

Political ecology of dams in Teesdale.

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SYNOPSIS. Between 1894 and 1970, six dams were built in the beautiful Pennine landscape of Upper Teesdale in North East England to supply industrial consumers on Teesside. Political influences on the decisions to build these impounding reservoirs are explored to discover the reasons for ignoring alternatives, some of them much less intrusive on the rural environment. Was the concept of a sequence of dams in upland dales overtaken by a megadam with consequent major transfers of water between catchments? With hindsight, should preference have been given to provision of domestic and industrial water storage by the “Metropolitan” solution of pumped storage off-river reservoirs close to the point of use? By asking who benefits and who pays, economically, socially and environmentally, this historical analysis presents a wide perspective on the social and environmental impacts of dams and reservoirs with implications for future choices.

INTRODUCTION

From the 19th Century, Pennine dams were regarded as a “natural” solution for water supply for growing industrial cities in the valleys and nearby lowlands. Over 200 were built between 1840 and 1970. The physical advantages of altitude allowing gravity flow from upland sources to lowland consumers, high rainfall and low evaporation, rivers transporting soft water in valleys topographically-suited for impoundment, gave the impression that this solution to water supply was pre-determined, a right and proper use of natural resources.

Industrial Teesside with its thirsty iron and steel works and heavy chemical factories sited around the estuary of the Tees, in a rain shadow area, followed this pattern of looking to the hills for water for a century. But a closer look at the history of the six dams built in Teesdale shows that the choices were strongly influenced by politics. Increasing wealth of urban industrialists on Teesside bargained with an almost feudal society of aristocratic Pennine landowners, threatened by new taxes, and their small tenant farmers, who had few resources and little power. Rights to build dams were easily negotiated with the gentry but post-Second World War opposition grew from middle-class defenders of the countryside.

The argument is proposed that engineering solutions to water supply to Teesside have been influenced strongly by politics. Historical vignettes, illustrate the role of engineers exercising power, in varying contexts, over

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development of water resources. Attention will be given to neglected alternatives. Once the interplay between technology and politics is recognised, “what if?” games may be played to assess how different political priorities might have led to outcomes more in tune with 21st Century ambitions in Europe for a water environment with a high degree of biological health.

JAMES MANSERGH AND JULIUS KENNARD: ENGINEERS AND POLITICAL ACTORS

James Mansergh and the first phase of dam building.

The first water undertaker for Middlesbrough and Stockton was a private company set up by the local industrialists, who organised direct abstraction from the Tees at Broken Scar (Figure 1), where a steam pump was installed in 1860, designed by Messrs J & C Hawkesley (Mansergh 1882). Later, the local Corporations claimed that the water supplied was sometimes unfit to drink and that the Tees was being ruined by abstraction. The Mayor of Middlesbrough had ambition to bring purer water from Pennine reservoirs in the manner of Manchester Corporation who, in 1847, took the whole of the Longendale valley to construct a series of stepped reservoirs (Walters 1936). He needed the help of an engineer who was a skilled politician as well as an expert in dam building to help him take over the private company by compulsory purchase.

He hired James Mansergh, who had designed a series of six dams in the Elan and Claerwen valleys in 1870-71 for the water supply of Birmingham. Mansergh held that it was “incontestable” that “the purveying of water to the public should be one of the distinctive functions of the responsible sanitary authority of any district” (Anon. 1905). His political beliefs suited and his advocacy skills won the day; the Stockton and Middlesbrough Corporations Act of 1876 was passed after a struggle lasting 42 days in committee in both Houses of Parliament. The Act authorised a new body, later to be called the Tees Valley Water Board, to abstract 39,096m³/d from the Tees at Broken Scar and to construct, in the tributary Lune and Balder valleys, six reservoirs starting with Hury and Blackton.

Far from leading to an instant improvement of water supply with increased investment, taking the company into public ownership paralysed activity for years. Compulsory purchase did not come cheap: the legalities of the Act cost Middlesbrough and Stockton Corporations each £12,403 (£0.56M) (Note 1), whilst the cost of purchasing the company amounted to £845,986 (£38.3m) (MRO 1898a). This financial burden was so substantial that progress with the proposed upland reservoirs, then estimated to cost a further £700,000 (£31.7M), was seriously delayed. Until 1882, the new Water Board ran at a loss (MRO 1898b). Without the backing of the

