regional water schemes,

give undue weight to developing new sources of supply through the construction of storages and diversions without adequate examination of the payoffs possible from less capital intensive measures, such as instream re-aeration and more stringent regulation through licensing, zoning and pricing (Craine, 1969).

Craine thought the central government subsidies encouraged capital-intensive structural solutions. Davis and Hanke (1973) reported from experience in the US: "Cost sharing brings inefficiencies". They pointed out that the possibility of attracting federal funds favoured large, expensive, reservoir storage schemes over limited storage and more direct abstraction. The less the direct customers were expected to contribute to the overall cost of the scheme, the grander the scale of the reservoir and the linked pipelines.

The WRB certainly broke new ground in looking at technical possibilities of water resources provision on a national scale but achievement of a national consensus, as proposed by Maass (1962) as a necessary precursor to consideration of local projects, proved elusive. Maass proposed that consensus should be reached initially on the economic, legal and political basis of investment in water resources development. The topics he suggested were only part of the agenda which lay at the heart of opposition to reservoirs and which continued to frustrate water resources planners. To the economic issues could be added a growing public interest in protecting the more natural environment. The narrow vision of the WRB water resources planners began to attract growing criticism.

The seeds of WRB's eventual destruction in 1973 were sown in its restricted terms of reference. The lack of any remit over water quality was a fatal handicap. Very polluted water cannot be transferred for use without great expense in treatment. For this reason, water quantity cannot be considered without taking its quality into account. Water shortages may exist because either water is physically absent or the water present is unfit for the purpose and too costly to treat. Thus long polluted stretches of rivers would be useless as channels to transport water from reservoirs. Quantity and quality must be considered together.

This deficiency was of course recognised by WRB staff. Rydz recalled that the boundaries between organisations at that time were patrolled fiercely: he felt that it was essential when planning integration of water resources to make assumptions about water quality standards so that the cost of

treatment could be weighed against options for alternative water developments. Yet even mention of notional standards brought down the wrath of defensive water executives:

Immediately I was assailed: Department of Environment: 'You are not allowed to talk about water quality'; Thames Conservancy: 'What do you know about pollution and water quality?' Me: 'Well for God's sake, if you don't like my figures, you put something up then so that we can use it!' Reply: 'No, we are not interested' (B. Rydz interview 2001).

Okun (1977) points out the deleterious effect of this handicap,

the use of rivers as aqueducts, the use of reservoirs to regulate river flows, and the successive uses of water by a sequence of abstractions and discharges made the problems of water quality and wastewater disposal inseparable from the problems of providing clean water for abstraction.

Engineers on a spree? Growing criticism

When economist Kinnersley (1988) characterised the WRB as "engineers on a spree" he captured its dynamism and enthusiasm and its temporary joy, whilst criticising its neglect of economics. Beaumont (1977) also criticised the WRB for giving little consideration to the economic standards of the country and the values and aspirations of the people:

To meet the increased demand which was predicted, the only solution considered seriously was the provision of extra water supplied by the traditional method of reservoir construction, despite the fact that large scale reservoirs are receiving growing criticism from all over the world.

Such retrospective criticism echoed contemporary doubts about the ambition of the planning of new water resources.

The response of the WRB (1969) to criticism was obdurate:

We are conscious of the objections made by some economists and others that our apparently uncritical approach to the question of the increasing demand for water is inconsistent with proper planning and that more sophisticated methods of estimating the total increase in demand are called for.

The WRB did not change its focus on supply. After all, in the absence of an urgent and increasing demand, any need for the WRB would have been invalidated. Restriction of demand by price signals was considered to be a marginal option: "price is unlikely to limit demand for water overall" (WRB, 1969).

The WRB served as a leader in stimulating enthusiastic support for large schemes and wholeheartedly embraced the ambitions of executive local water engineers and water engineers within the large-scale manufacturing industry. The WRB accepted with little question the water demand estimates they put forward. Gibb defended the WRB in saying that "it was the combined wisdom of the water industry at the time" and that the figures of the influential industrialists could not be queried because of the threat that industrial plants and jobs would be moved overseas (O. Gibb interview, 2002). Double counting and over-optimistic levels of industrial expansion and consequent water demand were later revealed by critics.

