

16/11/03 7:30:30

## The Mitchell River and Gippsland Lakes.

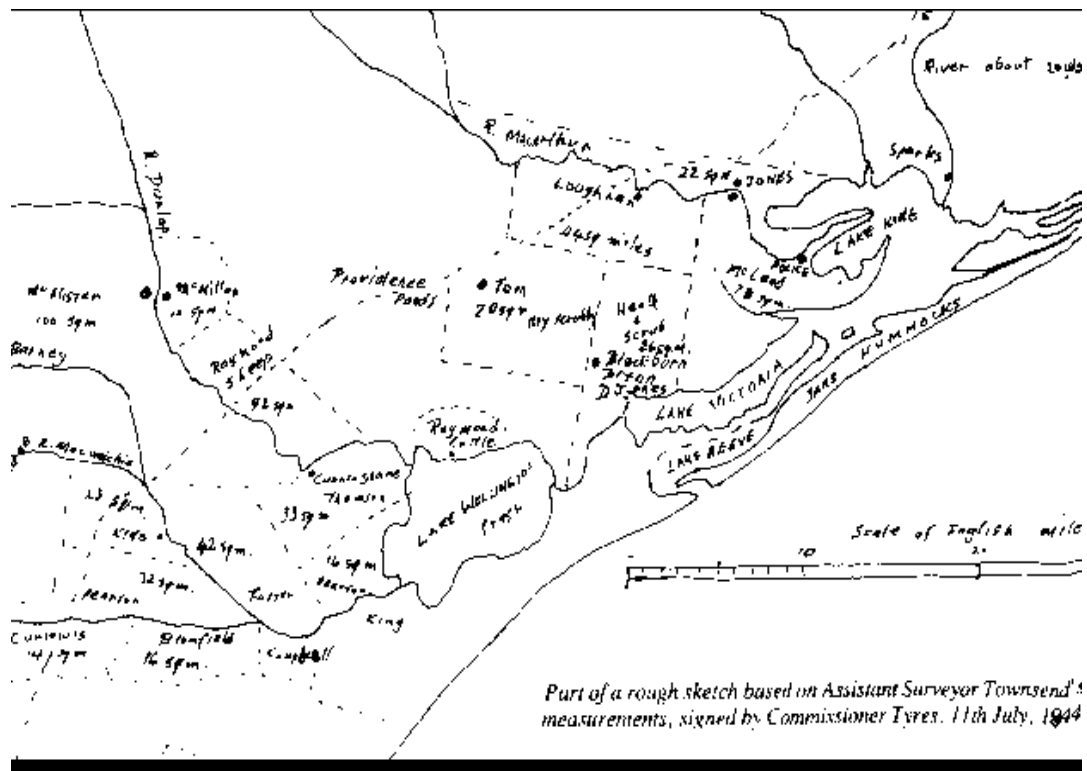
By Bruce Evans.

September 1999 (Revised 2002)



The Mitchell River Silt Jetties photographed c 1982.

The body of water to the left is Jones' Bay and to the right, Eagle Point Bay, both parts of Lake King. "The Cut", which can be seen slightly left of centre, was formed when the river broke through during a flood abt. 1936. It is spanned by a temporary bridge used to carry rock to protect the banks of the silt jetties from erosion. It was washed away in 1990.



The sketch map of 1844 was drawn only four years after the first white explorer reached the region. It is probably the earliest map of the Gippsland Lakes and Rivers. The dotted line diagonally across the map indicates the track from Monaro to Port Albert. Boundaries of the five "Runs" that covered most of what was to become the Shire of Bairnsdale are shown with the names of the owners and the location of their homes. The names given to the rivers at that time indicate that the naming of important features had not yet been finalised. There are several other points to be noted about the map of the lakes.

Two entrances to the sea are shown – the apparently larger one 30 miles to the west of the current entrance and the other some 2 miles east.

Lake Wellington is marked as "Fresh".

household needs. We drink it as it comes except for times when it is too dirty. We have a small reserve tank for such occasions. I concede to no one a greater interest in or concern for the river.

My great grandfather, Joseph Evans, lived less than 500metres from where we now live. He came here about 1856. When he registered on the roll to vote for the first elections for a Legislative Assembly in the Colony of Victoria, he was employed on the "Lindenow" Run. In 1860, he registered the death of his father-in-law, indicating he resided on "Lucknow" Run. He and his wife, Sophia, raised nine sons and three daughters here. (Lucknow Run extended from the lakes to the mountains on the northern side of the Mitchell River. Lindenow Run extended from the present Hillside to the mountains on the southern side).

Although he could not write at the time, Joseph put on record one of the earliest indications of the condition of the Gippsland lakes at the time of white settlement. In 1850, he was required to give evidence at a hearing at Flooding Creek, (Sale) in a dispute over the boundary between two sections of "Deighton" Run. Deighton Run extended from the Bengworden area south to the western end of Lake Victoria. His sworn statement states, *"In the year 1844, I was a shepherd in Mr. Thomas Blackburn's employment at Deighton.....I have watered sheep at an area of the lakes about three miles south of Mr. Jones' hut .....While I was shepherding at the lake station I watered many sheep at the place described. There was no other place to water them at."*

This statement confirms two points: -

In 1844, the water of Lake Victoria was fresh – certainly fresh enough for stock to drink., and

Surface water in the Bengworden area was scarce.

The naming of a small stream as Providence Ponds also supports the latter point.

As a farmer on the Mitchell River flats with a farm that straddles the river, I have had virtually daily contact with the river and its changing qualities all my life. The same vagaries that affect the river, such as flood and drought, affect my farming activities. I have held a licence to divert water for irrigation from the river for over 50 years.

Market forces are demanding consistent quality and reliable supply for all kinds of products but this is difficult to achieve with wildly fluctuating seasonal conditions. Dairy farmers in irrigation districts have a big advantage in meeting these requirements. They do not have to deal with the floods and they have a much more reliable supply of water in time of drought. For vegetable growers, the availability of water is even more critical. As a farmer and a Gippslander. I see it as grossly unfair that the residents of this region are not protected from the extremes of climatic conditions, yet the resources of this region are arbitrarily diverted for the benefit of people outside the region.

From 1961 to 1992, I represented Gippsland East in the Legislative Assembly. Up until 1967, the electorate extended as far as Walhalla and Gormandale so I was familiar with the issues in the catchments of rivers feeding Lake Wellington as well as the rest of the lake system

The natural cycle.

The Gippsland Lakes are, in fact, only one lake with various parts having different names. Geographically, it is a "lagoon lake" – which is a body of water separated from the sea by barrier dunes. It is a common geographical feature. There is every indication to show that the Gippsland Lakes behaved in the same way as other inlets along the Gippsland coast still do, although on a much larger scale and probably over a much longer time frame.

The entrance would be blocked completely by sand during a prolonged dry spell and would break out during a flood event, usually towards the western end of its range along the coastal sand dunes. As the next dry period progressed, the entrance would gradually move to the east and get shallower. The part of the lakes closest to the entrance would become slightly saline. The shallowing of the entrance acted as a natural choke against the ingress of seawater as the flow in the rivers feeding the lakes declined.

Eventually, if the dry period was long enough, the lakes were cut off entirely from the sea again and the cycle would restart. The rivers continued to provide an inflow of fresh water keeping the water level above sea level. It would have been during this period that the silt jetties, which are the feature that makes the lakes unique, were built up. The problem with this is that the rivers do not carry silt during periods of low flow. The only possible way they could build the silt jetties up is by rivers in full flood carrying massive amounts of silt and flowing into still water.

It is very obvious that the Mitchell River has carried vast quantities of nutritious silt during floods for centuries. The rivers flowed into a body of still water, which forced them to drop their load of silt. The pressure of the floodwater reached the point where the coastal sand dunes were breached releasing the impounded water. The level of the lake would steadily drop. The phragmites (reeds) and other vegetation along the river banks and lake shores held silt and other debris. The bed of the river would also be filled with silt. As the level of the lake dropped, the river currents would reclaim its natural bed by moving the silt between the silt jetties out into the lake. In this way, the river built the silt jetties out into the lake instead of forming a delta.

The Mitchell River has been depositing vast quantities of nutrients into the Gippsland Lakes for centuries. The material that makes up the soils of alluvial flats and silt jetties is very fertile. Probably most of the world's population is fed from food produced from such soils. Unfortunately, Australia does not have much of it. What other rivers, such as the Snowy do not drop on their floodplain, is taken out to sea, but the Mitchell has created a unique geographic feature.

