Submission No 3

INQUIRY INTO ADEQUACY OF WATER STORAGES IN NSW

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WATER.

OUR MOST ABUNDANT RENEWABLE RESOURCE.

HOW AND WHERE WE CAN CONSERVE AND USE IT.

Burrinjuck Dam.

Capacity 1,026,000 megalitres.

The first dam built in the MDB. First major dam in Australia.

Submission to the NSW Standing Committee on State Development.

Author**: Ron Pike.**

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The following people have provided input to this submission:

Mr. David Boyd: Former Chairman and CEO of Clyde Agriculture. Trustee of the McGarvie Smith Institute.
David has years of practical experience on the flood plains of the Darling River and its tributaries.
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Mr. Ian Mott: Third generation Native Forest owner and secretary of the Landholders Institute Inc.
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Mr. Max Talbot: Executive Officer Strategic Engineering, Snowy Hydro Ltd. (Retired)
FIA Aust. Operations Engineer, Snowy Mountains Council. (Retired)

Mr. David Lindsay: Retired businessman from Leeton who has devoted many years to studying water conservation and irrigation schemes and has helped the author with research and obtaining documentation of proposed water Conservation schemes.

Reference to Peter Andrews work with Natural Sequence Farming.
http://www.nsfarming.com/principles.html
Right click on URL and then click on Open Hyperlink.

The work of Peter Andrews (referenced above) is especially acknowledged along with many other people with generations of practical local knowledge and understanding of water and the rivers of our great Continent and with whom I have swapped and compared observations and experiences over many years.

Ron Pike.

EXECUTIVE SUMMARY.

- The reliable supply of cheap power and water to families, industry and agriculture is a prime responsibility of State Governments.
- An abundance of cheap water and power has been the basis of our development and prosperity as a Nation and until recently given Australia a competitive advantage over most other Nations.
- Recently this advantage has been squandered by Governments as their decision making process has become subservient to radical environmentalism and the growth of multi-Government bureaucracies.
- Australia is not short of water and there is huge potential for water conservation and the production of hydro power on most of our rivers.
- Prior to the conservation of water in dams, most of our inland rivers and many coastal rivers irregularly ran dry.
- The development of and growth of our cities and towns was and still is dependent on the conservation of water in times of plenty.
- It is essential that the oft repeated false claims that:
  Australia is short of water.
  Dams destroy rivers.
  Australia's water is not where we need it. Are countered and corrected.
- All of our recent water shortages were caused by a failure of Government to build water storage's for the last 35 years. Not because of a shortage of water.
- The building of costly desalination plants was irrational, unnecessary, wasteful and very bad economically.
- Rather than dams having an adverse impact on aquatic species, it is our dams, weirs and associated irrigation structures that provide the best habitat for aquatic flora and fauna and keep our rivers running during long droughts.
- Flood mitigation must be a whole of valley exercise and can never be achieved by just the building of one or two major dams.
- All of the available data and historical records support the need for water conservation and highlight the huge capacity for further storage.
- Our growing population demands that Government immediately plan, build and commission more water storage and power generating plants.
- All of the arguments presently being used to stop dam building are emotional rather than factual.

Ron Pike.

INTRODUCTION.

Unshakable Truth: **After food and shelter, the two most basic inputs to modern life for individuals, families, industry and agriculture are WATER and POWER and it is a prime responsibility of Governments to ensure these stays of modern life are adequately provided at the lowest possible cost.**

These services should never be used as quasi tax streams as has become the case.

All Governments win as a result of increasing business activity and productivity when these inputs are not overpriced as a result of shortages caused by Government inaction in planning and building capital works for the supply of power and water.

Before any Politician, Political Party or other group can successfully present a rational case for the construction of new dams and associated water conservation and hydro electricity generation, it will be essential to first educate the public that much of what has been claimed regarding water and dams in Australia in recent years is FALSE.

The first falsehood that needs to be countered is "*that Australia is short of water.*"

This totally untrue claim is usually associated with the statement, "*Australia is the driest inhabited continent on earth.*"

While the second statement is technically true it is totally irrelevant unless we also appreciate that Australia is also the smallest continent and far more importantly, has a miniscule population compared to the other continents.

If we look at our water availability per head of population (which is much more meaningful), whether via total precipitation or by average annual runoff, we see that rather than Australia being short of water, we have an abundance, even if our population was to double or treble.

Precipitation per Head of Population in Megalitres per Annum.

Australia---122	**China-----11**
Brazil-------121	**Japan-----5.9**
U.S.A.------- 29	**England---2.6**

Water is our most abundant renewable resource.

All we have to do is sensibly harness it and use it.