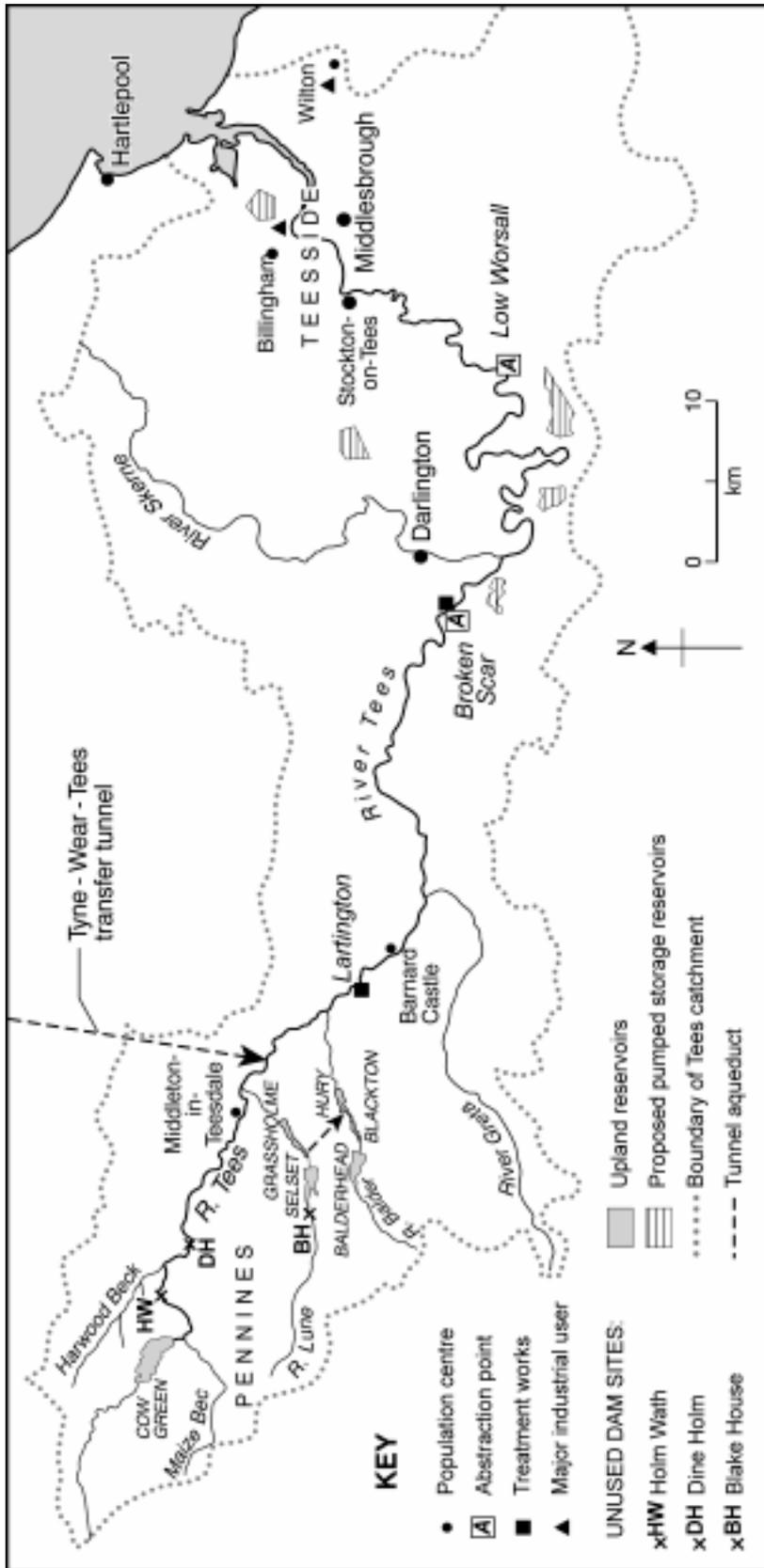


Figure 1. Teesdale Reservoirs

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Corporations and their ability to obtain long-term loans, bankruptcy would have loomed.

Twelve years after taking over the water company, the Mayor of Middlesbrough and Chairman of the Water Board was called to account. Pig iron production demanded more water and the Stockton and Middlesbrough Corporations had to apply to Parliament for further powers to abstract even more water from the Tees at Broken Scar to tide them over until one or more of the upland reservoirs had been constructed. At the House of Lords committee hearing, the Mayor was subjected to hostile questioning by Counsel: “Is there a single work; that you undertook, that you have done, or a single promise you have made at this time that you have not violated?” The Mayor was reminded that, as a prelude to the takeover of the private company, he had decried its intention of taking more water from the Tees at Broken Scar; yet now the Mayor was asking to do the same (MRO 1884). Nevertheless, powers were extended following a promise of an early start on the proposed Hury reservoir.