There can be no disputing the fact that much of the nutrient in the silt carried into the lakes also stimulated the growth of reeds and other plants such as titree, which used up the nutrients. The reeds and probably other plants will only tolerate mild salinity and as the effects of salt-water intrusion have extended throughout the lake system, these plants have been destroyed.

Algae, which can survive in the saline water, under the right conditions takes over, to use up the nutrients. In effect, the "build up of nutrients" that is blamed on agriculture may well be the "retention of nutrients" because the plants which should be using the material have been destroyed by salinity. Professional fishermen say that a good season on land means a good season at sea because marine plants and animals need nutrients too.

While there is still a little reed growth on the river side of the silt jetties, on the lake side the bottom is bare of aquatic vegetation and there is nothing to dampen the waves generated by the wind and they erode the banks. (See Pages 23 & 24) In a desperate measure to prevent even more erosion, rock protection was placed along the banks, thus destroying the very feature that makes the Gippsland Lakes really unique.

Part of the lake retains reed growth. McLeod's Morass, is protected from the intrusion of saline water by a small floodgate. For many years, the original gate was not kept in repair and the vegetation was adversely affected. The fact that the present flood gate now keep the water level in the morass above high tide level is evidence that the managing authority knows that salinity has destroyed similar vegetation around the lakes. The catchment of McLeod's Morass is completely cleared and is regularly fertilised. For many years, this relatively small area also took run off from the saleyards, and the City of Bairnsdale – which should have destroyed this vegetation years ago if excessive nutrients are the main cause of decline of water quality. In fact, a report some years ago recommended it as an excellent site to absorb the nutrients from this run off.

Some elements of the tourist industry and others who want to keep the lakes salinity level as it is are putting the long term interests of the lakes in more jeopardy than agriculture. If the problem is caused

by "farm effluent" there would be more prolific growth, not virtually a marine desert, on the floor of the lakes.

The effects of agriculture.

A quick look at a map of land in the catchment of rivers entering the Gippsland Lakes will show that only a very small proportion, less than 20%, is developed for agriculture. This is because little of it is suitable but it begs belief that agriculture is having more effect on the Gippsland Lakes than, for example, metropolitan Melbourne has on Port Philip Bay. Each year, more water, than is used by irrigators on the Mitchell River runs off the rooftops, roads, carparks and other impervious areas of Melbourne, carrying with it the oils and scum of industry and urban development into Port Philip Bay.

Claims that the use of fertilisers on farmland contributes to increased nutrients in the lake appear to be the product of researchers looking for easy answers. The nutrient levels in the lakes are increasing – farmers put the same kind of nutrients on their land when they top dress – conclusion: top dressing is causing the nutrient build up. It is difficult to disprove such an assertion.

Except for a few facts that do not seem to fit.

Farmers fertilise to promote plant growth. It cannot do this *and* get washed into the lakes.

Heavier applications can usually increase growth suggesting that crops and pastures use up available nutrients. Heavy applications are not economically sound if the surplus will be lost through leaching.

It can only be leached into the lakes if there is runoff rain. This is a fairly rare occurrence. When the rivers are in flood, the proportion of nutrients from top dressing of pastures to nutrients from natural sources would be microscopic.

If a strip is missed when top dressing farmland, it remains obvious until the next top dressing. Why does it not leach from the higher ground to the lower ground? Why does it not stimulate aquatic growth within the rivers before they reach the lake? <

Modern farming practises attempt to match fertiliser inputs with outputs.

Where irrigation takes place, techniques to minimise runoff are constantly being improved, such as, reuse pondages to catch runoff, timed bay outlets to avoid overwatering when flood irrigating, use of lateral shift and other spray irrigation techniques to improve efficiency in the use of water. In the Macalister Irrigation Area, irrigators may experience heavy rain after irrigation with run off inevitably following. This is because they need to order water in advance and weather forecasts are not reliable enough to predict rainfall. They try to avoid this as much as possible because of the loss of nutrients, which cause the growth of reeds and bulrushes in the drains which then need more frequent cleaning. Reuse dams reduce but do not eliminate this loss of nutrients.

The Macalister Irrigation District covers an area of 53,000 hectares out of a total catchment area of the Gippsland lakes of 2,077,000 hectares or about 2%

The average annual runoff of all streams entering the Gippsland Lakes is 3,465,000 Mls. from a catchment area of 20,770 sq.kms. Storages in the catchment have an estimated capacity of 1,574,200 Mls. of which 1,123,000 Mls. is the capacity of the Thomson Dam. (As at August 1999, the Thomson Dam is only half full). The Gippsland Lakes are 1,035 sq.kms. in area.

The Murray – Darling Catchment has an annual runoff of 5,800,000 Mls. from 7,770,000 sq. kms. It is estimated that 91% of available water in the catchment is committed to various uses. Lake Alexandrina

and associated lakes, 648 sq.kms. in area, are lakes at the end of the vast Murray - Darling system. Like the Gippsland Lakes, barrier dunes separate these lakes from the sea.

Given the vast area under irrigation and the great variety of crops grown in the Murray Darling system, the amount of nutrients discharged into Lake Alexandrina is far greater than any amount that could possibly be entering the Gippsland Lakes. Nevertheless, the lake appears to be in better condition than the Gippsland lakes. The greatest threat appears to be from salinity up stream, not added nutrients.

There must therefore be some significant difference in the management of the two catchments. There are dozens of water storages, huge areas of irrigation and many cities and towns in the Murray – Darling basin without apparently unmanageable effects on Lake Alexandrina and its associated waters. It is the source of up to 90% of Adelaide's water supply.

The significant differences are: -

A man-made barrier, built in 1940, prevents the intrusion of salt water into Lake Alexandrina while no such arrangement exists on the Gippsland lakes.

The huge volumes of water stored in the Murray Darling Basin help to maintain river flows during prolonged dry periods where previously it became a string of water holes.

The water naturally available in the Murray Darling Basin is augmented by water diverted from the Snowy River thus adding to the total available water. Water is diverted from the Gippsland lakes catchment to drought proof metropolitan Melbourne, substantially reducing flows through the Gippsland Lakes.

Other factors affecting the Gippsland Lakes.

Outfall sewer.

It would be misleading and an over-simplification to imply that there are not other factors involved with the current state of the Gippsland Lakes. One of these was the effect caused by the Latrobe Valley Outfall Sewer over some forty years. In the late 1940's, the State Government decided that it was essential to establish a plant in the Latrobe Valley to produce town gas to eliminate Melbourne's total dependence on black coal from New South Wales for gas making. Briquette production was also increased substantially. The Gas and Fuel Corporation was set up to implement the proposal, part of which was to construct an outfall sewer. Its purpose was to convey residential and industrial effluent, including saline water from open cut dewatering and highly discoloured water from the Maryvale Paper Mill, to treatment ponds at Dutson Downs before disposal out to sea. The two latter wastes were being discharged into the Latrobe River.

Before the project was completed, a new government elected in the early 1950's changed the plans and terminated the pipeline near Rosedale, constructing an open channel from there to Dutson Downs.

Instead of the treated effluent being discharged to the sea, it was diverted into Lake B9BT 1s 0a 0 0 1 Ouuing discharged into t

Brown coal has a very high water content and it is necessary to constantly pump ground water from the vicinity of the open cuts to prevent the coal face slumping from the pressure of underground water. This saline water was discharged to the Latrobe River for many years before being diverted to the outfall sewer. There is now a separate pipeline to carry this water to the sea.

There are probably other factors that have some influence on the conditions that have lead to the current condition of the Gippsland Lakes but one thing is beyond dispute, **a dam on the Mitchell River has had no part in it whatsoever.**

## A Dam on the Mitchell?

### History.

From the very beginning of white settlement of the Bairnsdale District in the 1840's, there is evidence that water supplies have been a problem. In the large area of undulating plains between the Mitchell and Avon Rivers, the availability of surface water was very limited. Stock water was mainly provided by farm dams. In the absence of rainfall of sufficient intensity to fill dams, stock water supplies became critically short.

Farmers on the Lindenow Flats saw huge quantities of water pass down the river at some times of the year but low flows at other times.

In the 1880's, a move was made to construct a weir on the Mitchell River. At that time, the procedure was for a local Trust to be set up for the purpose of financing such structures. A petition to establish a Trust was presented to the government by farmers on the Mitchell River flats. The request was approved but before any work commenced a further petition was presented requesting that the scheme be extended to include the high country south of the Mitchell River flats and also, supplies for the township of Bairnsdale. This further request was also approved, the whole process taking little more than six months.