The other Bob Brown and Greens propagated falsehood that needs to be destroyed is the claim; "*That dams destroy rivers.*"

In the Australian environment correctly sited, properly engineered and practically managed dams are always an enhancement of the environment and of the river ecology.

Dams simply store water in times of excess flow to ensure continuing stream flow and water for all users, including the environment in times of drought and even periods of no inflow.

There is no environmental downside in the building of well engineered water conservation areas (Dams) on the rivers of Australian.

It is a sad reflection on our lack of capacity for rational argument and decision making that following the Don Dunstan decision in 1970 to stop the building of the Chowilla Dam on the Murray River and delay the building of Dartmouth on the Mitta Mitta, and the Bob Brown driven campaign against the Gordon below Franklin hydro scheme, that for the next 35 years

while our population and water needs have more than doubled; we have done little to increase our water conservation and storage, other than building Wivenhoe Dam in Queensland.
The other false claim often made to justify lack of action or to support the senseless pursuit of desalination plants, is that most of Australia's water is not where we need it.
The facts are that most of our reliable runoff is exactly where we need it.
That is between Adelaide and Cairns on the east coast where most of our population and most of our industry is based. That is why people settled there in the first place.
Our recent water shortages were all caused by the failure of Governments to build water conservation structures for the last 35 years; not because there was a shortage of water.
History is going to be scathing of Governments, Political Parties and all involved in the decision to waste taxpayer money in building desalination plants, when that money could have been much more economically used to build dams and associated works that would provide far greater quantities of water (and produce hydro power) at a fraction of the cost of these power hungry, inefficient monuments to mans subservience to irrational environmentalism.
Green lobbying and preference deals done with State Labor Governments have caused the shortage of both water and power and caused unnecessary cost increases in these two basics of modern life.

THIS SUBMISSION IS ABOUT CORRECTING THIS.

The fact that the recent very long and severe drought (over 13 years) that affected most of southern Australia, coincided with a massive growth in environmental extremism, has convinced many that climate change would result in fewer floods, hotter summers and less rainfall, therefore less run-off and any new dams would be wasted money.
Weather over the last two years and the huge floods that followed the end of the El Nino period we have recently witnessed, should prove that these claims were at best sensationalist and at worst driven by an anti advancement ideology which seems to be the Green mantra.
It is time to put this nonsense behind us and start doing what our much more visionary forefathers did; harness our abundant resources to the best advantage of future generations.

Blowering Dam.

Man adapting and enhancing his Environment to the lasting advantage of both.

A beautiful and permanent man made wetland that provides water conservation for food production, flood mitigation, recreational facilities, Hydro power and a pristine habitat for aquatic species.

BACKGROUND TO DAM BUILDING.

Mankind has developed the techniques of dam building from very basic structures used by primitive man that were similar to Beaver dams to huge concrete and earth and rock fill structures that have capacities up to 40 million megalitres like the Hoover Dam pictured.

From this built by Beavers.

To this 35M megalitre Dam built by modern man.

When considering water conservation we should also be mindful of the capacity to improve flood mitigation. Modern man needs to be aware that all structures between the two extremes pictured above have a place in making our river valleys (drainage systems) more productive, more livable, more environmentally friendly and more sustainable.

Before making any decisions on dam and weir construction or any associated water infrastructure we must have a clear understanding of what we are trying to achieve.

While most dams have the potential to combine the outcomes of water conservation, flood mitigation and the production of clean hydro power, it is generally not practical or economical to build large dams primarily for flood mitigation.

Recent vivid images of the vast volumes of water that flow from whole of valley heavy rain events, highlight the inadequacy of even huge dams with one or more million megalitres of airspace having any worthwhile impact on preventing floods. (As was recently demonstrated at Wivenhoe Dam.)

How dam capacity is managed will always be a conflict between air space (flood mitigation) and water storage for drought times.

If we are serious about flood mitigation in any river valley, it must be planned as a whole of valley system where every creek and gully that delivers water to the main river (drainage channel) has a number of smaller permeable dams (check dams) that temporally hold the water but slowly release it back into the main river over a much longer period.

These check dams need to be augmented by controlled weirs on the creeks then delivering into one or several major dams on the main river depending on the catchment size of the valley.

We need to stress that all of these proposed structures are ideal habitat for all aquatic species that are native to that area and rather than “messing with Nature,” we are enhancing Nature and all “critters” including man are better off.

All water conservation and associated Hydro power considerations should be approached as an “all of valley” study and outcome, because each river valley is a unique situation and all of mans activities in any part has the potential to affect elsewhere in the valley.

Until we correct the destruction to our land, pictured below, we cannot prevent flooding; or hope to control our rivers to the advantage of all species that share their environment.

