

vantage accrues that the land is of little value, from the absence of manufacturing population and the pastoral character of the agriculture, causing the legal difficulties to be comparatively small, which in the case of large reservoirs near and in populated areas are such as to practically commercially preclude their construction.

Of an intermediate class are Millstone Grit moorlands forming the Pennine chain and much of Northumberland and Durham; there is generally a series of porous grits and sandstone alternating with beds of very impermeable shale, and the water that percolates into the former is supported by the latter and thrown out as springs, which when delivered in the same drainage area, permit a catchment reservoir to collect not only the flood water, but the percolated water, and make available in the case of the Manchester (Longdendale) and Liverpool (Rivington) works no less than 33 in. out of a total average dry year fall of 45½ in. In these cases the temporary absorption, storage and delivery of the underground water form practically storage reservoirs, delivering a dry weather flow of pure spring water. In these cases, on the Millstone Grit moorlands, unlike the Silurian unpopulated areas, a teeming manufacturing population has insisted on Parliament compelling those who constructed waterworks to form large compensation reservoirs, often to the extent of the whole of the flood water passing down, and there is no doubt that mill owners have largely benefited by the regular supply afforded them instead of the capricious volume governed by elemental conditions; and in many cases the conditions exacted are far too onerous, and point to the necessity of the formation of a water board in each important catchment area, selected by members of the county councils and county boroughs forming such areas, so as to give power of control from the source of each stream to its outfall. Parliamentary relief should be given from the penalty clauses of "compensation in bulk" when it is the opinion of the water board (hereafter suggested) that a corporation has done all that could be reasonably expected, and corporations should be no longer compelled, after their compensation reservoirs are exhausted, to supply millowners with pure spring water, whilst human beings have to be put on short supply.

The amount of "average flow" of a stream will be found to be far below the volume that would be yielded by a third of the annual rainfall, and the disparity is still greater when the "dry-weather flow" of the stream is compared with a daily average of one-third of the annual rainfall, pointing to the necessity of regulating the floods, which inflict a threefold loss—first, by destruction of property in the lowlands; second, by depreciation of the value of agricultural produce and by the stoppage of manufacturing processes; third, by the loss of vital energy and the premature death of those whose business and occupations compel them to live in areas subject to floods.

When the far-reaching influence of uncontrolled water is studied, the constant drain that is made by floods on the health, life, and wealth of the kingdom will be realized, and the necessity of sweeping away the conflicting authorities that have control over our river basins admitted; these at present are multifarious in number, antagonistic in character, and often injurious in effect. The river Witham and its chief tributaries, for instance, is under the jurisdiction of 17 separate authorities, without including the various drainage

commissioners of the Fenlands, that would bring up the number to 40; while the river Nene, according to the late Sir John Coode, on only 30 miles of its course, between Peterborough and the sea, is over-ridden by no less than 14 authorities.

Mill and navigation works affect rivers chiefly through weirs, obstructions fixed across a stream, with a view to prevent water passing on until it has attained a certain head; that height attained, its surplus water passes over the weir, in times of ordinary flow, with a more or less considerable fall. Landowners require a uniform top-level, neither too high to flood the meadows nor too low to deprive them of moisture. Navigation requires the water to be penned back to make the upper reaches navigable, whether the land below suffers or not; whilst fishing owners maintain their right at their own convenience to raise the top water to its highest limits, and then suddenly to depress it to its lowest limits, so that the fish may be caught in receptacles placed on the weir. Water users pound up the water to obtain increased fall and volume, and draw it off by a mill-race, discharging it at the mill-tail; the water is often allowed to pound up the mill-head until it backs up the mill-tail of the works above, no thought being taken of the requirements of the works above and below, "flashes" of water being passed on without any consideration whether the works below can use it or not. The burden of all Royal Commissions on this subject, and the consensus of opinion of all our eminent water engineers, is that without central control these varied interests cannot be reconciled. Weirs, properly constructed, would offer no obstruction to land drainage, but to carry this out the body exercising power over the river requires to be armed with the authority of drainage commissioners, so that in all cases districts receiving waters from above should have the corresponding rights of discharge into the districts below.

Applying these facts to that portion of the British Isles that have come under the jurisdiction of the Local Government Act of 1888, calling into existence the county councils of England and Wales, it appears to be necessary that there should be one authority for each river basin, with absolute control over its waters from their source to their tidal outfall, that such authority should be selected from or nominated by the county council of the county or counties forming the river basin, the number of representatives on the board being regulated partly by the rateable value of the portion of the river basin in the county in question, and not solely by its area.

Looking to the fact that the water used in this country for manufacturing and other trade purposes is so largely in excess of that required for drinking purposes, and that the value of a large area of land is in direct proportion to its facility of giving the water required by industry, it is inexpedient that there should be any interference with the riparian rights of ownership, now exercised by lords of the manor, so long as such rights do not interfere with the public good. The control of these rights might be safely left in the hands of a body acquainted with local requirements, appointed by the county councils, as suggested. Such a representative board would be able to benefit landowners far more than they could benefit themselves; having control of the whole of the river gradient from its source to its outfall, they would be able to maintain our rivers at sufficient average minimum height to insure a free arterial drainage, and the