A permanent entrance into the Lakes was being constructed at about the same time. At that time, heavy transportation was by water wherever possible, using rivers, and canals constructed for the purpose. Canals and barges were the easiest way to move bulky loads in most countries. The alternative of using bullock wagons was slow and expensive.

By 1890, a stone weir had been constructed across the Mitchell River but the Trust ran out of money. Work on the project was brought to a halt. During the next few years, there was a severe economic depression and many banks closed their doors. One of the most severe floods on record occurred in 1893 and soon after, cracks appeared in the wall and the structure started to collapse.

In 1896, a Royal Commission was set up to examine the reason for the failure of a number of irrigation schemes in various parts of the colony of Victoria, the Mitchell scheme being one of many. The Royal Commission found that, in the case of the Mitchell weir, construction had started without any survey work on the site being carried out and what was thought to be bedrock was, in fact, large fractured rock which allowed water to undermine the wall.

It was clear from the report that the costs involved in the construction and operation of a dam and its associated irrigation district were beyond the financial resources of rural communities and, in the early 1900's the State Government established the State Rivers and Water Supply Commission. This body was given the responsibility of constructing dams and irrigation schemes.

Parliamentary Public Works Committee.

In subsequent years, the procedure by which any scheme received Government approval was for the government to refer a proposal to the Parliamentary Public Works Committee for examination and report. This applied to all major works such as power stations and irrigation proposals. It was apparent that, for any new scheme to get approval there was a need for intensive lobbying to get the Government to submit it to the Parliamentary Public Works Committee. The vast flat plains of northern Victoria were obvious targets for irrigation and there was support for each scheme from over the whole Murray-Darling region. Because it is just one river system, there is far more community of interest in irrigation north of the divide than there is to the south. These inquiries took evidence from everyone who had a point of view.

The Thomson River.

As the Mitchell and Thomson Rivers are part of the one system, the use of the latter must also be taken into consideration. In the late 1950's, a deputation of farmers in the Glengarry – Toongabbie area interested in the construction of a dam on the Thomson River were told that there was no suitable site for a dam on that river. A Councillor of the Rosedale Shire, who had been an officer of the Forest Commission, disputed this claim. Some time previously he had encountered surveyors of the Melbourne and Metropolitan Board of Works surveying a site on the Thomson River.

This spurred the local community into action and they set up a committee to further investigate the proposal. They had the benefit of contour maps that had become available after the first aerial mapping survey in the early 1950's. A study of these maps showed that there was indeed, an excellent site for a dam on the Thomson.

With the burgeoning growth of the metropolitan area that became apparent in the early 1960's, the Melbourne and Metropolitan Board of Works proposed in a report in July, 1962 that the Big River should be diverted to meet the growing demand for water. This brought an angry response from all parts of northern Victoria because the Big River flowed into Eildon Reservoir and its diversion would mean less water for irrigation in those areas. The Premier of the day declared that no water would be diverted from north of the divide to the south. The same report also sought two thirds of the flow of the Thomson River and its tributary, the Aberfeldy River for diversion to the metropolitan area.

Melbourne's future water supply requirements were referred to the Parliamentary Public Works Committee. At that time, the whole of the catchment of the Thomson River except that part between the southern boundary of the Shire of Maffra to its confluence with the Latrobe River, lay within the electorate of Gippsland East, as did the Glengarry – Toongabbie area. As the Member for Gippsland East (1961-92), I took a keen interest in the inquiry.

During floods in 1952, the Thomson River cut a new course along Rainbow Creek, from a point close to where the river emerges from the mountains, for a distance of about 10 kilometres where it rejoined its original course. This was a major disaster as it cut a gulch 2 to 3 metres deep through many farms and left irrigators along the old course with insufficient water to irrigate. It also carried a huge amount of silt into the lakes.

A diversion weir was built at the location of the break to regulate the flow of water down the two arms of the river which now existed and a channel was constructed to divert a small amount of water to the Nambrok – Denison irrigation area. It was many years before a River Improvement Trust could be formed to tackle the task of stabilising the steep, eroding banks of the new section and to remove the willows choking the old section, because the owners of small allotments near Sale kept voting out the proposal.

Urban and rural requirements.

At this time, it was government policy that the cost of dams to supply urban communities should be born by the ratepayers who benefited while the cost of dams and infrastructure for irrigation was born by the government. The Victorian government had a running ten-year programme for the construction of dams for irrigation purposes. This meant that, if a dam was to be constructed under some kind of sharing arrangement, metropolitan ratepayers through the Melbourne and Metropolitan Board of Works would pay for their share and the government would pay for the balance.

During the course of the inquiry by the Parliamentary Public Works Committee, representatives of the Gippsland Water Utilisation Committee (G.W.U.C.) followed it closely. The latter committee had representation from most Central and East Gippsland municipalities and other organisations interested in the development of Gippsland. As the evidence unfolded, the G.W.U.C. agreed to the proposal for sharing the water of the Thomson with the metropolitan area. They did so because they believed that was the only way they could achieve their aim of a dam on the Thomson. Together with four of my Parliamentary colleagues representing Gippsland, I issued a public statement rejecting this proposition on the grounds that, once it became physically possible to divert the water, the metropolitan area would take the lot.

The G.W.U.C. pointed out that, in addition to the Glengarry – Toongabbie area, there were other substantial areas of suitable land in Central Gippsland that would benefit from irrigation. The Parliamentary Public Works Committee noted in its Final Report in 1967: -

**" that the conservation possibilities on the Mitchell River are far in excess of the potential demand within the Mitchell Valley..."**, implying that water from the Mitchell could be used in that area.

NOTE. The Parliamentary Public Works Committee was made up of 6 Members of Parliament, two from the government party, two from the opposition party and two from the corner party. The governing party did not have a majority. (I was Chairman of the Public Works Committee when it recommended the construction of Loy Yang Power Station).

A New Player.

The year 1965 was a disastrous one for East Gippsland with bush fires ravaging the countryside from Heyfield to east of Bruthen. Water restrictions on irrigation from the Mitchell River threatened the development of the vegetable growing industry. Interest in a dam was also stimulated by evidence to the Parliamentary Public Works Committee that there was potential for water from the river to be diverted elsewhere.

A Mitchell River Water Utilisation Committee was established in 1965 under the Chairmanship of Cr. W.H. Dumaresq. At my suggestion, it was modelled on the Thomson River Committee with three Vice-Presidents. One was given the task of studying contour maps to try to locate a suitable site and estimate its storage capacity. The second was to ascertain what area of land would be available for irrigation. The third was to examine what kind of agriculture would be likely to follow the introduction of irrigation. Questionnaires were sent to landowners between the Mitchell and Avon Rivers and a good response was received.

At the time, a considerable portion of the Lindenow flats was under pasture for dairy production but there was a trend toward vegetable growing. The rich alluvial soils are ideal for these crops.

At the same time, the government was being lobbied to refer the Mitchell to the Parliamentary Public Works Committee. The construction of a dam at Chowilla, near the N.S.W., Victoria and South Australian border was abandoned and the alternative of a dam at Dartmouth was referred to the Committee. This put the Mitchell inquiry back.

In 1967, a new player entered the arena. Water conservation was so popular that the Commonwealth Government went to an election with the promise that it would provide funds for what had been exclusively a State responsibility. I objected strenuously to this policy, as I believed, among other reasons, that it would lead to duck shoving between the two levels of government. In the event, the

commonwealth government was re-elected and that government became involved in deciding where dams would be built.

The States were invited to submit proposals to the Commonwealth for consideration. One condition was that they were not to be part of a State's current planning. This put Victoria at a considerable disadvantage because this State's ongoing commitment to water conservation meant that Victoria already had more land under irrigation than all the other States put together. The Mitchell River Water Utilisation Committee (MRWUC) found itself trying to prepare a case in competition with proposals from places we had never heard of. The Department of Agriculture prepared a report that indicated that 200,000 acres of land between the Mitchell and Avon Rivers could be suitable for irrigation.

An Agricultural Economist, McColl and Associates, was engaged by the MRWUC to prepare a submission and in the concluding stages, we found ourselves trying to estimate the cost/ benefit ratio fifty years hence. As no one seems to have succeeded in accurately forecasting prices for agricultural products fifty weeks ahead, it seemed an exercise in futility. This proposal would not have catered for the farmers on the red gum plains who were anxious to participate.