Financial difficulties continued and reports of enteric fever were still being attributed to the drinking of water from Broken Scar (Anon.1890-91). The costs for Hury alone had doubled from the original estimate of £108,637 (£7.1M) to £224,933 (£14.7M) (MRO1898a). New borrowing powers were required to ensure completion of Hury and Blackton.

James Mansergh must have been a patient man. His plans for the Elan & Claerwen reservoirs had taken 20 years before adoption and his Teesdale scheme, approved in 1876, was only partially built before his death in 1905. His scheme involved relatively pure water being piped from two connected reservoirs: Hury (1894) and Blackton (1896) to a filtration plant at Lartington and then to Teesside. James Mansergh took the provision of compensation water very seriously, although he appeared less sensitive to biological issues. He had planned a third reservoir, Grassholme, in the neighbouring Lune valley mainly to remedy “serious injury” being caused by excessive abstraction (Note 2). Grassholme was connected to Hury by an aqueduct driven through the watershed so that water, above stipulated levels to ensure continuity of compensation releases, could flow into Blackton and Hury and thence into supply. Grassholme was not finished until 1915, built under the supervision of James Mansergh’s son.

Financial compensation was substituted for building fish passes over the dams. A donation of £1,250 (£0.08M) “to be expended at such times and in such manner as the Board of Trade in their discretion may think fit for the permanent improvement of the salmon fisheries of the Tees Fishery District” sufficed to grant the Water Board relief from the requirements of

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the Salmon and Freshwater Fisheries Acts 1861 to 1892. In whatever way the Board of Trade spent the donation, it did not stop the subsequent rapid decline of salmon fishing on the Tees, caused by pollution of the estuary.

An alternative in the search for pure water might have been exploitation of local aquifers but one of the reasons James Mansergh avoided using groundwater was the poverty of its legal protection: “there was no right in underground water unless it could be proved that such water was flowing in a defined and locatable underground channel”. This meant that there was no assured compensation if another party drilled a well nearby, reducing supply from the earlier well (Mansergh 1901).

Features of this early phase of dam building included:

- Importance of a champion for the reservoirs who could speak with authority to investigating committees.
- Need for an effective management organisation. The new Water Board took years to build up the necessary finance to implement plans approved in 1876.
- Ease of negotiations with Pennine owners with large estates. Agreements allowed retention of gaming rights, so that sale of the land did not affect landowners’ life styles, whilst providing much needed cash to set against increasing taxation and agricultural depression.
- Tenant farmers had little protection except that there might be resistance from the Local Government Board, if it were to be faced with an excessive number of displaced people (more than 10 families).
- Before introduction of chlorination, there was a premium on the relative purity of the upland water.

The second phase of dam-building in Teesdale led by Julius Kennard Industrial contraction during the interwar years affected the finances of the Water Board so badly that it had to raise the water rates whilst there was much hardship from unemployment. Spens (1948) attributed the lapse in investment in the interwar years also to poor management before an “energetic and enthusiastic” Engineer and Manager was appointed in 1941. Construction of the fourth Mansergh dam at Selsset above Grassholme had been planned during the War but no funds were available. Expansion on Teesside of heavy manufacturing, despite its high water demands, was given encouragement by the post-war Government. Imperial Chemical Industries (ICI) opened its Wilton petrochemical works in 1949 and began a programme of rapid expansion (Owen, 1999).

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Water demand on Teesside became pressing and the Water Board needed an engineer with both experience in building dams and political skills to win Parliamentary approvals. Heightened political awareness and strengthened defence of alternate land uses faced Julius Kennard on his appointment as consulting engineer to the Tees Valley Water Board in 1952. Promotion of dams in the upland dales now invited opposition from organisations such as the Wear and Tees River Board, the Nature Conservancy, the National Parks Commission, the National Farmers Union, the Ramblers' Association and many other bodies with different priorities for the use of the uplands.

Like James Mansergh, Julius Kennard acted politically both in planning reservoirs, in sounding out opponents and in promoting the schemes. The practice at the time was for the consulting engineer undertaking the promotion to be appointed to design the works approved. This dual role led to preference for supply rather than proposals for demand reduction; and for the form of supply of the type preferred by the appointed engineer, in this case upland reservoirs. Julius Kennard added another reason for his choice: "an underground water scheme will involve the promotion of numerous Orders, which, if objected to, will necessitate local enquiries, and it is more than likely that protective clauses will be included on behalf of existing users"(Kennard 1965).

