

## PRESIDENTIAL ADDRESS

### THE RIVERS AND SEA WALLS OF SOMERSET

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This Presidential Address of mine should have had the conveniently short title of "The Land Drainage of Somerset", for that subject has been my work and hobby for the past 30 years. But a few years ago a young university graduate arrived at my office with the laudable intention of writing a treatise on this very subject. I was impressed by him, and, as he had ample time to do the research in a comprehensive manner, I put all my own information at his disposal, and was delighted to find that he was able to obtain quite a lot more from our own library here, the County Archives, Public Record Office and other sources. His treatise — by the way his name is Michael Williams — got him a Ph.D., and he has now re-written it in book form. The manuscript has been accepted by the Cambridge University Press, and should be published some time this year.

So I have entitled my Presidential Address, "The Rivers and Sea Walls of Somerset" — which enables me to range far and wide on certain aspects of the lowlands which are of particular interest to me.

My story really starts some thirty years ago when I was on one of my frequent visits to Somerset, and happened to be standing on the high land near Curry Rivel looking down into West Sedgemoor. The moor was badly flooded at the time, but, as so often happens after a flood, the sun had come out and the valley looked like a big inlet of the sea, sparkling and rippling in the sunshine — and to my eyes looking utterly captivating.

I turned to the girl who was with me and said, "What wouldn't I give to have a crack at these floods."

Now, Heaven from all creatures hides the book of fate, but perhaps I was overheard by the ancient River Gods of Pedred. What is quite certain is that I had not the slightest idea that within a very short time I would become Chief Engineer of the then Somerset Rivers Catchment Board, or come to that, that the girl in question was destined to become my wife — let alone that some 30 years later I would be honoured by the Presidency of this Learned Society.

Well, I got the West Sedgemoor floods and all the rest of the Somerset floods as well. I've lived with them for 30 years, and I still haven't tired of talking about them. The great difficulty, however, is to know where to start — or rather, when did the flooding start. Our floods depend to a very great extent on tidal conditions along the Somerset coast. These have fluctuated very greatly over the millenniums, due it is said, to periodic melting of the polar ice-caps. The approximate dates of these incursions and subsequent recessions of the tides have been determined with reasonable accuracy from geological and botanical data, but the precise level of the tides at any particular time in pre-history can only be a very rough approximation. Under present day conditions, a tidal rise of even two or three feet would put a large part of the central Somerset plain permanently under water, but if, say, one thousand years ago the tides were in fact two or three feet lower than at present, a flood problem would hardly have existed.

So when I am asked that ever popular question, "Who built the first sea walls along the Somerset coast; was it the Romans?" I nowadays give a somewhat qualified answer.

Previously, I used to quote our own *Proceedings* of 1885 which give details of an inscribed stone found after the collapse of a sea wall on the Welsh side of the Bristol Channel. The inscription is no doubt Roman, and the inference can be drawn that, if the Romans found it worth while to embank the Welsh coast, they would probably have dealt with Somerset in similar fashion.

On going into the matter in closer detail, however, I began to have grave doubts. To start with, the inscription contains only 16 letters and numerals, and seems to record that Statorius, a centurion of the II Legion, had carried out the project in which the stone was set, but no details are given as to what the work was. As the stone was not found until after the collapse of the sea wall, it must either have been buried in the wall or have been removed at some time and then replaced with the inscription inwards. There was also the possibility of the stone having formed, say, part of the building, the materials of which had subsequently been used for the repair of the sea wall; hence the lack of any attempt to keep the inscription in public view.

Evidence of Roman sea walls on the Welsh side of the Bristol Channel having become suspect, I again looked at such evidence as there was to be found along the Somerset coast. The most interesting is the remains of the Roman villa at Wemberham near Yatton, which include no less than six mosaic pavements. The site is situated within a few yards of the tidal Congresbury Yeo, and, but for the river embankment, would be covered by the tide twice a day. Now the Romans, besides being first class engineers, have always seemed to me to be very practical people. So the question arises, why should such people build an expensive villa on a site which was only protected from inundation from the sea by an earth bank. Had the building been functional, for instance a warehouse in connection with navigation, the site would arouse little comment, but it is surely unlikely that such a building would have included mosaic floors.