The Victorian Government submitted to the Commonwealth proposals for storage on each of the Mitchell and King Rivers. The Commonwealth insisted that the State government give priority to one or the other but the State was equally insistent that they were of equal priority. Finally, with a State election coming up, the Victorian Minister stated that, if the Commonwealth Government funded one, the State would build the other. The Commonwealth allotted funds for the King River storage, which prompted me to comment that it apparently preferred tobacco and hops to beans and butter.

In 1972, the Mitchell River was finally referred to the Parliamentary Public Works Committee for investigation and report. After an open and public inquiry, the Committee recommended a proposal by the State Rivers and Water Supply Commission for a storage at Billy Goat Bend. The wall was to be about 600 metres long and about 70 metres high. The whole top of the wall was to be an overhanging lip to form a spillway, the water falling free to the rocks below. This would have provided a spectacular waterfall, particularly when the river was in flood. The impounded water would have extended upstream about twelve kilometres between high cliffs providing a tranquil fiord-like lake. The estimated cost was about \$4,000,000. The dam would have stored about 1/30<sup>th</sup> of the annual flow of the river. In most years, it would take a matter of days to fill and in times of flood, just hours. The rest of the river would have been unchanged apart from more flow downstream of the dam during droughts.

Over more recent years, some farmers have millions of dollars invested in land, machinery, buildings, etc. for growing and preparing their produce. In some cases, substantial investment has been made in establishing market outlets, both in Australia and overseas. Any failure to supply the product can mean the loss of the contracts, and the need for a dam has increased.

#### A Green Growth.

Under a new Premier, the government decided that Environmental Effects Assessments were to be carried out on all major projects. The first of these was conducted on the proposal for a dam at Billy Goat Bend. As part of the assessment, three alternative sites were also to be examined. The assessment team rejected the Billy Goat Bend site on the grounds that it would drown portion of a lillypilly closed forest. There was still plenty of this vegetation down stream of the site and the only thing unique about it was that it is the most westerly occurrence. No assessment was made of whether there was any likelihood of an even more extensive closed forest developing at the new water level. The effect on the "endangered" grayling, which have since been found in abundance in numerous Gippsland streams, was also of concern to the authors of the report.. In fact, the report dealt only with the negatives – no attempt was made to find anything positive. This may have been the result of their instructions rather than the evidence.

The report made the bare statement that the team was unable to examine one of the alternative sites because access was blocked by blackberries. For a report supposed to be dealing with environmental

effects, it was astonishing that the alarming growth of this noxious weed along our mountain streams drew such scant comment.

A consistent campaign was waged through the metropolitan press against a dam on the Mitchell highlighted by a claim that just 99 farmers would benefit from the scheme. An officer of the Mines Department claimed that the needs of irrigators on the Mitchell Flats could be assured by recharging aquifers that some farmers already accessed for underground water. He also proposed that Jones Bay could be converted to fresh water as a storage for urban requirements by blocking it off from the rest of the lakes.

The aquifers referred to are basically old river beds which were covered with silt hundreds of years ago. They appear to draw most of their water from the river at various points. The problem with that proposal is that the aquifers are also an essential part of the drainage of the soils and recharging would be likely to waterlog the soil at the lower end of the flats during years of above average rainfall. The theory did not address the problem of where the water for recharging would come from during prolonged periods of very low flow in the river.

Nevertheless, despite the strong campaign, the Environment Effects Assessment did state that an alternative site at Angusvale would be acceptable and, in fact, would have beneficial environmental effects. The problem with that decision was that there were additional costs involved making the proposal less viable and giving more fuel to the opponents. This also stymied plans that were certainly in the minds of the original designers of the scheme that the dam at Billy Goat Bend would become a balancing dam for a much larger storage incorporating hydro-electric power generation which could be built at Angusvale at a later date. The lower dam would then be used to even out flows arising from release of water to produce electricity.

I was in close contact with both the design engineer and the construction engineer and was assured that the design of the small dam at Angusvale would provide for the construction of a much larger dam at the same site if it were required at some time in the future.

The Premier of Victoria at the time, who was a regular visitor to the Gippsland Lakes, in a personal conversation, surprised me with his theory of returning the Gippsland lakes to a fresh water system. He suggested a barrier near Metung which would allow the use of the lake system as a means of conveying water from a large dam on the Mitchell to pumped irrigation schemes as far afield as Longford and the lower reaches of the Latrobe. His scheme also envisaged the generation of hydroelectric power from the release of the water to operate the pumps.

The idea of reducing the size of the dam was also canvassed. This increased the cost per acre/ft. of the stored water even further as there are basic costs regardless of size. The spillway, for example, had to be large enough to accommodate flood flows regardless of the size of the dam. Access roads and workers accommodation and other costs would be required to the same extent as a larger dam.

### **Work begun.**

The dam was almost a reality when funds were provided in the State budget in the early 1980's. Several houses and single men's quarters were constructed at Lindenow. Almost \$1,000,000 was spent building a road into the site. In the late 1980's, Parliament passed legislation setting up the Public Bodies Review Committee (P.B.R.C.) that was to examine public bodies and determine whether they should continue to exist. I imagined that such bodies as the Sludge Abatement Board, a relic of goldmining days, and similar archaic bodies would be targeted. It came as a surprise that the first referral to the new committee was the "Water Industry" including Water and Sewerage Trusts, River Improvement Trusts and Irrigation Districts. Significantly, the Melbourne and Metropolitan Board of Works, Melbourne's water supply authority, was specifically excluded.

One of the Committee's first reports dealt with general principles that the committee believed should be applied to "government business undertakings". One of these principles was that these undertakings

*"should provide a rate of return on government money invested in them."* It was suggested that this rate should be 2-3%. The report went on to say that *"For authorities for which such a target is inappropriate, such as VicRail and the Tramways Board, other specific financial targets should be set."* At that time, VicRail ran Melbourne's suburban trains. There was no attempt to justify why a lower standard should be set for public transport in the city than for drinking water in the country. Country people did not seem to care although I warned at the time that they would be hit by substantial increases in water and sewerage charges. (It was the policy of the government that freight services, almost entirely in the country, should operate under full cost recovery but passenger services, almost entirely in the metropolitan area, were expected to operate at only half-cost recovery).

In 1982, there was a change of government and three of the members of the Public Bodies Review Committee became Ministers. Work on the preparations to build the dam was soon brought to a halt. Meanwhile, in 1982, I was appointed a member of the Public Bodies Review Committee and participated in the inquiry into the irrigation aspects of the Water Industry. I wrote substantial minority reports to several of the reports the committee made to Parliament in which I drew attention to such issues as the interpretation that the vesting of rivers in the Crown gives governments the right to sell water to the highest bidder.

The P.B.R.C.'s Twelfth Report to Parliament on Irrigation and Water Resource Management in 1984 recommended fundamental changes in the financial arrangements for the construction of dams for irrigation. This was held out to be part of a grand plan to implement the user pays principle – the beginnings of the level playing field – the elimination of cross subsidisation.

Over previous years, I had often criticised the fact that the State government picked up the tab for immense losses on Melbourne's public transport. These had regularly been in excess of \$1 billion annually, meaning that rural people supported cheap public transport for metropolitan people to the tune of about \$300 per head, year after year. It seemed to me that this was offset to a degree by the money spent by government on building water storages for irrigation and substantial subsidies for water and sewerage services to country towns. The government abolished all the rural subsidies but the support for the metropolitan transport system remains.

The major impact from the viewpoint of a dam on the Mitchell is that irrigators would have to pay for the construction of the dam. This is reverting to the system that failed 100 years ago. It also fails to take into account the whole of catchment concept.

The Gippsland Lakes.

Concern is expressed at the possible effects on the Gippsland Lakes of building storage on the Mitchell. As pointed out previously, the whole purpose of the proposed dam was to maintain better flows in the river during severe drought. The storage referred to above could be filled in a matter of days during normal winter flows and hours in a flood. In April 1990, the flood flow was estimated as 133,000 Mls. per day at Glenaladale, 5 times the capacity of the proposed dam.

At the same time that these changes were being implemented, the State government reneged on the arrangements to share the water of the Thomson with the Central Gippsland area. The arrangements were agreed to after years of negotiation with Gippsland representatives. The original recommendation was that about 130,000MI out of a total of 346,250 MI. should be made available to Central Gippsland but this was arbitrarily diverted to the Mornington Peninsula without any environmental effects assessment or consultation with anyone. The diversion of this large amount of water out of the catchment has a far greater impact on the Gippsland lakes than any size dam on the Mitchell could possibly have unless it, too, is diverted out of the catchment.