Whole of valley water control and flood mitigation must start with correcting this type of land degradation and should begin with:

Changing erosion gulley batter to a sustainable forty degrees maximum is essential as a start. It is not always necessary to use rock filling if the whole area can be grassed and most importantly kept stock

free. The aim is to arrive at a sustainable, non erodible watercourse with permanently vegetated run in areas delivering into creeks that also have the water flow impeded by weirs and other structures.
The result is run-off is spread over a much longer period and flood peaks are much lower.

The desired outcome is to achieve something like the above water courses.

One of the great mistakes of recent times has been the reluctance to accept that many of the best plants for this erosion control and water filtering work are in fact not native to Australia, as shown above.
The next step is the construction of run-off control structures that adequately restrict flow volumes in streams following high rainfall events.

The structures shown above, but on a bigger scale, have a practical place in flood mitigation.
In general terms it is true to say that in NSW we have barely begun to harness and use water to the everlasting benefit of our State, its citizens and the environment.
The State government needs to urgently also ensure that in all urban housing and industrial developments, the first decision that is made is:
Where are we going to store and how are we going to use the increased run-off?
Our planning still does not address this must basic and important issue.
To understand the truth of what is needed we need to revisit some of the history of water use and conservation since the arrival of white man to this continent.
Once the settlers managed to cross the Blue Mountains in 1813, the Colony began expanding rapidly as farming and grazing land was abundant and excursions to the west revealed plentiful open grasslands sufficient for the Colony's expansion for years to come.
However when the Government surveyor, Mr. Evans was on his second trip to the west he notes in his journal:
"*Rivers such as these no man has ever heard of before. They all flow inland. Sometimes they are as salty as the ocean and at other times contain excellent drinking water. From my observations it is apparent that they can go from a chain of stagnant ponds to boiling over their banks, filling whole valleys with raging water."*
As the settlers moved across and settled what is the Murray Darling Basin the extremes and unreliability of the Australia climate became known and adaption to its vagaries became essential for survival.
While coastal settlements were always on rivers for obvious reasons.
The need for water conservation to supply any permanent settlement west of the mountains was recognised by the mid nineteenth century and in 1884 the first ever in NSW, Royal Commission was established to investigate the Conservation of Water and Irrigation. It was in an address to this Royal Commission that the then N.S.W. Surveyor General, Mr. P.F. Adams, first suggested diverting water from the Snowy and Eucumbene Rivers westward.`
This action by the fledgling Colony was precipitated by the devastating droughts of 1825 to 1830 which resulted in most of the Colonies expanded stock numbers dying. This was followed by another devastating drought in the 1840s when all of the rivers of the southern MDB ran dry and the Bank of Australia failed as a result of farmers and graziers going broke.
Following a decade of good years the drought of the 1860s halved the sheep population of Australia and the rivers of the MDB again ceased to flow.
However it was not until drought had again ravaged the land in the Federation drought that Legislators finally agreed to act and begin building dams with the commencement of Burrinjuck in 1906. (Even back then it took Legislators a long time to initiate action.)
It needs to be understood that prior to the man's intervention to conserve excess water for release in dry times that our rivers irregularly ran dry. The rivers of the lower Basin ran dry four times between 1788 and the completion of Burrinjuck Dam in 1928. However, since the completion of Burrinjuck on the Murrumbidgee in 1928, Eildon on the Goulbourn in 1929, Hume on the Murray in 1931 and Wyangla on the Lachlan in 1935, despite the growth of our population, the development of inland cities and towns, the growth of regional industry and vast developments of world class irrigated agriculture, the rivers have never run dry since.
We owe much to the visionary Politicians and others who had the foresight and determination to plan, invest in and bring to completion the water conservation, hydro power systems and

irrigation industries that have made it possible for our Nation to independently grow and flourish with an abundance of food and fibre and thriving regional communities.

It is now time to again show some of the same spirit and faith in our future.

Khancoban Pondage.
Quote: *I have never spoken to a midge, yabbie, fish, duck or pelican that made a decision; is this a natural or man made wetland?*
Pikey.

DOES NSW NEED MORE WATER STORAGE?

Obviously the quick answer is yes, simply because while our population, industry and agricultural needs have been expanding over the last 30 years we have added very little to our storage capacity.
This situation applies across the MDB and sadly also for most of our coastal rivers on which so much of our expanding population relies for domestic and industrial water.
The answer is also yes, if we accept the likely scenario that our population will continue to grow and therefore industry and agriculture will need more water and power.
However to thoroughly explore this question I would like to break NSW into two geographical areas.
A: West of the Great Divide- Murray-Darling Basin.
B: The Coastal rivers.

The Western Rivers of NSW, part of the MDB.