A tidal height increase of the order of 10 feet may seem impossible under the stable tidal conditions which have existed during our lifetimes. But it is worth remembering that in pre-historic times far greater increases took place, some of which are much more recent than is often supposed.

Detailed research between Hinkley Point and Steart Island (14 miles of coast) has been carried out over the past 10 years by Professor Kidson of Aberystwyth University in conjunction with The Nature Conservancy. His findings have not as yet been published, but he has kindly provided me with the following information for my Presidential Address:

The submerged forest at Stolford has been dated by the Carbon 14 method to 2500 B.C.

He had made 250 borings through the sand and mud of the foreshore, and in doing so had passed through no less than 6 beds of peat; the lowest at a level of—39 O.D. is dated at 6500 B.C.

The Somerset coastline at Hinkley Point in 7000 B.C. was three miles out to sea from the existing coastline.

The explanation could be that, when the villa was built, the land on which it stood was not subject to tidal inundation. Present day high tides rise to 7 feet above the level of those mosaic pavements, so, allowing a minimum margin of safety of 3 feet, we reach the conclusion that either the land has sunk 10 feet or the tides now rise that much higher.

A land subsidence of that magnitude seems most unlikely, for some physical evidence would surely remain. On the other hand, an increase in tidal height did in fact occur about that time, and the date 250 A.D. has been suggested. What does not seem to have been determined is the extent of the tidal increase.

If in fact this tidal increase was of the order of 10 feet plus, then the need for sea walls in Roman times never arose, for the highest tide would have been below the level of the lowest land along the Somerset coast.

This theory does not rest on the Wemberham Villa alone, for Roman remains at a similar level have been found at other places along the coastline.

With the end of the Roman occupation and the advent of the Dark Ages there would be little chance of existing sea walls being maintained, let alone new ones being built of sufficient strength to withstand the more severe tidal conditions. No records of such work have survived, and we have to jump to the 14th century, by which time, sea walls were undoubtedly in existence and had become of considerable local importance. Commissions *de Waliis et Fossatis* in connection with them were issued by the Crown at frequent intervals, the earliest Somerset reference being 1308. They continued to be issued for many years, but judging by the reports of the condition both of the sea walls, and of the Somerset rivers, they seem to have had little permanent effect, which is not surprising considering the very limited resources available in those days.

The first comprehensive attempt to improve the lowlands by maintaining sea walls and cutting drainage channels was undertaken by the Church, particularly the great Churches of Glastonbury and Wells, which between them had acquired most of the valleys of the Brue and Axe, then known as Brent Marsh. Their tenants were made liable for the maintenance of the sea walls, and for the river systems, parts of which were of considerable importance as an inland navigation connecting Glastonbury to the sea. The rivalry between bishops and abbots resulted in numerous legal wrangles and on several occasions amounted to open warfare with attacks on the drainage operations of competitors. In fact, the Church was quite prepared to be militant over its drainage responsibilities, and to enforce its rights with "swords, bows and arrows". If martial efforts were not successful, they were not averse to pronouncing a sentence of the "greater excommunication", though it seems there was some difficulty in finding the miscreants.

No doubt the great bulk of the work was carried out peacefully, but the rivalry and drastic measures resorted to by both sides seem to indicate that large sums of money were being expended, and that correspondingly large profits were anticipated.

During the medieval period there was a steady trend towards the enclosure of those parts of the lowlands adjoining the coast which could be defended against the sea. This coastal belt had been gradually built up by tidal deposit to within a few feet of high tide level, so the problem of excluding the tide by a sea bank was not very difficult. The danger to the stability of the sea bank arose under storm conditions, when long lengths of such banks were frequently eroded and carried away, leaving the land which they had protected at the mercy of the subsequent tides.