With a prestigious remit to provide structural solutions to increase supply, Julius Kennard at first followed James Mansergh's plans, developed by his son, for a second reservoir in the Lune valley at Selset, above the Grassholme reservoir, and he reported to the Water Board (1952) that "our survey confirms the information which Mssrs. Mansergh set out in their report dated 1/10/20 suggesting an earth embankment dam of the usual design." He also quoted with approval Ernest Mansergh's views:

'Some years ago, and not very many, "compensation water" was looked upon as something bordering on the sacred, and rightly so, because after all it represents a form of property in which others have a right and interest, sentimental perhaps to a very large degree, but nowadays compensation water must be looked at from a more materialistic point of view, not who has a right to the water, imaginary or real, but to whom is the use of the water going to be of the most benefit.'

This more materialistic point of view was endorsed by the Water Board, and drastic reduction in compensation water was sought as a stop gap, until further upland reservoirs could be built.

The Wear and Tees River Board, set up in 1952 with wider terms of reference but excluding water supply, did not view their reasons for wanting more water in the Tees as "sentimental". Water in the rivers was needed to

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dilute pollution and improve water temperatures for fish, while people visiting the river for recreation wanted to see more water flowing. An unusual battle began between the Water Board and the River Board, all the more extraordinary because of the unremarked conflict of interest of Alderman Charles Allison, who was simultaneously not only Chairman of the Water Board but also Deputy Chairman of the River Board.

In 1953, and again in 1958, the Water Board promoted private bills (Tees Valley Water Bills) seeking temporary reductions in the compensation water. On both occasions, they were petitioned against by the Wear and Tees River Board, without success. Despite “several meetings between representatives of the River Board and the Water Board...unfortunately, no agreement was reached on the several points of difference” (Wear and Tees 1959). Alternatives to the Water Board’s plans for further reservoirs in the dales were put forward by the River Board in 1955 but were rejected. (See below: “The Metropolitan solution”).

After ensuring the necessary Parliamentary procedures, Julius Kennard oversaw the construction of Selsset reservoir, acclaimed by the Water Board as an ample water supply for at least 25 years (Anon. 1955). Yet demand threatened to outstrip supply very soon after building started so that the Water Board wanted further dams.

The enticement of greater discharge encouraged Julius Kennard to stray from the Mansergh scheme, although two potential dam sites remained: at Balderhead above Blackton and at Blake House above Selsset, and to investigate the possibilities of dams in the main valley of the Tees. The physical attributes of a large river flowing in a gorge were attractive but not only to an engineer: Upper Teesdale was contested territory. Beautiful scenery was valued by walkers, the dales’ improved pastures were important for agriculture. Also most of the land had been designated by the Nature Conservancy as a Site of Special Scientific Interest (SSSI) and the bleakest upper reaches at Moor House had been bought in 1952 as a National Nature Reserve.

Julius Kennard sounded out the Nature Conservancy (NC) over potential dam sites. At first, the NC officers were not alarmed. They took their lead from much revered Professor W.H. Pearsall, F.R.S., who was interested in biological productivity more than preservation. As a member of the Conservancy since 1949, Chairman of the Conservancy’s Science Policy Committee 1955-63, architect of the Upper Teesdale SSSI and the Conservancy’s land use policy, he wrote to the Regional Officer:

‘I think that it is pretty clear that from the point of view of the naturalists that the project of putting a dam just above Cauldron

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Snout is much the better one and I personally would offer no objection to it. I would not offer great objection to the alternative but I am pretty sure that there would be an outcry from the naturalists about this one. It is, between ourselves, logically and geologically the better site and I should not be at all surprised if ultimately adopted. (PRO FT 17/68, 08/05/56).'

But, in November 1956, Julius Kennard met with the Deputy Director, Dr Worthington, and was told that the NC might take strong exception to the reservoir. Worthington noted for the record that Julius Kennard was not interested in Natural History. (PRO FT 17/68 27/11/56).

The upper site above Cauldron Snout, Cow Green, was investigated first to test its geological suitability. The geologist, Edgar Morton, advised the Water Board that the site would not be watertight and should be abandoned. Attention turned to sites below Cauldron Snout, first at Holm Wath just below the cataract and then at Dine Holm further downstream, but above the waterfall at High Force, a major tourist attraction. Morton advised that the narrow valley with dramatic limestone cliffs at Dine Holm could, with some grouting, be suitable for an impounding reservoir. Water augmented by the reservoir could flow by gravity in a pipeline from an intake just below the waterfall to Teesside.

