The Evolution of River Basin Management in England & Wales

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1 Introduction

This brief overview of the historical development of river basin management in England and Wales covers the evolution of the present institutional arrangements and how the inherited water quality has changed over the period 1850 to date.

Three overlapping phases of development are suggested that relate to the political, social and economic imperatives of the time; namely the:

- ***sanitation provision phase*** – covering the 1850's to 1950's;
- ***pollution control phase*** – between the 1950's and the 1990's;
- ***sustainable development phase*** – 1990's onwards.

2 The sanitation provision phase (1850s – 1950s)

During this phase the imperative was the provision of clean water supplies and safe sewage disposal. By the mid-nineteenth century the concentration of commercial, industrial and domestic development in overcrowded urban areas with little or no sanitary provision had resulted in epidemics of waterborne disease. Better understanding of the linkage between contaminated water and infection resulted in a series of Acts of Parliament designed to improve matters. The pioneering work of Sir Edwin Chadwick in the London area was influential in these changes (Daviss 1966).

The provision of sewerage sanitation to urban areas in the latter part of the nineteenth century greatly benefited the health of the population by virtually eliminating water-borne disease. However, it merely transferred the pollution problem to the rivers and streams into which the sewers discharged.

The Rivers Prevention of Pollution Act 1876 was an attempt to control river pollution by placing on the local 'sanitary boards' the responsibility for treatment of the sewage before discharge to a watercourse. However, it was only in 1912, with the publication of the Eighth Report of the Royal Commission on Sewage Disposal, that quality standards for river water and sewage effluent were first proposed in the form of chemical and biological measurements (Roberts 1974). Unfortunately, these standards were never incorporated into water law.

By 1914, the onset of the First World War focused attention on industrial production, putting further strain on sewerage and sewage treatment facilities thereby increasing river pollution.

In the period between the First and Second World Wars major advances were made in sewage treatment technology. However, the post-war recession and economic difficulties throughout the nineteen twenties and thirties meant that investment to meet the 'Royal Commission Standard' was patchy with many urban rivers remaining grossly polluted. Industries were encouraged to discharge their effluents to the public sewers to gain some treatment in admixture with domestic sewage. Unfortunately, many such effluents were toxic to the biological processes used in sewage treatment.

The Public Health (Drainage of Trade Premises) Act 1937 gave local authorities some measure of control over new trade effluent discharges to sewer, but exempted existing discharges from any control.

The focus on industrial production during and after the Second World War diverted attention away from dealing with the appalling state of many urban watercourses. It was not until the formation of the River Boards in 1948 that effective action to clean up polluted rivers was put in place. The Boards' remit was comprehensive responsibility for river pollution control and this was strengthened by enactment of the Rivers (Prevention of Pollution) Act 1951.

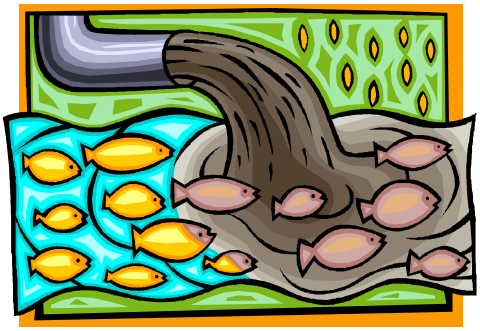
Case history: the Midlands River Tame during the sanitation provision phase

Industrial and domestic pollution of the Tame had resulted in its loss as a fishery and as a source for public water supply (Harkness 1982). Over the period 1891 to 1931 Birmingham grew from a city with a population of 470,000 to over 1 million (Box 1984).

Attention to pollution control was patchy, whilst the City of Birmingham took a responsible attitude, the Black Country towns paid little attention with the result that the river entering the City was little more than an open sewer. The major barrier to alleviation of the gross pollution was political as evidenced by the repeated failure of a joint committee established to agree remedial measures (Box 1984). Eventually, the formation of the Upper Tame Main Drainage Authority in 1966 brought sewerage services under the control of one authority and improvements began.

During the sanitation provision phase the river Tame changed considerably. Water supply for the conurbation now came from sources in other river catchments, such as the Elan Valley Reservoirs in Mid-Wales and the River Severn. As a result the flow in the Tame was increased to 1.5 times that of the river Trent, originally the major watercourse, at their confluence. The Tame was very heavily polluted as it left the Birmingham conurbation and was fishless throughout its 25-mile length. Such was the impact of the Tame on the river Trent that, beyond their confluence, the river was often devoid of dissolved oxygen for several miles downstream.