Opposition to WRB plans was based not only on economics. Whilst recognising that "the community's sense of values and social priorities" came into the picture, the WRB was unable to devise a means of approaching the first task of a river basin planner, as defined by Maass (1962) who advocated broadly-based consideration of common objectives before arbitration of interests specific to a locality or to individuals. The narrow terms of reference and focus of the WRB prevented any such consensus on objectives of water development. By the time of the Board's Fifth Annual Report (WRB, 1969) the tone had become more defensive, apparently in response to criticisms on social and environmental grounds:

In this crowded island, proposals to change the use of any substantial area of rural land nearly always excite controversy. Such proposals bring into play the community's sense of values and social priorities and it is right that they should be subject to informed public comment. But it is important to identify and separate the various strands of argument and feeling. Some such as the value of agricultural produce can be expressed in terms of money. Others are based on less tangible factors. The submergence of farmland clearly involves both tangible and intangible values. We recognise the need for conservation of the landscape and countryside and we accept that decisions which involve loss of amenity should not be taken until all reasonably practicable alternatives have been explored. On the other hand, we must have regard also to the large number of people who flock to the new reservoirs to enjoy the new amenities provided and to the future generations who will expect an ample water supply.

Limitations of the engineers' debate

The WRB made little progress with non-technical issues, which included the ecological effects of mixing river waters or the changes wrought by regulating rivers, even though some contracts were let to a biological research organisation, which proved unenthusiastic about the WRB's demands for speedy results (O. Gibb interview, 2002). Also WRB underestimated the political resistance caused by separation of the environmental costs suffered in rural water supply areas from the benefits experienced only in distant urban areas. The difficulty of achieving agreement between different political entities, local and national, was an unanticipated social barrier to the extension of water grids.

After 9 years' experience of disputes over reservoir construction, WRB (1973) concluded:

The social and amenity aspects of any proposed development are much more difficult to evaluate than costs and technical merits. The value of agricultural or other land taken for a reservoir can be assessed in terms of money. It is less easy to assess consequential damage such as destruction of a family home, disruption of a community or loss of "in by" land. It is even more difficult, if not impossible, to assess objectively the effect, good or bad, on amenity of flooding a valley. Nor have we been able to find a convincing way of valuing the potential for recreation.

In this statement, there appears to be no consensual moral standpoint possible without the guidance of the market economy. The WRB's claims for rationality, without exploration of its conceptual basis, hampered communication with opponents holding different values.

Sir Norman Rowntree, even after the end of his time as Director of the WRB, could not cope with "the intangible nature of environmental factors". In his Presidential Address to the Institution of Civil Engineers, (Rowntree, 1976) he said,

the duty remains with engineers and other experts to minimise the range of intangible issues... the inaccuracy of words and the opportunities of distortion are enormous. In the present age of unreason this is a real danger and may be responsible for many of our present ills

The undimmed confidence of the WRB in its narrowly defined rationality proved a barrier to communication and accommodation with non-engineers thus diminishing the value of its opportunity to think creatively about water supply on a national scale.

Despite this, the reign of the WRB made a lasting impression on the water landscape of England. After the demise of the Board, no new schemes on such an ambitious scale have been developed, although 30 years later a large reservoir is currently being planned in the Upper Thames basin near Abingdon to serve London and Swindon by 2026.

What the WRB had not anticipated was the dramatic decline in industrial water demand as Britain passed from being a major manufacturing country into a post-industrial age. This slackening of demand left former industrial regions over-resourced with expensive reservoirs whilst the growth of service industries led to a shift of population to the water-scarce South East. In the long term, there were even more significant ramifications: the planning overshoots fuelled demands to divest and privatise water resources, when the political context changed.

Downfall

The 1973 Water Act disbanded the WRB. No direct successor was appointed. Instead, ten Water Authorities were created with much broader terms of reference including water supply, sewerage, sewage disposal, pollution prevention, land drainage, flood prevention and fisheries. Local authorities lost all of their functions in relation to water supply, the 29 River Authorities disappeared. Porter (1978) writes "It is difficult to exaggerate the magnitude of the change".