Alarm grew amongst scientists and amenity groups who feared loss of the rare flora, which had made Upper Teesdale internationally remarkable. At the same time as the Water Board was laying plans for a reservoir, an influential paper appeared in the *Journal of Ecology* (Pigott 1956) analysing why such a concentration of rare species found congenial conditions in Upper Teesdale, far from their usual habitats in high mountains or in the Arctic. The governing committee of the NC on 30/01/57(PRO), agreed "to make the strongest opposition to the proposed reservoir". A letter deploring the proposal was orchestrated for publication in the *Times* in February 1957, signed by 15 prominent botanists. The stakes had been raised from a local planning issue to a national debate both about nature protection and national policy for industrial water supply.

Communication between the Water Board and the NC appeared indirect at this stage. In July, it was a representative of Durham County Council who told the NC that the Water Board had now confirmed that it would be promoting a Parliamentary Bill in the next session for the construction of an impounding reservoir at Dine Holm (PRO FT17/68 18/07/57).

At last, on 8 October 1957, a meeting was held between the Water Board (Julius Kennard and E.A. Morris), the NC (R. J. Elliott), R. Atkinson

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(Durham County Council) and J. Vincent (North Riding County Council). There was little meeting of minds. Elliott reported, "Pressed on the methods that the Board would adopt to meet a recurring water deficit - Kennard's only solution was 'additional reservoirs'...Asked what alternative sources of supplying industries' needs had been investigated - the officers (of the Water Board) present became decidedly hostile" (PRO FT17/68 08/10/57).

On 25 October, the Director-General of the NC, Max Nicholson, wrote "now that the Conservancy have instructed me to fight this Tees Valley case I will do so to the utmost of my ability, and am reasonably confident of success". He had been working behind the scenes, with the National Parks Commission, to tackle the Ministry of Housing and Local Government (MHLG). He recorded:

'The most interesting point of all which emerged was that the Ministry and the promoters have given no real thought or study to the alternatives and that they have at least at present no answer which could stand up to examination as to why the reservoir is necessary at Dine Holm or anywhere else (PRO 17/68 25/10/57).'

Then, Max Nicholson had an inspiration: rather than continuing to argue with the Water Board, or to hope that the MHLG would take action, he would approach the Chairman of ICI (1953-60), Sir Alexander Fleck KBE, FRS, DSc, directly. The letter amounted to refined blackmail,

'You are likely to be next year's President (of the British Association for the Advancement of Science) at Glasgow when, amongst other things, I understand that the question of water conservation is likely to be discussed...'

He went on to alert Fleck to the threat of the Tees Valley Water Board "irretrievably to destroy this area by inundating it under a reservoir at Dine Holm" and concluded by saying, "we would be very sorry to find ourselves compelled to do battle with ICI without having made every effort previously to reach an acceptable solution" (PRO FT 17/68 01/11/57).

Faced with a potential humiliation on an occasion that should have marked the pinnacle of his scientific career, Fleck readily agreed to meet with Nicholson on 14 November 1957. Nicholson jubilantly reported back "the ICI were ready to put a brake on the Dine Holm project until there had been more opportunity to examine alternative sources of water." (PRO FT 17/68 14/11/57). ICI staff reported dryly on the Water Board's proposed bill:

'In view of the expected opposition from outside bodies to the scheme and incompleteness of the investigation of reasonable alternatives, ICI did not feel that they were in a position to support such a bill and this scheme was therefore shelved. (ICI X/11489).'

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Julius Kennard reverted to the Mansergh plan for a third reservoir in Balderdale, above Hury and Blackton at Balderhead, despite opposition from farmers (Sheail, 1986), and an extension to the pumping station at Broken Scar. The Daily Express (8/4/61) reported the inauguration of construction at Balderhead and the passionate response of the Chairman of the Water Board who “was very cross about it all”. Alderman Allison is reported to have said, “All this fuss is a lot of tommy rot. It is sickening to think that a little flower is more important than the future of Teesside. Who cares if the gentian disappears - it is no good to anyone?”