There is a very logical case for the government to finance a dam on the Mitchell large enough to store sufficient water from high flow periods to replace in part, at least, the water taken from the system by the diversion of Thomson water. The need to maintain water quality in the Gippsland Lakes makes this almost an imperative.

There is no doubt that water taken from Gippsland has enabled the metropolitan area to grow and prosper but without a cent of compensation to Gippslanders for the use of our water. Landowners in Gippsland are levied rates to pay for catchment management but Melbourne property owners or their municipalities who benefit from the water that naturally belongs to Gippsland pay nothing towards these charges. (*Catchment management rates have since been dropped but there is growing concern that river maintenance is being neglected*).

Similarly, irrigators in Northern Victoria, and the municipalities in which they are situated, benefit from the diversion of water from the Snowy. The users of electricity generated by the scheme also benefit but pay nothing for the water that nature intended to run down the Snowy. There is no doubt that the town of Orbost exists because of the Snowy River and to deprive the residents of the water in the river involves a financial penalty that is grossly unfair to them.

### **Fundamental issue.**

In 1886, the Government of Victoria abolished the system inherited from British law under which the titles of adjacent landowners extended to the centre of streams and, in its place, vested the use and management of surface water in the Crown. The fundamental issue is the interpretation that is now being applied to this decision. It is reasonable to assume that the original intention behind vesting water in the Crown was to prevent monopoly control by private landowners and to ensure that all in the vicinity had access to essential water supplies. There was not the technology to transfer vast quantities of water from one catchment to another and no provision was made to guard against that eventuality.

The interpretation applied over recent years is that the government has the right to transfer surface water to wherever it sees fit - and more recently, to sell the water in any river to the highest bidder. **The principle that a person cannot be deprived of property without compensation does not apply to regional property.** A government in the future may well decide to sell the water in the Mitchell River to the highest bidder. Melbourne Water, and irrigators in Central Gippsland could be likely bidders. The farmers in the Mitchell River catchment could not compete.

We are faced with the dilemma that we cannot afford to pay the costs that the government now expects the irrigators to pay for water storage but if we do not use it ourselves, to find it sold off to some other area. Anyone who doubts this should look at what has already happened to the Snowy and Thomson Rivers.

The following statistics on the flow of the Mitchell River were recorded in the report of the Parliamentary Public Works Committee presented in 1972.

The lowest annual flow recorded up to that time at Glenaladale was 195, 000 Megalitres.in 1967/68.

The highest annual flow recorded of 2,223,750 Megalitres in1952/53.

The average annual flow is 850,000 Megalitres.

The proposed storage at Billy Goat Bend was 31,250 Megalitres.

The proposed storage at Angusvale was 18,750 Megalitres.

Irrigators at Lindenow use 6,550 Mls. from the Mitchell plus 4,450 Mls. from bores. As of 1988, 2.3 Mls. was diverted by the Water Trust.

The potential storage capacity at Angusvale could be as much as 2,000,000 Megalitres. Storages of the size contemplated in the 1972 report would have an insignificant effect on the flow of the river. There would be little impact on the lakes either, with the possibility of marginal benefit from slightly higher minimum flows.

There is the potential to build a much larger dam, up to more than 2,000,000 Megalitres capacity. Something larger than anything proposed up until now would be needed if land between the Mitchell and Avon Rivers were to be irrigated. If sufficient water was committed to maintaining flow into the lakes, it could have a significant benefit on the lakes. On the other hand, if opposition to a dam in this area is taken to mean that we do not want to make use of the water, it may lead to the ultimate disaster of the water being diverted away from this region.

It is true to say that throughout the various inquiries concerned with the conservation of water in Gippsland, local people submitting evidence kept the impact on the Gippsland lakes very much in mind. It was the final decision-makers, who were and always will be the people of metropolitan Melbourne, who made decisions adverse to the interests of the Gippsland Lakes.

The problems of the Gippsland Lakes are serious. A dam on the Mitchell River does not contribute to the problem because it does not exist. Nevertheless, it may be part of the solution and to discard that proposition is literally burying one's head in the sand.

There have been a number of studies made of the Gippsland Lakes involving the expenditure of millions of dollars but there is little evidence of any real solution to the problems. Studies indicate that there is a rising nutrient level to which is attributed an increasing incidence of algal bloom.

For many people, the cause appears self-evident – farmers apply fertilisers and runoff from farms carries some into the lakes system, hence increased nutrient levels equate with increased algal growth.

This theory ignores a number of facts.

The rivers have carried huge volumes of nutrient rich silt into the lakes for thousands of years. The silt jetties are proof of this.

Runoff from farms is a relatively uncommon occurrence. It would be reasonable to assume that during periods of low flow any nutrients would be used up within the streams before it reached the lake. The area under irrigation in the catchment of the Gippsland lakes is only a minute part of the whole area.

Visual observation indicates that fertiliser is not leached down slopes. If it were, lower levels of sloping properties would not need the same level of top dressing.

Eutrophication is a natural process, taking place in water. The process is characterised by a development of excessive plant production arising from high levels of nutrients. The process in the Gippsland Lakes is a decline in plant production as salinity kills off shoreline and shallow water vegetation.

It is not disputed that some nutrients from farmland reach the lake system but it is debatable whether it would be significantly greater than what would have been contributed if that land were not under agriculture. In the context of its proportion to the total deposited from the whole catchment, it would be very minor.

The permanent entrance.

It is rare indeed not to see several carloads of tourists admiring the magnificent view from Jemmy's Point as one drives through Lakes Entrance. Probably none of them realise that right under their noses is taking place one of the greatest environmental disasters along our coastline. Why should they when the locals cannot see it either!! It is happening so slowly but nevertheless, inexorably.

A mountain of sand has built up under water to create the sand bar that is a menace to boats and has claimed too many lives over the years. In addition, so much sand has been dredged from the lakes inside the entrance that the authorities have run out of places to put it. Bullock Island is vastly bigger than it was 50 and 60 years ago and much filling has occurred in adjacent areas as well.

Where has all that sand come from, or more specifically, where **should** it be? It is very obvious that it is in the wrong place now. Is there a massive hole developing somewhere to produce all that sand? Nowhere else along the Ninety Mile Beach does sand build up off shore in such a way. It is certain that it is a product of man's interference with the natural cycle of events.

An aerial photograph taken from east of the entrance to the southwest along the beach indicates the dunes to the east of the entrance have increased substantially while to the west the beach is retreating. The sand which is building the bar and which is clogging up the lakes should be replenishing the beach in that area. Even without the benefit of a photo from a similar angle from forty years ago, the popular post card reproduced shows what is happening. Look at the curve of the 90 Mile Beach in the distance and visualise a steady curve in the beach to the foreground and it becomes apparent.



The silt jetties.

Those of us who went to school over fifty years ago remember from our geography books that the silt jetties on the Mitchell River were the best example of this type of geographical feature anywhere in the world. It has been a sad experience to see this unique feature "saved" by the dumping of rock at the water line. The very nature of the silt jetties is that they are made of silt - and the dumping of rock has destroyed their uniqueness.

The Paynesville road had to be deviated because it became impossible to beat the bank erosion. Quite apart from the enormous cost, substantially carried by local ratepayers, it is hard to see where it will all end. This is a very big price East Gippslanders are paying to keep the lakes in a condition that tourists seem to expect.

Farmers know that silt left behind after a flood is very fluid and takes days, if not weeks, to settle. It seems reasonable to suggest that the twice-daily rise and fall of the tide that occurs with the permanent entrance would prevent the settling of silt at the edges of the silt jetties and all around the lake shore. It

does not need the expenditure of millions of dollars to test this argument. Just take two bottles, put a cup of silty soil in each. Shake one of the bottles gently twice a day and let the other stand undisturbed. After a week or so, gently pour the water out of the bottles and it will be seen that almost all the silt stays in the unshaken bottle and almost all pours out with the water in the bottle that has been agitated.

During the flood of 1998, there was an excellent illustration of another way nature would have protected the silt jetties. This flood occurred during winter. Part of our farm has a low-lying area that is associated with a large billabong, in the property across the road, containing extensive reed growth. Being winter, the reeds were dormant. During the flood, a raft of dead reed material floated on to the road and part of our property where it lodged as the floodwaters receded. The council removed the material from the roadway and burnt it but that portion on our property was left untouched. After 12 months, the material, which had trapped almost an equal quantity of silt has completely rotted down and, no doubt, improved the fertility of the soil. It is easy to see how this would be repeated on a vastly larger scale if the reed growth in the lakes had not been destroyed by salinity. I imagine that once the lake broke out under natural conditions, vast amounts of reed debris would have floated out to sea, reducing the nutrient load in the lakes.