3 The pollution control phase (1950s – 1990s)



During this phase the priority shifted to the improvement of river water quality through the control of polluting discharges. The formation of the River Boards in 1948 with powers to fix standards for discharges to rivers saw the beginning of this shift. However, the responsibility for provision of adequate sewage treatment works remained with local authorities and joint sewerage boards. So funding for this service had to compete with the demands of other, often more glamorous, local services.

Under the Rivers (Prevention of Pollution) Act 1951 it became an offence for a person to cause the pollution of a stream. The River Boards were empowered to set standards for watercourses, and for new discharges to them, by granting conditional *Consent* to dischargers. However, existing discharges were exempt. These existing discharges finally came under control under the Rivers (Prevention of Pollution) Act 1961. In the same year new public health legislation gave sewerage authorities, local authorities and joint sewerage boards, the powers to control previously exempted trade effluent discharges to sewer. The *pollution control phase* had truly begun.

Post-war industrial expansion and the improving standard of living were placing pressure on water resources. Political action was necessary and, as a result, river basin management was rationalized. During the 1960's the River Boards were abolished and a smaller number of River Authorities with wider powers were formed.

Continuing pressure to resolve a perceived water resources crisis in the early 1970's prompted the government of the day to introduce river management reforms alongside the local government restructuring scheduled for 1974. The sewerage and water supply functions of local authorities, together with the functions of the existing River Authorities, were transferred to ten new Regional Water Authorities (RWAs) in England and Wales (White 1979). In addition a new body, the National Water Council (NWC), was set up to co-ordinate consultation between the RWAs and government.

The RWA governing bodies comprised appointees by the Secretary of State to represent special interests and a majority of representatives from local government in the region. Public participation in river basin management was restricted to lobbying remotely appointed representatives.

The RWAs were geographically based on river basins so heralding the commencement of comprehensive river basin management in England and Wales. However, they suffered from two fundamental weaknesses. Firstly, in matters relating to resource allocation and water quality they acted as both gamekeeper and poacher. Secondly, they had to prioritize investment between sewerage, water

supply and other services. Treasury constraints limited available revenues and, after an initial surge following their formation, RWA investment in infrastructure fell during the late 1970's and the 1980's (Martin and Woods 1992).

Kinnersley (1998) indicates that, in the 1980's, the imposition by the Treasury of external financing limits, financial targets and performance aims, reintroduced similar conflicts to those prior to 1974 when sewerage services were the responsibility of local authorities or joint sewerage boards. Inevitably, sewage works effluent quality fell. Many failed their *Consent* conditions and the government was forced to postpone the implementation of new legislation to strengthen the law on water pollution. This legislation included provisions for the maintenance of Public Registers showing Consent compliance and the lifting of restrictions on who might bring a prosecution against those responsible for non-compliance

To overcome this problem, the National Water Council (NWC 1977/78), after consultation with stakeholders, introduced use-based river water quality objectives (RQOs) and initiated two courses of action: -

- sewage works *Consents* were revised to actual performance where no deterioration to existing river water quality would occur even if the river did not comply with its RQO;
- the new RQOs were used to determine '*Long Term Consents*' as targets for future performance.

The latter provided a basis for the prioritization of capital expenditure.

These actions paved the way for enactment of the delayed Control of Pollution Act 1974 (Part Two). Lester (1980) considered the consequent establishment of Public Registers of sewage works performance and the easing of the controls on prosecution as important steps towards an open-book approach to water pollution control. It also provided a considerable step forward for public participation and stakeholder involvement.

The major debate on the future structure of the water industry during the 1980s was prompted by the political imperative to reduce the extent of the public sector economy. It concluded with the privatization of the water and sewerage services and the establishment of three regulatory bodies (Kinnersley 1998): -

- The National Rivers Authority (NRA) – inheritor of the regulatory and other functions associated with water resources, surface and groundwater quality, rivers and coastal engineering and water space amenity and recreation;
- The Drinking Water Inspectorate (DWI) – with regulatory responsibility for drinking water quality;
- The Office of Water Services (Ofwat) – with the responsibility for the economic regulation of the water and sewerage services companies.

Both the NRA and Ofwat established consultative committees to allow stakeholders to make inputs on water management issues, but public participation remained at arms length.