What Rydz described⁴ as the 'socialist' period of national water planning was over but the legacy of its planning continued.

SEQUELS AND ONE CONCLUSION

Some WRB schemes were abandoned and others completed.

Following an expensive field trial to investigate the physical feasibility of constructing a reservoir in the Wash under the aegis of the National Water Council (a weak and ineffective successor to WRB), and a field investigation in Morecambe bay, the concept of estuarine reservoirs was abandoned as uneconomic and politically damaging in view of growing hostility from environmentalists anxious to preserve wading birds' feeding grounds.

In contrast, the Kielder Water Transfer Scheme materialised, at least as far as Teesside. This regional-scale planning of a water grid (see figure 3) aimed to meet all conceivable water needs in North East England for the foreseeable future; it was approved in 1972 just before the WRB was disbanded in 1973. Despite falling industrial water demand and severe economic recession, the reservoir was opened in 1982 by the Queen undeterred from her duty by posters declaring the scheme a 'white elephant' (McCulloch, 2006, 2007). The Scheme has been operated fully on only three occasions since opening, although the reservoir has been developed for recreation and its water has provided a backup for abstraction from other dams in the region. Similarly, another large reservoir, Carsington, was planned by WRB but completed only in 1992 following a long delay caused by collapse and rebuilding of the dam but, like Kielder, its water is underused for supply because of the expense of pumping the water up to the reservoir from the River Derwent. Other proposed new reservoirs, such as Farndale and Otmoor were abandoned.

This legacy of over-provision may have contributed to the drastic change to full privatisation of the Water Authorities in 1989 under the neo-liberal Thatcher government, which believed not only Hayek's commentary on the dangers of special interest groups but also his solution of reliance on market forces to deliver a better outcome.

My analysis of the WRB so far appears to verify Hayek's prognosis. The WRB was an enthusiastic special interest group dominated by engineers with a desire for technical excellence. The WRB enrolled many river authorities, central government and other funders to its cause. Former staff members still meet for reunions and bemoan a perceived lack of strategic water planning since WRB's demise. On the downside, WRB was also intolerant of the views of others and did not achieve a broad view of societal priorities.

Yet whilst Hayek's appreciation of the dangers of WRB as a single issue interest group has value, it does not follow that the sequel should be adoption of a neo-liberal agenda and privatisation of the water supply industry. Single-issue interest groups are valuable in creating new agendas, achieving expertise and in displaying enthusiastic leadership but they cannot, and should not be, in a position to determine societal priorities more broadly. Democratic input into water resource strategy is needed to balance conflicting priorities. But the British Parliament withdrew from major water resource decisions in 1971 and, in 1973, elected local authorities lost their administrative functions for water supply, main

⁴ B. Rydz, Interview, 2001.

sewers and treatment plants (Porter, 1978). With privatisation, the possibility of democratic input into decision-making has diminished further.

Privatisation has meant that citizens are now regarded as 'customers', excluded from commercial decision-making, even though 'consulted'. The customers' interests are intended to be protected by three state-appointed official regulators: the Office of Water Services (OfWAT) to consider water pricing and financial investments; the Environment Agency to ensure compliance with the EU Water Framework Directive and other environmental legislation and the Drinking Water Inspectorate to enforce quality standards. Each organisation, despite procedures for consultation, presents barriers and limits to democratic involvement (see Watson et al., this issue).

Economic concerns were neglected by WRB but now economists have emerged with a strong voice. The first Director General of OfWAT was Ian Byatt, who as a junior Treasury economist had attended WRB as an observer. After his retirement, Sir Ian Byatt (2004) highlighted contrasts between the current, privatised water industry and the previous regime:

Before privatisation, water was largely insulated from the market economy. Water companies are now part of global business. Expertise, in economics and customer service as well as in engineering, is now freely traded internationally. Water companies raise their own finance and account to their shareholders. They have incentives to increase their profitability by reducing their costs. They are no longer enmeshed in the culture of the public sector labour supply.