Reclamation also encroached into the moors from the higher land around their boundaries, especially into areas where the predominant soil was estuarine silt. In those days, the reclamation of the peat moors was largely avoided, as the silt areas gave a

higher agricultural return. That some reclamation of the peat moors did take place, shows that they must have been at a considerably higher level than they are today, as otherwise the prevention of frequent flooding would have been impossible, and reclamation would have been rendered totally uneconomic. That this was so is supported by the records and references to navigable channels through the moors which, with present day land levels, would have been fraught with insuperable difficulties.

With the dissolution of the monasteries, followed by other national upheavals and economic difficulties, the lowlands seem to have languished for several centuries. In fact it was not until the 18th and early 19th centuries that the second great effort was made to really utilize the moors for agriculture, as compared with their previous state of vast open commons or "waste of the Manor". This came about with the Enclosure Acts, about which much has been written concerning the social and economic effects. The physical effects, though less well known, were no less spectacular.

Almost all the Somerset Enclosure Acts contained extensive provisions for the drainage of the areas to be enclosed, in addition to the powers for dividing up the "wastes" into individual fields. The field boundaries were formed by digging ditches. This was cheaper than planting hedges, and also provided drainage for the fields on all sides.

It is impossible to determine how much money was spent on the drainage, but it is known that the drainage of King's Sedgemoor cost £60,000, and that a similar amount was spent on the Brue, whilst the Axe accounted for a further £40,000. In addition, there were a large number of less ambitious schemes, which together with the digging of the vast network of ditches, must have brought the total to an extremely large sum.

The improved drainage, and particularly the widespread network of ditches, must have lowered the general water table very considerably, and for a time gave encouraging improvement of the enclosed land. But such a drastic lowering of water table inevitably resulted in collapse of the peat structure and a general lowering of moorland level. No doubt this was of small consequence at first, but it seems to have been aggravated by an agricultural practice of burning the fields to provide potash for the next crop. How long this practice continued, and the extent to which it was used, is difficult to say, but once peat is well alight it is very difficult to control, and well nigh impossible to extinguish unless heavy rainfall occurs or the burning reaches water level.

The digging of peat for use as fuel was also extensive, particularly in the Brue Valley, and undoubtedly contributed to a general lowering of the moorland areas.

As the general level of the peat moors subsided, so drainage became more and more difficult. The coastal belt, being mainly alluvial silt, remained unaffected and formed a barrier to the drainage of the peat moors which today have an average level several feet below that of the coastal belt. The moors had to drain through the coastal belt by means of deep channels, which owing to the very soft nature of the estuarine silt were (and still are) very difficult to maintain at a sufficient depth to provide adequate drainage.

The great transformation of the Somerset Levels under the Enclosure Acts was largely financed by selling sufficient of the reclaimed land to pay for the work of enclosing and draining or by special drainage rates. But once an enclosure scheme had been completed, no more income could be obtained by the sale of land, and the maintenance of the scheme had to be undertaken by the new landowners under the supervision of the

Commissioners of Sewers who had powers to impose drainage rates whenever necessary.

As the drainage of the moors deteriorated, and consequently the financial return from the land, it became more and more difficult to extract money from the farmers for maintenance, let alone for further much needed improvement of the drainage system. The Commissioners of Sewers lacked the money and probably the ability to do very much, and the moors eventually reached the stage when they would have been of little more use than they were before the Enclosures. The solution had to wait for the introduction of steam power, which was first used in the Somerset moors in 1830.

Prior to 1830, the earliest record of any form of machine having been used occurs in 1613 in connection with the reclamation of land adjoining the River Axe at Bleadon. It is clearly stated that the sea was "kept out from overflowing the same by a windmill built at the time [of] the said enclosure for that purpose." Now, no windmill could have kept the sea out, though it might have thrown out any sea water which had come over the enclosure embankment. Even this seems quite unnecessary, as once the tide had dropped, the unwanted sea water could flow back into the river through a sluice or sluices far quicker than it could be dealt with by a windmill. The most likely explanation is that the windmill was used to raise water for irrigation purposes during the summer months. Nevertheless, this is the first recorded use of a machine in connection with land drainage in Somerset.