Meanwhile, the NC was lulled into complacency: the Dine Holm scheme had been averted and the potential reservoir site at Cow Green deemed unsuitable because of permeable rocks. A major flaw in the legal protection of Upper Teesdale remained: Moor House Nature Reserve had been purchased, a further National Nature Reserve had been agreed with the Earl of Strathmore west of the Tees but the land on the east, owned by the Raby estate, included Widdybank Fell with its valued Arctic-alpine vegetation still vulnerable as a “proposed” Nature Reserve with no legal status. The owner, the Hon H.J.N. Vane, later to inherit the title of Lord Barnard in 1964, did not want to comply with the NC’s proposal for a nature reserve, perhaps because the barytes mines at Cow Green, closed in 1954, might be reopened should the market for this mineral recover.

To Julius Kennard, this unprotected site, barring the gloomy predictions of leakage by Edgar Morton, seemed more attractive than the last site identified by Mansergh higher up the Lune valley above Selset at Blake House. He sought a second opinion. His son, Michael, with Dr John Knill carried out a detailed site investigation from which they concluded that the high water table on the east side of Cow Green would prohibit leakage through the limestone strata to the adjacent Harwood Beck (Kennard & Knill 1969). With this good news, Julius Kennard recommended that steps be now taken for obtaining statutory powers to construct the reservoir.

The difficulties for the NC were just beginning. Julius Kennard approached them again in August 1964 (PRO FT 17/61 24/08/64) and was at first assured that the Cow Green site was unlikely to be problematic but in fact the proposal to build a reservoir at Cow Green unleashed angry reaction from naturalists in the Northumberland and Durham Naturalists Trust, the Botanical Society of the British Isles and many other environmental organisations. A public subscription was raised to fight the case and, following submission of a private bill in December 1965, the debate continued in the Select Committees of the House of Commons and the House of Lords throughout 1966. The story is told by Gregory (1975). This

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time, Julius Kennard and the Water Board were victorious: the Board was granted permission by Parliament to build the Cow Green reservoir.

THE RISE OF THE MEGADAM

A decade later, in response to projections of increased industrial demand and in an attempt to avoid adding to the plethora of dales reservoirs, a tunnel was constructed to bring water 45 miles to the Tees from the river Tyne, supported by what was claimed to be the largest man-made lake in Europe, Kielder Water. This scheme made the Teesdale dams no longer essential. In theory, the Teesdale dams could now be decommissioned in favour of water imported from the Tyne. In practice, it is the giant Kielder reservoir with a capacity of 200 Mm³, double that of all six Teesdale reservoirs, which has remained underused for 20 years, failing in its aim to improve the economic development of the North East by attracting new, water-needy industries. Supply from the Teesdale reservoirs continues as the cost of pumping water from the Tyne to the highest point of the Tyne-Tees tunnel is greater than the cost of supply by gravity flow from the Teesdale dams; also soft water from Lartington is economical for boiler feed. Only twice in its history has Kielder been used to transfer water to the Tees, first in 1983 and then in 1989, (FOE 2003) although water has been transferred as far as the Wear to supplement the underperformance of the Derwent reservoir (Soulsby *et al* 1999).

Planning water resources on such a large scale required political reorganisation. The Water Resources Act 1963 set the scene with the creation of large River Authorities and a national body, the Water Resources Board (WRB), to encourage long-term integration of water supply over wide areas. Rather than continued iteration with the industrial consumers to judge its effectiveness in promotion of economic development, dedicated focus on water supply made it an end in itself and safeguards against overinvestment were weak. Uncritical extrapolation of water demands at the outset was not corrected at later stages when British Steel failed to expand on Teesside. "Over investment for any particular area is indicated when facilities stand idle or else are put to makeshift uses, either to avoid the appearance of idleness or to minimize the losses due to past mistakes."(Hirshliefer *et al*(1960)). Tourism gains from Kielder may be viewed in this light. Short summers, high rainfall, biting insects, restrictions on motor boats and remoteness from centres of population suggest that such a recreational facility would not have been sited in the Upper Tyne valley, if this had been the main aim for such a huge financial investment.

Unlike the financial arrangements in Teesdale, those industries which demanded more water at the Kielder inquiry made little or no contribution to the capital costs of the Scheme, which was funded by loans from the

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National Loans Fund £46M(£121M); from the European Investment Bank £63M(£166M) (at interest rates of up to $17\frac{7}{8}\%$ over 25 years) and grants from the UK Government £24M(£63M) and the European Regional Development Fund £36M(£95M) (HoC Public Accounts 1984-85). Brady (1983) claimed that “the financial burden has shifted substantially away from Teesside industries towards the region’s other consumers”. In 1989, at privatisation, much of the outstanding debt was transferred to Government to make the sale of the Northumbrian Water undertaking attractive. Today, Northumbrian Water Group plc has debts of £1.7bn and receives £11.5M annually from the Environment Agency to operate Kielder (NSL Group 2003).