A stumbling block to the implementation of the privatization process was the continued failure of many sewage treatment works to meet their Consent conditions. The solution was a new, two-part *Consent* that comprised a *time limited* element and a *long-term* element (Matthews 1987).

These C*onsents* provided: -

- Temporary *Consent* conditions fixed at sewage works performance and the *time limit* for action to be taken.
- The required action to be taken to secure the *long-term Consent* requirements within the *time limit* allowed.

The privatization financial settlement provided the new companies with the funds to meet the requirements of these *Time Limited Consents* and the measures needed to substantially reduce river pollution by unsatisfactory storm overflows. Flotation of the new water companies triggered a massive investment programme in sewerage services that was to have a major impact on river water quality.

Ofwat, called a 'periodic review' of the price structure for water and water service company charges to be effective from 1994. A key feature was the costing of the investment and other actions needed for compliance with the EU Urban Wastewater Treatment Directive (Woods 1994a&b).

The 'periodic review' process requires the water and the water & sewerage companies to provide audited cost projections in the form of a business plan for all their activities for a given period against a set of criteria developed by all the regulatory bodies and approved by Government. The companies canvass customer support for their business plan before its submission. Following further consultation, Ofwat determines company price limits to meet agreed elements of the business plan after taking into account efficiency savings. Since privatization, this periodic review process has been held at five yearly intervals and provides the mechanism by which Ofwat sets individual price limits for water and sewerage service charges for each water and sewerage company.

The implementation of the EU Urban Wastewater Directive resulted in further marked improvement to river and coastal water quality and marked the end of the *pollution control phase*.

However, point source pollution from sewage and industrial effluent discharges is only one contributing factor to river water quality problems. Dowse and Selby (1975) reported the impact of industry on groundwater in Birmingham and the Black Country and pointed to the close relationship between ground and surface water quality. Webster *et al* (2001) report a further problem with river water quality when highly localized storm events disturb fine riverbed sediments. Outside urban areas, diffuse pollution from agricultural activity affects the quality of many rivers in England and Wales.

Case history: the Midlands River Tame during the pollution control phase

The formation of Severn Trent Water Authority in 1974 firmed up plans for a major clean-up. A major initiative was the closure of unsatisfactory sewage works in the Black Country and the construction of a trunk sewer to convey the sewage for treatment at modernized sewage treatment works at Coleshill and Minworth, downstream of the conurbation.

Another initiative was the Tame Lakes Scheme (Woods *et al* 1984), which involved the use of former gravel pits as stilling basins to provide sedimentation for the river flow as it left the City of Birmingham. Downstream river quality improved to such an extent that fish returned to the Tame and local fishing clubs were quick to benefit.

Ultimately, privatization provided the impetus and the finance to facilitate all of these improvements, but it was well into the *sustainable development phase* before they were fully realized.

4 The sustainable development phase (1990s onwards)

During the 1980's there was growing realization that a holistic approach to environmental issues would be necessary if the government's commitment to sustainable development principles was to be realized in the longer term. Yet regulatory control for environmental aspects of air, water and land were in the hands of several bodies including the NRA, Her Majesty's Inspectorate of Pollution (HMIP), local authorities, etc.

The move to consolidate such control in a single institution came with the Environment Act 1995 that established the Environment Agency (EA) and provided the regulatory, institutional structure necessary for the *sustainable development phase.*

The EA is organized geographically more or less on the same river basin model as the former NRA Regions, with sub-regional operational areas aligned with river sub-catchments. In addition to stakeholder contact through consultative committees at Regional level, the development of Local Environment Agency Plans (LEAPs) involved extensive consultation at local level with local authorities, industry, special interest groups and environmental campaigners. The LEAP process (Petts *et al* 2002) is essentially the mechanism by which government policy on environmental issues meets local needs as expressed by stakeholders and the general public who live, work and play in the area and provides a basis for mobilizing resources to achieve such goals.

Implementation of the EU Water Framework Directive (European Commission 2000) will provide the next stage of river quality improvements and consolidate the *sustainable development phase* of river quality management. It is worthwhile spending a little time reviewing the background to its development. There is an interesting parallel between the development and implementation of water policy in the UK and in the EU. Just as the author postulates a *sanitation provision phase*, a *pollution control phase* and a '*sustainable development phase'* in the UK, Kaika and Page (2002) refer to a 'public health phase', a 'pollution control phase' and a

'sustainable development phase' when reviewing the development of EU water policy.