The second record occurs in that fascinating little book "The Diary of a West Country Physician". In his diary Dr. Claver Morris records that on the 5th November 1723, "Mr. Chancellour Bridges and I returned home through Glastonbury, Mr. Nicholls accompanying us from Kennard Moor, and we went and saw Mr. Nicholl's Engine to throw water into all the Ditches of Common-Moor, and he set it a working on purpose for us."

The Engine was no doubt a windmill and in this case its use was obviously for providing irrigation water.

In 1830 the first of the Somerset drainage boards, the Othery, Middlezoy and Westonzoyland, was set up under its own Act of Parliament. The main object of the Act was to give the necessary power for attempting to keep the District drained by means of an engine. Now, at this point, I want to introduce to you a very interesting Somerset family who lived at Bradford-on-Tone, and who were named Easton. I shall start with Josiah Easton, born 1761, whose great, great, grandson, Dr. John Easton is a member of our Society and is with us this afternoon.

Josiah was a land agent specialising in tithe matters, who in later life seems to have developed an interest in mechanical engineering. He also produced a family of twelve, one of whom, James, became a mechanical engineer of distinction owning a thriving foundry and engineering shop at Southwark, London. Another son, John, became a well known local surveyor, and was specifically appointed by the Othery, Middlezoy and Westonzoyland Act to be Commissioner for carrying out its provisions.

The engine was made by James Easton and was installed without delay as soon as the Royal Assent was received. In the meanwhile yet another Easton son, Abel, had been appointed Surveyor for the project, which it can be fairly said was carried out by the Easton family. The engine drove a scoop wheel which can be likened to a large water wheel. The scoop wheel, as its name implies, scooped up water brought to it by low

level moor drains, raised it a foot or two, and discharged it into the higher level of the River Parrett. Similar plant was installed on the opposite bank of the river at Saltmoor in 1837, and in 1845 a steam driven pump was erected in Southlake near Burrowbridge. There was then a lull (probably due to the state of agriculture) until 1861 when the Westonzoyland engine was replaced by a steam driven pump, and between then and 1869 similar plants were installed at Curry Moor, Stanmoor, Chedzoy, Saltmoor, Northmoor, Aller Moor and Southlake. Unfortunately, the pumping capacity required to deal with the flood problems of these moors was not sufficiently understood. The largest of the engines was rated at 40 horse power, whereas when, eighty years later, the Catchment Board replaced them with diesel driven pumps, it was found necessary to use engines of 270 horse power!

In spite of the efforts at improvement, the moors as a whole continued to deteriorate, and by the 1870s were often under water for large parts of the year, with the consequence that they were virtually useless for agriculture. There was great public agitation that something should be done, and that money should be found to carry out one or other of the numerous schemes which had been propounded.

The Somersetshire Drainage Act was obtained in 1877, but did not come into full effect until 1881. New internal drainage boards were set up to cover the lowlands not included in the boards already in existence for the pumped areas. The Commissioners consisted of representatives of the internal boards. Large loans were obtained and work was started to cure the flood problem of the Somerset lowlands. Once again the magnitude of the problem was completely underestimated, and although some improvement was effected, the floods were still as frequent and calamitous as ever. At the end of ten years, the Commissioners found they had committed themselves to loans amounting to £60,000, the charges on which absorbed a very large part of their income, and for the next 30 years they had to forgo expensive improvement schemes and content themselves with what amounted to maintenance — and that very sparingly!

The Act, though an excellent and far seeing piece of legislation, failed on the question of finance. Every penny of the Commissioners' income had to come from the owners and tenants of the land they tried to drain, and, as that land was in a deplorable condition when they started, it would have bankrupted every farmer in the area had the Commissioners tried to extort the amount of money which was really essential if improvement was to be carried out on a sufficiently comprehensive basis.