Environmentally, the assessment is mixed. Omission of a fish pass was justified at the time by substitution of a fish hatchery at Kielder and the hatchery has been successful in reintroducing salmon to the Tyne (Marshall, 1992). Yet there are serious doubts whether the genetic pool from which these stocks are bred is sufficiently diverse for the process to be sustainable (Anon 2002). Transmission of water from the Tees to the Yorkshire Ouse catchment is now physically possible via a pipeline constructed during the 1995 Yorkshire drought but such transfers are opposed by the FOE as dangerous biologically. Instead of importing water from another company, Yorkshire Water has improved conjunctive use of its own resources.

The high costs of the Kielder Water Scheme have weakened support for similar megaschemes. The words of Rocke (1980) ring true “schemes such as Kielder may be the last of their kind for some time”.

A CENTURY OF DAM BUILDING FOR SUPPLY TO TEESSIDE: WINNERS AND LOSERS

Determined pursuit of water supply led by water engineers resulted in:

- Successful supply to Teesside industries and domestic users.
- Construction of six reservoirs in Teesdale, without oversupply because of control of funding by the industries benefiting.
- The second phase of 3 reservoirs in quick succession fuelled demands for longer-term planning and a national strategy.
- Expensive and protracted disputes, increasing distrust between water engineers and environmentalists.
- A greatly-modified river environment.
- The Cow Green reservoir, still regarded “as an unforgivable intrusion”. (Ratcliffe, 2000). Valued vegetation was drowned and the surroundings affected (Huntley *et al*, 1998).
- The expensive and under-used Kielder Water Scheme, still a drain on the public purse.

Table 1. Impounding reservoirs in Teesdale, also Kielder Water

Reservoir & consulting engineer	Date built. River	Dam dimensions	Full Capacity	Type
Hury <i>J. Mansergh</i>	1894 Balder	33m H 374m L	3.9Mm ³	Direct soft water supply
Blackton <i>J. Mansergh</i>	1896 Balder	21m H 338m L	2.1Mm ³	To Hury + flood bypass.
Grassholme <i>E Mansergh</i>	1914 Lune	34m H 274m L	6.1Mm ³	Compensation + to Hury.
Selset <i>J. Kennard</i>	1959 Lune	41m H 928m L	15.3Mm ³	To Grassholme
<i>Dine Holm</i>	<i>Abandoned Tees</i>		<i>17.2Mm³</i>	<i>Direct</i>
Balderhead <i>J. Kennard</i>	1964 Balder	52m H 914m L	19.7Mm ³	To Hury + regulating
Cow Green <i>M. Kennard</i>	1970 Tees	26m H 572m L	40.9Mm ³	Regulating
Kielder <i>D.J. Coats</i>	1982 N. Tyne	52m H 1140m L	200.0Mm ³	Regulating

(See Note 3)

AN ALTERNATIVE WATER ENVIRONMENT.

More use of groundwater, demand reduction by improvement of industrial efficiency in energy use, water recycling and elimination of polluting discharges are some of the alternatives raised by critics of this century of impounding dam construction (Kinnersley 1988; Pearce 1982). The quantities of water required might not have been met wholly by such means but a concept raised during the struggles, perhaps too easily dismissed by the water engineers intent on upland dams, is worth revisiting in the light of modern ambitions, such as those raised in the European Water Framework Directive. This was called the Metropolitan solution, basically reducing the spatial extent of the “footprint” of industrial Teesside, following the example of London.

THE METROPOLITAN SOLUTION

Cecil Clay, Chief Engineer of the Wear and Tees River Board, put forward plans more protective of the integrity of the Tees. He suggested conjunctive use of abstraction at Broken Scar with storage in the three existing upland reservoirs and seasonal variation in release of compensation water (HoC 1958). His ideas were supported by Thomas Hawkesley, great grandson of the first engineer of the private Middlesbrough and Stockton Water

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Company, who added that water abstracted at Broken Scar would need more treatment and pumping than the upland water but the extra cost would be “a bagatelle on the total annual cost of the undertaking”(HoC 1958) (17). Later, the River Board put forward a plan to the Water Board that added pumped storage reservoir(s) in the Tees lowland to store river water abstracted at Broken Scar or nearby points during high flows. Six possible sites were proposed as shown on the map (Figure 1).