If it is accepted that it is essential to control tidal influence in the lakes at least at critical times to enable the silt to settle, expert advice should be sought on how to achieve this. Obviously a barrier and lock at some place would be essential. The pros and cons of this proposal could be more controversial than those surrounding the construction of a dam on the Mitchell would. Nevertheless, if the tourist industry keeps blindly blaming the farming community and closing their eyes to the obvious, the lakes will be doomed.

What created the silt jetties?

If there is any desire to preserve the truly unique silt jetties on the Mitchell River, it is necessary to decide what conditions lead to their formation in the first place. Obviously, the first condition was a river carrying large quantities of silt.

Next, it was necessary for the river to flow into still water to force the dropping of its silt load. Mostly, this results in the formation of a delta with rivers developing a number of outlets into the receiving waters. In fact, this is what the Mitchell River appears to now be trying to do through "The Cut". Some significant change must have occurred prior to 1936 when that break was made. The only water storage in the catchment was Lake Glenmaggie, which filled for the first time in 1928, and could not have affected the silt jetties. The bulldozer and heavy earthmoving machinery were unknown and dams were constructed using horses and scoops – a slow laborious process.

The likely reason for the formation of the silt jetties would be from the silt that it would have dropped in a delta shape, including in the bed of the stream itself. As the level of the lakes dropped slowly once and entrance opened again, the velocity of the river would gradually move this silt and as it reached the lake, drop it on either side of the main current of the river, reinforcing and extending the silt jetties.

Well before the 1930's, however, salinity was creeping up the lake bringing with it a plague of crabs that wiped out much of the aquatic vegetation. The permanent entrance allowed the lake level to reduce too rapidly, not giving time for the silt to consolidate before it was subjected to twice daily agitation from tidal effects.

Greenhouse effect.

There are many scientific reports stating that global warming will bring a rise in sea levels and almost as many rejecting the assertion – almost as many as there are theories on how to fix the problem of the bar.

If there is any substance in the reports, what will happen to the Gippsland Lakes and Lakes Entrance in particular? A king tide and high river flows already cause water to cross the Esplanade. It will be a multi-million dollar gamble if nothing is done - and the worst predictions are right. A rise of up to a metre has been predicted.

If they are right and the government says, "Its your problem, you fix it", the anglers and the fishermen and the boat hirers and the tourist operators will need all the friends they can get to help them press their claims. The farmers will look with great sorrow at the loss of the beautiful Gippsland Lakes but they will be able to carry on. The highway to Orbost can be diverted through Bruthen to avoid the distress of seeing the remains of people's dreams being shattered by ocean waves crashing through once fine motels and shops.

A far-fetched scenario? - Maybe – but is it any more far fetched than the claims that a dam storing 1/30<sup>th</sup>. of the annual flow of the Mitchell River will push the Gippsland Lakes over the brink of total destruction?

For every centimetre that the ocean level rises, it is many times that amount that a beach recedes. Bearing in mind that a rise will affect both sides of the barrier sand dunes, a rise in ocean levels and perhaps more severe storms may bring sudden, dramatic and disastrous changes to the entrance.

While the Greenhouse effect may be open to question, it is tempting fate to dismiss it completely when the only protection may be to build higher sand dunes which would need time to become stabilised by vegetation.

There is convincing evidence that the permanent entrance has been the major contributor to the deterioration of the lake system. Salinity has slowly killed vegetation that previously used up nutrients, held silt and protected shorelines. This was in evidence long before water storages were built in the catchment. The silt jetties have been eroding since before the 1930's when the river broke through "The Cut" at Eagle Point into Jones Bay. For sixty years, the silt that should have been reinforcing the silt jetties has been filling up Jones' Bay. The salinity has gradually extended further to the west, depleting shoreline vegetation and opening the way for further erosion. Diversion of flows from the Thomson must aggravate this problem.

If the deterioration in water quality were caused by agricultural practises it would be expected that the effect would have worked from Lake Wellington towards the entrance. It is the rivers entering that lake that are modified by the construction of dams, more extensive irrigation and more domestic and industrial pollution.

Parallel thinking.

The aspirations of the farming community and the tourist operators are not in conflict – they are in parallel. They must work together to find a solution that will serve everyone's interests. It will take all the political clout that can be mustered to convince any government that the issue is not a local one but a State and National one.

Gippsland people should consider how both sectors have been affected by government policies. Consider the effect on regional development if water conservation for irrigation had not been pursued. It is undeniable that by constructing water storages that converted wheat land in northern Victoria into dairy farms (in recent years using Gippsland water to extend it) the government denied the opportunity for the dairy industry to develop in the higher rainfall areas such as East Gippsland. With greater certainty of water supplies, dairy farmers in irrigated areas can plan with more certainty and their output is not subject to such variability as dairying under natural rainfall conditions.

Consider too what the effect would have been on the tourist industry in this region. There would not be the need to keep spending large sums of money to attract tourists because places like Eildon, Yarrawonga and dozens of other counter attractions based on water storages would not exist to attract the fishing and boating fraternity. In fact, the former State Rivers and Water Supply Commission used to pay the local contribution to match grants for boat ramps, toilets and amenities blocks at reservoirs while local communities had to find that contribution for identical structures around the Gippsland Lakes.

The single issue I raised more than any other during thirty-one years in State Parliament was the bar at Lakes Entrance. This can be substantiated by reference to Hansard. Much time was spent in talking with anyone who had an idea to solve the problem.

Some of the matters I took up were for the simple expedient of improving the depth of water on the bar to make it safer for fishermen. One proposal that I put forward led to one ton of explosives being detonated to loosen the sand in the hope that it would shift with the tide.

Another theory was that, if piers were extended far enough out to sea, the ocean currents would take the sand away. The piers could be built out of tetrapods (Interlocking concrete blocks) made using the abundant sand in the vicinity. It was claimed that, as the sand on the bar was worn away, so would the sand in the lakes be reduced. It may well have also reduced the barrier dunes.

Having never owned a boat or gone fishing, I had to seek advice from locals about issues in relation to the lakes. Bill Jeavons, the Manager of the Fishermen's Co-op. when I entered Parliament in 1961, had been in touch with the Wallingford Hydraulic Research Institute in England to seek advice on what would be the best way to deal with the sand bar. It seemed to me to be an excellent idea to seek the help of people with worldwide experience to solve problems of this kind.

All my requests to the government met a negative response. In 1967, I visited the Institute and was astonished to find that the State government had that very week asked the Institute for assistance in building its own model. The problem the Institute had in giving advice was that it was not given any information on how much the government was prepared to spend to fix the problem, what depth of water it wanted or any details of the hydrology of the catchment. Eventually a model was constructed in a rented shed at Port Melbourne but the project came to an end when the shed's owner wanted it back.

Most proposals appeared to be trying to beat the natural ebb and flow of the sand along the beach. I eventually came to the opinion that the best solution to the problems of the Lakes and the entrance is to try to replicate the natural cycle as closely as possible. But even that theory was shelved when the salinity of the lakes seemed to be a barrier to the spread of European carp from the Latrobe to streams to the east. This no longer appears to be the case.

Officers of the Ports and Harbours Branch were not impressed by the argument that the lakes should be returned to a fresh, or brackish, water regime as they claimed that it had become stabilised as a salt water one. The continuing need to stabilise the banks around the lakes appears to prove that opinion wrong.

In more recent years, yet another investigation of the lakes was undertaken. I put a case that the Wallingford Research Institute should carry out a study on the assumption that the entrance was not in place and recommend what should be done to accommodate the present uses of the lake system. Once again, the response was negative.

The conservationists.

Since 1970, a movement with influence far beyond its numbers has developed in Victoria and further afield. Obviously they did not exist in the late 1960's when plans were being laid to divert Thomson River water to Melbourne. They also appear to have all been on holiday when even that portion of the Thomson water designated to Gippsland was also taken.

They were very vocal when a democratically elected government in Tasmania proposed to put a dam on the Franklin River. The Commonwealth Government took the Tasmanian Government to court over the issue. The Victorian Government joined the action on the side of the Commonwealth. In Parliament, I asked the Premier, whether, in view of what appeared to be an unequal contest anyway, would not it be better to spend the several hundred thousand dollars it was costing in legal fees to protect some of Victoria's own heritage, such as the unique silt jetties on the Mitchell River. The Premier's response was that he had never heard of the silt jetties on the Mitchell River but he would take my word for it that they were unique - but the money was spent on legal fees.