Over the period 1973 to 2000 Chave (2001) indicates that EU policy in the water sector has been driven by a series of five Environmental Action Programmes (EAPs) that identified a number of priority issues including: -

- Definition of water quality objectives for waters used for specific uses: sources of drinking water; bathing; protection of aquatic life.
- Control of dangerous substances: substances known to be toxic, persistent and which bio-accumulate in the water environment.
- Protection of the sea against pollution: to preserve the fundamental biological and ecological balances of the planet.
- The adoption of industry specific measures: to reduce pollution caused by industries posing particular threats to the aquatic environment.

Other measures facilitated the development of international agreements on trans-boundary water quality issues and promoted research to further the knowledge of the origins, impact and remediation of pollution.

Taken as a whole these actions signaled a progressive move towards the embodiment of sustainability and sustainable development principles in EU water policy.

In 1995, amid growing concern at the lack of progress with the fragmented nature of existing Directives, fears about the inadequate measures for the protection of groundwater and the added pressure for a new Directive to protect aquatic ecology, the Environment Committee of the Council of Ministers requested that the European Commission develop a more comprehensive approach to water policy. The outcome of this process was the EC Water Framework Directive (European Commission 2000)[1].

The Water Framework Directive (WFD) has the following key features.

1. The concept of river basin management is introduced through the establishment of river basin districts as the basic management units.
2. For each river basin district a river basin management plan must be developed, including a programme of measures to form the basis for the achievement of water quality protection and improvement.
3. Although its prime aims are environmental the WFD embraces all three principles of sustainable development. Environmental, economic and social needs must all be taken into account when developing river basin management plans.
4. River basin management plans shall not allow further deterioration to existing water quality. With certain defined exceptions, the aim is to achieve at least

[1] *The EC Water Framework Directive – An Introductory Guide,* is downloadable from the FWR website at www.fwr.org

good status for all water bodies in each river basin district. Geographical factors are allowed for when good status is defined.

5. The use of environmental quality standards (EQS) and the use of emission limit values (ELVs) are brought together by the WFD in a new dual approach.
6. A number of existing Directives will be replaced when new local standards are developed to meet WFD requirements. These must be at least as stringent as those being replaced. Daughter Directives will be introduced for groundwater quality and for priority substances, formerly known as dangerous substances.
7. Measures to conserve water quantity are introduced as an essential component of environmental protection. Unless minimal, all abstractions must be authorized and, for groundwater, a balance struck between abstraction and the recharge of aquifers.
8. The polluter pays principle is incorporated through a review of measures for charging for water use, including full environmental cost recovery.
9. Public participation, and the involvement of stakeholders, is a key requirement of the river basin management planning process.

The EA is designated as the competent body to implement the WFD in England and Wales.

The Directive will affect every aspect of water use: domestic, industrial, agricultural, leisure and environmental conservation. Besides restrictions on point source discharges the achievement of good status will mean tackling the problem of diffuse pollution from agriculture and contaminated land. In some instances it may require river re-grading work, or the reversal of land drainage schemes, to restore lost habitats

The river basin district management planning process has a tight schedule with the first plans and associated programmes of measures to be completed by December 2009. Thereafter the process is cyclical with updates to the plans and programmes of measures required on a six yearly basis.

The first task for the EA is the establishment of the boundary conditions for good status for the various types of water bodies and this should be completed by December 2006. These definitions will then be used to identify where action is needed to either secure or maintain good status and thereby establish the programmes of measures.

It should be noted that for artificial water bodies, such as dams and canals, and for heavily modified water bodies, such as the canalized River Tame passing through an urban area, somewhat less stringent water quality standards would apply.

5 The future

The WFD provides an excellent framework against which to plan and implement the *sustainable development phase* of river basin management. The EA with its inherited, long experience in such matters is the ideal organisation to manage its implementation.

Many interested parties have high hopes that this will result in major benefits to the ecology of the water environment, yet sustainable development principles embrace economic and social aspects in addition to environmental issues. In reality the full environmental benefits may only be realized after several planning cycles.

Throughout the history of river basin management in England and Wales the general public have rarely, if ever, been directly consulted on plans for river water quality. There has been extensive liaison with stakeholder groups and this approach has again been adopted by the EA for river basin district plan consultation. However, the Directive calls for more direct consultation public participation as the river basin management plans, and associated programmes of measures, are developed. Time will tell whether the EA approach will meet the ambitions of the WFD.

6 Useful reading

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