By 1930 it had been realised that if land drainage in England and Wales was to be dealt with satisfactorily, national assistance was imperative. Unfortunately the passing of the Land Drainage Act, 1930, almost coincided with the well-known Economic Crisis of that period, and Government aid for land drainage was deferred for some years. In the case of Somerset, nothing much had been done by 1938, when I took over as Chief Engineer, and was faced by a Board who had had more than enough of paper schemes and were vociferous in their demands for the digging to start — what more could an Engineer ask for?

Of course the war started the next year, and it looked as though all our schemes would have to be postponed indefinitely, instead of which the reverse happened. Increased food production necessitated the efficient drainage of every available acre, and other wartime needs meant that parts of our drainage system had to be radically altered.

The Catchment Board and its successors were kept busy until long after the war; in fact, the pace has rarely slackened and at the present time we have the biggest works programme of our existence. I do not propose to detail our recent works, as I think they are well known by those who are interested. It will give you some idea of their extent, however, if I tell you that in the last 30 years we have spent at least £5,000,000 on flood prevention schemes.

The schemes which are now in progress, or are planned to start in the very near future, include the draining of a large part of the Axe Valley, by means of a large pumping station; a new tidal outfall sluice at Brean Cross near the mouth of the Axe; and a 10 mile flood relief channel from Langport to the Parrett below Bridgwater at Dunball, which will necessitate the re-widening of several miles of the King's Sedgemoor Drain. These and numerous minor schemes will add at least another £1½ million to the cost of finally getting Somerset's floods under control.

In carrying out these very extensive works, I have inevitably altered and in some cases added to the map of Somerset. Houses, cottages, old bridges, trees and hedges have been swept away, and the old scene has been changed, and some part of the charm of our rivers has gone with it. It was, of course, inevitable, and much that has gone was well past its prime, and could not have lasted much longer. I have had to content myself with doing what I could to prevent ruination of the landscape. Trees have been planted, brickwork and tiles used instead of concrete and galvanized iron; unsightly spoil banks have been levelled, re-grassed and returned to agriculture. In fact, in many cases the inexperienced eye would never know that recent improvements have been made, and I have to warn archaeologists, naturalists and others that things aren't necessarily what they seem to be.

But the aspect which has given me the greatest concern is the effect my schemes were having on the bird life of Somerset.

With the transformation of water-logged and flooded marshes into good agricultural land, I soon realised that we were destroying the habitat for many of our migratory birds. In 1957 we undertook sea defence works which necessitated the purchase of the foreshore from Lilstock to Steart together with Steart Island. This included all the land between high and low water mark — an area of 6,000 acres when the tide is out, which is completely covered when the tide is in. My Authority then agreed to lease this area to the Nature Conservancy for use as a National Nature Reserve. It has proved to be a very successful reserve, and much scientific work has been done there particularly in connection with the grass *Spartina townsendii*, stocks of which have been sent from Steart to many parts of the world. But my own pleasure in the Reserve is that it provides sanctuary for the great flocks of Whitefronted Geese, and the many thousands of duck which winter in Somerset, and which I had regretfully deprived of the great areas of flooded moors which previously gave them some measure of safety.

I wish I could say that we have done as much for archaeology, but our discoveries in this field have been disappointing, possibly because we excavate in lumps of anything up to two tons at a time. Nevertheless, considering the hundreds of millions of tons of Somerset soil of all descriptions which we have shifted over the past 30 years, it is surprising we have not stumbled on any major discoveries. We are not likely to miss much, for our workmen report all finds and show considerable interest in what "the

museum” has to say about them. As a result, the Somerset Museums have accepted a varied assortment of pottery, bones and other specimens.

We have done much better for industrial archaeology. I referred to the 19th century pumping stations earlier in this talk. Inevitably the time arrived when they had to be replaced by something more efficient. Unfortunately, that happened during wartime, when the Ministry of Supply was scouring the country for scrap metal. I managed to save five engines out of eight, and we have since preserved them in, or near, their old surroundings.

I suppose no one can predict the future of the Somerset lowlands with any degree of certainty, but some trends are already apparent.