In his view, even increases in water prices by 42% since privatisation (Cave, 2009) should be welcomed as "incentives to use water wisely" rather than as an added burden on low-income households. Privatisation has been followed by an increase in water poverty (defined as a situation when water bills exceed 3% of a household's bills) and an increase in non-payments. Yet intervention by Parliament to deny companies the right to disconnect water supplies of non-payers rather than pursuing debts through the courts was regarded by Byatt as undue interference by politicians who mistrust the invisible hand of the market. Bakker (2001) has shown the far-reaching effects of disaffection of consumers with one of the privatised water monopolies. A democratic deficit remains.

Whilst Byatt enthuses about the passing of the national 'master planners', others regret that future strategy has been left to a regionalised private water industry, which naturally favours provision of new resources within territories under their own jurisdictions. The water transfer schemes favoured by WRB have become more difficult to realise. For example, the Group Against Reservoir Development (GARD) created to oppose Thames Water's plans to build a very large reservoir, which would drown 500 hectares of farmland near Abingdon, prefer alternative options first explored by WRB. These involve transferring water to the Thames from the less-overused Severn catchment draining from the rainy Welsh uplands (Binnie, 2009). Crucially, in addition to structural works, such a transfer would involve Thames Water in purchasing water from the Severn Trent Water company. Political and financial barriers between regional companies have grown in importance in the absence of a national water engineering strategy. Yet the notion of a national policy is emerging once more, this time led by another group of enthusiasts.

Today, the main interest nationally is not in engineering developments but in introducing competition into monopoly situations and encouraging trading to achieve a more efficient distribution of resources matching supply and demand more closely and lowering costs. The driver of water resources development has passed from the engineers to another special interest group, the economists. The current government has commissioned Martin Cave, a regulation economist, to lead a review of competition and innovation in water markets in England and Wales. Cave (2009) believes:

Introduced in the right way, competition and cooperation between companies, driven by market mechanisms, market-like instruments or regulation can encourage innovation and the delivery of lower prices, a better service and improved environmental outcomes.

The recommendations of the Cave report, 2009, which were initially welcomed by the government in the 2009 Budget, include one for "addressing the potential bias towards capital expenditure". This is a far cry from the WRB's desire to build reservoirs and bore tunnels. Hope is now to be placed on trading: the Environment Agency should be given new powers to facilitate the trading of abstraction and discharge licences, whilst a choice of supplier should be available to industrial and other non-household customers who annually use more than 5 mega-litres (1 mega-litre fills an Olympic-sized swimming pool). Cave appears undeterred by the failure of a previous attempt in 2005 to allow choice to non-household customers (using at that time more than 50 mega-litres a year) which resulted in only one taker!

In one respect, the Cave report harks back to the WRB era in recommending the setting up of "a research and development body to agree priorities and coordinate action" but this time funded not by the government but by the water industry and customers.

Once again, water is being treated as a simple commodity torn from its organic interconnections with society and the environment and with innovations led by a special interest group, this time emphasising market (economic) rather than structural (engineered) solutions. Introducing economic instruments to match supply and demand more closely, although 'efficient' in the short term, may prove dangerous when our knowledge of natural and unnatural climate change is so shaky. The engineering overambition to increase supply exemplified by the WRB may prove, in the longer term, to be the lesser of dangers caused by domination by special interest groups. Without the generous safety margins, so beloved of water engineers but often derided as uneconomic by investors, mitigation of predicted increases in floods and droughts with rapid onset of climate change will be hard.

In addition, there are sequels in social dynamics following the intervention of economists in increasing the application of market forces to water supply. Moral decisions about reducing personal water use become replaced by rights to use freely what has been purchased, irrespective of scarcity of supplies, as well as rights to pollute when a discharge licence has been obtained by payment. Social solidarity in response to severe climate variations is likely to be threatened.

The story is ongoing. My one conclusion is that democratic involvement in decision-making and fora for discussion of social priorities in water resources development will remain weak and underdeveloped whenever special interest groups of enthusiasts hold sway.

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