This “Metropolitan” solution, similar to London’s supply, with water abstracted from the Thames and stored in large off-river reservoirs at Windsor and Staines, was turned down by the Water Board before they promoted the Cow Green scheme in Upper Teesdale in 1965. Julius Kennard (1965) advised the Board “we are in no doubt that such a scheme should not even be contemplated in the circumstances”. He argued that the capacity of the abstraction plant at Broken Scar would have to be extended if high flows were to be abstracted and taken into storage and suggested that a pumped storage scheme might take longer to construct than the Cow Green reservoir. However, it is debatable whether construction in the lowlands would take longer than construction of Cow Green in the Pennines, where the construction season was short because of heavy snowfalls.

A pumped storage reservoir built at about the same time for London’s water supply, Wraysbury (35Mm³), provides a comparator with Cow Green (40Mm³). Wraysbury took 5 years to build, (1965-70), and cost £3.7M (£35.2M). Cow Green took 3 years to build (1967-70) and cost £2.5M (£28.6M) (Griffiths 1984). Yet Kennard claimed: “the cost of the reservoir (pumped storage at Teesside) itself could be as much as twice the cost of Cow Green reservoir”. WRB (1965) thought two of the six Teesside sites were comparable with Cow Green: at Staindale, and at Cowpen on the estuarine marshes where the building estimate was equivalent to that of Wraysbury, even though costs of construction and land purchase in Teesside were likely to be much less than those in the desirable London suburbs. Other potential problems were listed, none of which deterred the engineers constructing similar off-river reservoirs at London, Farmoor (Oxford) and Exeter. The case was concluded by anticipation of great opposition from the public; in fact, it was the underestimated opposition to the upland Cow Green reservoir that caused two years’ delay.

The multiplicity of arguments made against the Metropolitan solution gives an impression of special pleading. Some could be countered; for example one of the sites, on Cowpen Marsh, was not good agricultural land. Even the loss of good farmland did not prevent the building in the area of many service reservoirs for the Teesside distribution network. One of these, the

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Long Newton reservoir at 200 ha, a third of the possible size of a pumped storage reservoir, was constructed without opposition, only two miles south of one of the proposed sites at Newbigin. Even if the costs were somewhat higher, reservoir construction near a city offered much needed water-recreation facilities within easy reach of many and, probably, less upset for any families displaced by compulsory purchase because of the greater availability of job opportunities in a suburban area and greater acceptance of industrial development by the public.

The botanist, Professor Donald Pigott (1957), summarised the situation:

‘The continual expansion of British industry results inevitably in an increasingly urgent competition for space in this crowded island. This would be less serious if industrialisation could be confined to certain agreed areas. But enormous quantities of water are demanded for modern industrial processes and this leads to constant requests for permission to construct reservoirs at points well outside the actual industrial regions.’

If the alternative of off-river pumped-storage schemes had been opened up to public debate, the outcome of the struggles for water in Teesdale might have been very different with habitats of rare plants left unmolested.

CONCLUSION.

A century of industrial expansion in Teesside began with laws requiring compensation for water withdrawn from rivers or for injury to game fish populations and it was a criminal offence to pollute water. Each of these ideals was eroded under pressure, as illustrated in this story but now, with the decline of heavy manufacturing industry in Europe (often re-located overseas to even more water-stressed environments), hopes of an undamaged water environment have returned.

The challenges presented by the European Water Framework Directive will require cooperation rather than the antagonism between engineers and biologists that marred the era of industrial expansion. If the new legislation is to be more successful than the old, many water resource solutions, structural and non-structural, need to be explored before attitudes harden around preferred options. Historical studies of the connections between politics and the environment may illuminate scenario building for a future requiring holistic responses.

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NOTES

1. Money has been translated into 2002 purchasing power by Economic History Services www.eh.net/hmit/ppowerbp/
2. In Mansergh's words, reflecting on common law, "no public body may abstract water from a surface stream (other than a large river at a low level) without compensating the owners below, either in money or in water...Further, no riparian may pollute a stream as it passes through his estate, or take water so as to reduce its volume except for fair and legitimate uses upon that estate" (1901).
3. Hury, Blackton and Grassholme engineered by J. Mansergh & Son; Selsset and Balderhead by Sandeman, Kennard & Pts; Cow Green by Rofe, Kennard & Lapworth; Kielder by Babbie, Shaw & Morton.

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