The long lines of pollard withies which border the great majority of our rhynes and ditches seem fated to disappear. The trees themselves are no longer an economic crop, and their presence prevents the mechanical cleansing of the watercourses. Hand labour is almost unobtainable for such cleansing work, and, in consequence, the withies are being felled in great numbers by the farmers. If Judge Jeffreys were to return to this earth, he would have to find some other method of disposing of his victims than “by hanging a man on every withy tree from Bridgwater to Westonzoyland”.

The commercialization of the peat industry is already causing big changes in the Brue Valley. The use of specialist machines enables the peat to be dug to a far greater depth than in the past; in fact, there seems no reason why the full depth of peat (say, 15 feet in some areas) should not be taken.

The Nature Conservancy are doing what they can to safeguard parts of the area, and have set up the Shapwick Heath National Nature Reserve. But if peat digging continues at the present rate, estimated at 100,000 tons a year, it is obvious that eventually a substitute for Meare Pool will be created, which could only be kept dry by constant pumping.

But the trend with the most far-reaching consequences is the switch from milk and beef production to arable farming. The basis of the development of the land drainage system of the lowlands over the past 30 years has been that these inevitably wet areas would always be used as pasture. The aim has been to prevent flooding during the spring, summer and autumn, in other words to extend the grazing period. During the winter period, November to March, flooding can be tolerated provided it can be controlled and got rid of sufficiently quickly to prevent undue damage to the herbage. Certain large areas, Currymoor and Aller Moor are examples, have been set aside as flood reservoirs into which excessive river flows can be stored for a short period and then returned to the rivers, as soon as they have dropped sufficiently. As more and more of our large schemes of drainage have been completed, these flood reservoirs have been used less and less, but they are still a vital part of the system. To prevent all winter flooding would necessitate much larger, and very unsightly rivers, capable of keeping the run-off from our heavy rainfall within their banks. The present agricultural return of the lowlands would not justify the enormous expenditure required. Unfortunately, however, the production of milk and beef is a seven day a week job, and of recent years more and more farmers have turned to arable farming, which can be done successfully on a five day week basis. In the lowlands, the risks of doing this are inevitably great but nevertheless it has started. An outstanding example is Horsey Farm, Langport, where only a few years ago the

entire farm was under water for long periods during the winter, and on one occasion the army used their amphibious vehicles to get the pigs to market. To-day, the farm drains to our new Huish Episcopi Pumping Station and the entire farm has been ploughed. In spite of variable success with the corn crops, the farmer shows no inclination to revert to pasture cultivation.

Should this trend continue, there will be a strong call for a lower water table which in turn would produce severe shrinkage in many areas. In fact, the lowlands would have embarked on yet another period of highly complex and expensive development, which would change their character almost as drastically as the enclosures of 200 to 300 years ago.

I have added four photographs to this address. The three flood scenes (Pls. I A, II and III) show rather well the conditions with which the Somerset River Authority has had to contend after heavy rainfall in the Somerset lowlands. Plate I B shows one of the old steam pumping engines, which the Authority has preserved; this photograph gives a good idea of the fine Victorian craftsmanship which went into their construction.



PL. IA The River Tone, looking downstream from Athelney Station on 28 October 1960.

Curry Moor Pumping Station (left of centre) is surrounded with flood water. The flood is prevented from spreading into Stanmoor (right half) by the Stanmoor Bank (r. h. side of river), on top of which the cottages adjoining the river are situated.



PL. IB Curry Moor Steam Pumping Engine, built by Easton, Amos and Sons in 1864. Though no longer in use it remains at its original site protected from the weather by a new house. The site can be seen in Pl. IA.



PL. II The Parrett below Langport, looking from Aller Moor, with Wick Moor on the far side crossed by the Western Region main line.

Water from the Parrett is overflowing the Parrett bank into Aller Moor. It is known as "white water" and can be seen from a considerable distance. (28 October 1960).



PL. III Langport, showing the bottleneck at Great Bow Bridge (top right), through which the drainage of about 190,000 acres must flow. The channel flowing across the lower half of the picture is the Long Sutton Catchwater, which is no longer used and much of which has been filled in.