The Tasmanian government was trying to help its economy by generating low cost, pollution free electricity. The Commonwealth government succeeded in "saving" the Franklin for the people of Australia but the Tasmanian people are bearing all the cost in the form of a depressed economy and unemployment.

Options.

There are several possible options to consider in relation to the future of the Mitchell River. It is an over-simplification to confine discussion to the question of a dam or no dam.

A dam of 2 million Megalitres to supply the metropolitan area. Hopefully, there would be unanimous opposition from Gippslanders. Every day brings more plans for the growth of the metropolitan area and this expansion cannot take place without water. Now that people can reach the city much more quickly, growth will be stimulated until it becomes clogged. The advocates of no dam on the Mitchell can expect strong support from the metropolitan area - which will evaporate as soon as more water is needed for Melbourne.

A dam half that size to maintain water quality in the lakes and supply stock and domestic supplies and limited irrigation to the area between the Mitchell and Avon Rivers. This should be in conjunction with appropriate structures to protect the lakes system from the effects of any possible rise in ocean levels. This may be in the form of a lock or locks that could be managed to maintain the lakes at optimum level and appropriate salinity level. This option is not possible unless the state accepts that it should bear the cost.

A dam of similar size built by private finance. This would ignore the need to treat the existing and potential problems facing the lakes system. It would also present the threat of the water being diverted elsewhere, further compounding the problems.

The dam which was proposed in 1972.

This would provide for a small extension of irrigation on the Lindenow flats, additional security of supplies to existing irrigators and a slight increase in water quality in the lakes. It could not be financed under current government policies.

Other factors in relation to the operation of a dam on the river must also be taken into consideration. The site at Angusvale is above a gorge some fifteen kilometres in length. It is not possible to construct open channels or pipelines to convey the water from this site to where it could be used. The only way it could be utilised is by extremely expensive tunnelling, or by release downstream and pumping. This would make it more expensive than the vast majority of irrigation districts that operate under gravity schemes. It could therefore only be economically used for production of high value crops and possibly for stock and domestic supplies and perhaps limited irrigation. However, metropolitan users could afford the expensive tunnelling needed to convey the water for use in the metropolitan area.

Underground water.

There is extensive use of underground water for irrigation on the Lindenow flats, mainly by property owners without direct access to the river or unable to obtain the appropriate permit. The water is suitable for irrigating pasture but has limited use for vegetables because of the discolouration it causes. This adversely affects quality of crops such as lettuce.

The aquifers are old riverbeds that were covered by silt hundreds of years ago and are recharged by the river at times of high flow. They also act as drainage and prevent waterlogging of the soil in very wet years. It is extremely doubtful if all the recharge sites could be located; and the reliability of the system would be very suspect. Many farms have quite reliable bores but some have searched in vain.

Flood mitigation.

Flood mitigation is not a realistic side benefit of any dam proposal. Flood retarding basins are largely only justified to protect urban areas. The daily volumes that the Mitchell can produce in flood times would require the construction of a huge dam. In some cases, this has been generated from rainfall in the catchment below the site of the dam. The Snowy scheme, for example, has not reduced the devastating floods in that river for the same reason.

No Dam.

There is the further option of opposing a dam altogether. Unfortunately, other people put their own interpretation on such a decision and it is likely to be interpreted as a disinterest in development in this region. This will suit the ideas of those who have their eyes on Mitchell River water for metropolitan Melbourne. This option has already been investigated as a possibility. There is the clear precedent of the Thomson River. There was not one voice of dissent from outside Gippsland when the share allocated to Gippsland was taken by the metropolitan area.

There is more water run off the roofs, the roads, the car parks and other impervious areas of metropolitan Melbourne, and drained into Port Phillip Bay, than is needed to sustain irrigation on the Lindenow flats. It is time the people who waste water are penalised rather than those who use it.

Plan the catchment.

Over thirty years ago, I came to know Ernest "Watershed" Jackson. For many years, an Officer of the State Rivers and Water Supply Commission, he acquired his nickname from his dedication to the concept of watershed management. He once said to me, "Rivers should not be boundaries (as between municipalities). Rivers should unite people, not divide them as activities within a catchment affect everyone who lives in it in some way." He retired early so that he could dedicate all his time to his passionate belief in this concept.

At his instigation, when the opportunity presented itself, I visited the Muskingham Valley Conservation Trust and the Tennessee Valley Authority in the U.S.A., the Metropolitan and Toronto Conservation Authority in Canada and the Thames Conservancy Trust in England. Most of these bodies were established to deal with seriously degraded environments. Even the largest of them, the Tennessee Valley Authority, emphasised that the community needed to be involved to get the best results.

Bairnsdale Waterworks Trust

There has been considerable criticism among supporters of a dam on the Mitchell of the failure of the Bairnsdale Waterworks Trust, now part of East Gippsland Water, to support the construction of a dam. As mentioned earlier, this was the product of government policy in the past, that urban water supply authorities had to bear the cost of their storages, although there was financial assistance provided to country towns. East Gippsland Water is in the process of linking town supplies from Lindenow to Lake Tyers Beach in one large scheme with the newly completed storage at Woodglen as the main reservoir. East Gippsland Water has gone down the path of constructing very expensive off-stream storage rather than contribute to sharing the cost of an on-stream storage.

It would appear that the quality of water obtained from an on-stream storage, in which there would be continuous circulation of water with the natural purification that goes with it, would be superior to that from a static reservoir open to the full heat of the sun. As the City of Sydney discovered, under certain conditions even on-stream storages can be affected. These conditions include warm temperatures and still water, the same conditions that bring on the problem in the Gippsland lakes. Logic seems to suggest that these problems will be aggravated in an open reservoir such as at Woodglen. It would not be the first time that water storages had become unusable.

Make things happen.

We have a choice –we can continue to argue amongst ourselves and give the government the choice - of doing nothing, or disregard our opinions and do what it wants

or

we can put up a logical proposal that demands proper consideration.

There is no doubt that the cost would be very high and well beyond the capacity of this region to fund but there is ample evidence that past and present actions of the government are substantial causes of the problems. The cost would be insignificant, for example, relative to the amount that has been spent in extracting coal from the catchment to add to the wealth of all Victorians.

The cost will be high but it may be much higher if it is not done.

The Grand Plan.

A complex of barriers and locks to enable the level of the Gippsland Lakes to be maintained at a level above high water at times when required to ensure the depositing of silt to maintain the silt jetties and lake shores. Closure of the cut into Jones' Bay would also be desirable.

It would be appropriate to also manipulate the entry of seawater at other times to replicate salinity levels that occurred under natural conditions.

It may be necessary to create a second entrance to enable the system to operate without the lake rising to levels that would cause damage to private property.

The construction of a dam on the Mitchell River of sufficient capacity to provide flows during prolonged dry periods to off set the loss of water diverted to Melbourne.



Mouth of the Murray showing beach aligned either side of entrance.

*The following are extracts from a report on the lakes at the mouth of the Murray.*

*Incidences of Blue-green Algal Poisoning*

*Lake Alexandrina, Australia*

The first recorded incidence of animal poisoning from a blue-green algal bloom was in Lake Alexandrina, Australia in the late 1800's. Cattle, horses, pigs, sheep and dogs died after drinking water covered by a scum of the blue-green algae

## WHAT'S WHAT ABOUT THE MURRAY : LOWER LAKES AND THE RIVER MURRAY

Water Resources Group, Department of Environment and Natural Resources In conjunction with the CARE program

What do you do when the Lower Lakes have been changed from an environment that was estuarine to one that is now permanently freshwater?

Between 600 and 1000 GL of South Australia's water entitlement is lost due to evaporation, mainly from the Lower Lakes. In fact, 43% of South Australia's minimum entitlement is to compensate for evaporative losses from the lakes and to maintain their levels.

## HOW HAVE THE LOWER LAKES CHANGED?

As River Murray approaches the sea near the end of its 2200 kilometre course, it arrives at Lakes Alexandrina and Albert before dividing into five channels leading to the Murray Mouth Area. At that point, river water either flows into the Southern Ocean or enters the long coastal lagoon known as the Coorong.

Today, this is a permanently freshwater environment, with no estuarine influence beyond the Murray Mouth area. Why? Because the construction of the barrages has prevented seawater from entering the shallow terminal lakes. Other environmental changes brought about in the wake of the European settlement also have had a dramatic effect on the Lower Lakes ecosystem.

As the river moves downstream from Mannum, it was originally fringed by permanent swamps occupying a wide floodplain valley. Today these wetlands have been "reclaimed" for agriculture. Swamp reclamation began in the Wellington area in the 1880's. Levees were built, creating a large irrigated area for intensive settlement and grazing. By 1929 development works had drained nearly all of the wetlands along the river between Wellington and Mannum. River flows are now confined to the main channel. Changes to the flow regime as a result of river regulation have also had an impact as the Murray reaches the sea. Under natural conditions there was almost always some outflow at the mouth. These flows were sufficient to keep Lake Alexandrina fresh for extended periods. Indeed, in the 1800's and early 1900's the Lower Lakes supported a thriving Murray cod fishery. Control of the Murray has caused the overall volume of water passing through the Murray Mouth to be reduced. Although this is largely due to the upstream harnessing of the Murray-Darlings natural flow and the increasing diversions of water from the basin, the barrages have further reduced the flow passing in and out of the mouth under the influence of ocean tides. Current outflows of the Murray Mouth are now only a third of the natural outflows, and periods of four to five years of little outflow can be expected.

In April 1981 the Murray Mouth closed for the first time on record since settlement, after there had been no flow through the barrages for six months. The mouth nearly closed again in 1995, and it seems that this may become a more frequent event in the future.

## WHY WERE THE BARRAGES BUILT?

A barrage is a barrier built across the river mouth to separate fresh river water from salty seawater. Stoplogs (which act like giant corks) can be inserted or removed along the length of a barrage to accommodate varying flow and tide conditions. Barrage gates are also used to maintain the desired water level in the Lower Lakes.

Early landholders in the Lower Lakes region lobbied for the construction of barrages to maintain a reasonable supply of freshwater for stock and irrigation. They also wanted to stabilize the river at a level normally above that of the surrounding river flats (which were protected from flooding by levees along the banks). This would allow them to irrigate their low-lying pastures without pumping. After many proposals were investigated, the River Murray Commission finally recommended that five barrages be built. They were to be sited across the various channels from Lake Alexandrina to the Murray Mouth.

Work began in 1935 and the five barrages - Goolwa, Mundoo, Boundary Creek, Ewe Island and Tauwichee - were finished in 1940. The barrages are operated by SA Water for the Murray-Darling Basin Commission. With fresh water guaranteed in the lower reaches of the river, pipelines were then installed - from Mannum and from Murray Bridge to Adelaide, and from Tailem Bend to Keith. These pipelines ensured the water supply to Adelaide and the Upper South East. Water piped from the Lower Murray provides at least some of the water supply to 1.25 million people in South Australia. On average, Adelaide receives 55% of its water from the Murray. In drought years this rises to over 90%. In dry years like 1994, the Lower Lakes act as reservoirs for the Adelaide pipelines, with water being pumped backwards to Murray Bridge.

More than 14 000 hectares of land are now under irrigation between the barrages and lock 1 at Blanchetown. Today the Lower Lakes region supports a thriving dairy industry, pasture and horticultural crops, and a commercial fishery. Activities in the area have diversified and it is increasingly becoming a multi-use resource. The recreation and tourism sector is rapidly expanding, and there is growing recognition that it is the environmental value of the Lower Lakes which underpins their attraction.

## WHAT PROBLEMS HAVE BEEN CAUSED BY THE CHANGES TO THE LAKES?

Changes to the natural environment have arisen from a number of sources - construction of barrages and levees, settlement and land use, and more recently the pressure of tourism and recreation. These are all factors which have had an environmental impact on the Lower Lakes, causing problems that now need to be addressed. The complex system of freshwater and saltwater wetlands that forms the Lower Lakes supports an abundance of birds, animals and fish. More than 240 species of birds have been recorded in the area. The Coorong is recognised as a "Wetland of International Importance" under the Ramsar Convention, and is included on the register of the National Estate. The increasing demands on the Lower Lakes must be managed so as to protect their natural assets.

**Water Quality** - This is one of the most critical resource management issues for the region, having both an environmental and economic cost. Lake Albert is more saline than Lake Alexandrina, and this level of salinity is aggravated during extended periods of low flow. The barrages have had a significant impact on the Coorong, as they have halved the flow of water from the river, resulting in more saline conditions. Land clearance has also contributed to salinity problems. Pollution arising from agricultural and urban run-off and recreational activities is another factor affecting water quality. Blue-green algal blooms have at times caused serious problems in the Lower Lakes. Water from the Lower Murray must undergo filtration, adding to water costs.

**Lakeshore Erosion** - Soon after completion of the barrages in 1940, landholders became aware there was an erosion problem. It is estimated that 750 hectares of land have been destroyed. The main cause of foreshore erosion is wave action which is aggravated by prevailing winds. Certain soils are more susceptible, making some areas particularly vulnerable. The problem has been exacerbated by higher water levels in the lakes (due to the barrages), clearance of vegetation, and grazing. Erosion destroys valuable lakefront land, increases water turbidity and affects wildlife habitat.

Loss of habitat - Tidal effects and the intrusion of salt water during periods of low flow were once felt as far 250 kilometres upstream from the Murray Mouth. As a result estuarine fishes and invertebrates were commonly found as far up river as Murray Bridge. Thanks to the barrages, these species no longer exist in the Lower Murray and Lakes. The barrages have also impacted adversely on the life cycle of native fish, especially those which migrate between freshwater and the sea. (For more information refer to fact sheet 8, What's What about Native Fish and the River Murray.) Loss of habitat has also occurred in the wake of swamp reclamation. As the wetlands which once fringed the Lower Murray were drained, valuable biological habitat was lost.

#### WHAT CAN BE DONE?

Flow Management Options. In looking at what options are available for improved environmental management of the Lower Lakes, the first issue to consider is water control policy. Although it is possible to some extent to control water levels in the Lower Lakes by operating the barrages, there are many different interests to consider - environment, irrigation, bank erosion, salinity, water supply, recreation and navigation. The main operating rule for the Lower Lakes is to maintain an average water level of EL 0.75 (this represents a distance of .75 metre above sea level). However, at the beginning of summer the lakes are usually "surcharged" to EL 0.85.

This allows for the relatively low flow that is South Australia's minimum entitlement and for evaporation during the summer season. By autumn the level of the lakes will have dropped to about EL 0.6. There is usually no discharge to the Coorong or the Murray Mouth from late spring to early autumn. There is little flexibility to move outside of this range - (EL 0.6 to EL 0.85). Higher water levels aggravate foreshore erosion problems. Lower levels create navigation problems, make gravity fed irrigation difficult, and may allow salt water to enter the system under adverse tide and wind conditions. The main management strategy available under the present regime relates to the timing and extent of outflows from the barrages. Releases could be better managed so as to promote fish recruitment and migration, and to benefit the Coorong by encouraging Murray water to enter this system at times when there are flood flows. At certain times of the year there is also an opportunity to reduce salinity in Lake Albert by allowing some of its more saline water to be drawn out to sea, replacing it with fresher river water.

Erosion control options. One means of controlling erosion of the Lower Lakes foreshore is to use vegetation to help stabilize the banks, thereby minimizing the effects of wave action. Trials carried out to identify the most appropriate species suggest the following plants may be suitable: bulrush (*Typha angustifolia*), common reed (*Phragmites australis*), reed canary grass (*Phalaris arundinacea*), and spiny-headed mat-rush (*Lomandra longifolia*). However, the exposed nature of much of the foreshore means that other mechanisms such as sand bags, tyre, sleepers and rockfill need to be considered in conjunction with revegetation. More efficient grazing strategies excluding stock from the immediate shoreline could help to stabilize the foreshore and improve the establishment of reeds. Lowering the water levels in the lakes would reduce erosion, but this is a complex issue which has implication for all of those who use the resource.

Management Planing. Demands on the resources of the lower lakes must be managed in an integrated way to reduce environmental impacts and conflicts between users. A management plan will be developed for wise use of the Ramsar wetland, with many opportunities for community involvement in the process.

From 1989 to 1993 the River Murray enjoyed five years in a row of overbank flows which reached the sea. This gave a major boost to breeding and regeneration cycles in the wetlands and kept the Murray Mouth open. Fish catches in the Coorong rose due to consistent high flows.



Mitcell River at junction with Morass drain shows almost no vegetation.



Silt jetty with no natural erosion protection.



Total absence of aquatic growth. Rock is totally foreign in this environment.



Morass Drain with some protection from salt water intrusion shows aquatic growth.



This small structure protects Mcleods Morass from salt water intrusion.