We need to recognise that any developments in the MDB must be done in consultation with the other States and is compatible with the existing multi-State agreements.
In general terms the sites of all of the existing dams in the MDB system are in the correct position to maximize their capacity to catch and store water, (most were initially too small and some still are too small.) It is also true to say that with the exception of some of the early MIA land and some early settlements on the Murray, that most of our irrigated land is where it should be.
That is, we are watering our most fertile and suitable land that is also fortunately positioned in an ideal growing climate (mostly a Mediterranean climate.)
That is why this area is the Food Bowl of Australia.
However because the source of our stored water is in most cases, days of natural gravity flow away from where it is used, this causes a number of operational problems that lead to water being wasted.
To use the Murrumbidgee valley as an example; water released from either Burrinjuck or Blowering Dams takes from five to six days to reach an irrigator on the Murrumbidgee Irrigation Area (MIA) or the Coleambally Irrigation Area (CIA) and longer for irrigators further down river.
During the irrigation season to supply all likely needs for the Murrumbidgee, NSW Water has to maintain flows of at least 8,000 megalitres per day to meet likely requirements. Therefore on any single day in the river between the Dams and the Irrigation areas there will be around 40,000 to 60,000 megalitres of water in the river.
If the irrigation area receives a rain event (a common occurrence, usually in the form of a thunder storm), Irrigators will stop irrigation and most of water that is in the river runs to waste, because with the exception of the Tom Bullen Storage (only 12,000 megalitres) there is nowhere to store the now unneeded water.
This situation is mirrored on the Murray river. However on the Lachlan, because there are downstream storage’s at Lake Cargelligo and Lake Brewster any unneeded water in that river can usually be diverted and stored.
For NSW Office of Water to more efficiently manage the supply of water to all end users we must have downstream storage's on our major regulated rivers, always remembering that each of these storage's becomes a breeding ground for most aquatic species.
However there is a much more demanding reason for more storage's below the existing major Dams on the rivers of the MDB and to appreciate this we have to look at the historical flow data.
The record of river flows and flood events attached for the Murrumbidgee River and the graph of annual flows in the Murray give us compelling historical data supporting the need for more storage and the adequate high flow and flood events to justify their construction.

History of Murrumbidgee River Floods at Wagga Wagga.

A height above 8.2 metres at Wagga Wagga is considered a significant flood. (approximately 1M over banks and a flow of over 120,000 megalitres per day.)

1840 Murrumbidgee becomes chain of waterholes and horse races held in bed of river.

1844	October Flood of 10.97 mts.
1845 – 1852	No floods for 8 years.
1852	June- Flood 10.67 mts. 80 people drowned at Gundagui; third of population.
1853	July –Flood 10.9 mts.
1854 – 1867	No floods for 14 years. Lachlan, Murrumbidgee and Murray all run dry.
1867	July – Flood 9.32 mts.
1869	July – Flood 9.09 mts.
1870	Three floods all above 9.2 mts. in year.
1871 – 1878	No floods for 7 years.
1878	November – Flood 8.99 mts.
1879	September – Flood 9.35 mts.
1880 – 1887	No floods for 8 years.
1887	July – Flood 8.38 mts.
1887 – 1891	No floods for four years.
1891	Four major floods in year.
1892	October – Flood 8.34 mts.
1894	Five major floods in year.
1894 – 1900	No floods for 6 years. Federation drought; extremely low rainfall for several years.
1900	Two floods in year.
1905	July – Flood 8.38 mts.
1906	October – Flood 8.89 mts.
1906 – 1916	No floods for 10 years. Government legislates to build Burrinjuck Dam.
1914 – 1915	Lachlan, Murrumbidgee and Murray all run dry.
1916	Two floods in August and October.
1917	Four floods in year.
1922	July – Flood 9.17
1925	May – Flood 10.13 mts.
1925 – 1931	No floods for 6 years.
1931	Two floods above 8.6 metres both in June.
1934	Two floods in August and October.
1934 – 1939	No floods for 5 years.
1939	August – Flood 8.61 mts.
1939 – 1950	No floods for 11 years. Burrinjuck and Hume dams kept the rivers flowing.
1950	Three major floods in year.
1952	Four major floods in year.
1955	August – Flood 8.43 mts.
1956	Eight flood peaks at Wagga. Wettest year in Lower Basin’s history.
1959	October – Flood 9.17 mts.
1960	September – Flood 8.99 mts.
1960 – 1970	No floods for 10 years.
1970	Two floods in year followed by flood if February 1971.
1974	Five floods in year.
1975	Four floods in year, followed by further flood in 1976.
1978	September – Flood 8.92 mts.
1978 – 1983	No floods for five years.
1983	August – Flood 8.86 mts.

1984	Two floods in January and July.
1984 – 1989	No floods for five years.
1989	Two floods both in April.
1991	July – Flood 9.61.
1993	October – Flood 8.8 mts.
1993 – 2010	Sixteen years with no floods.
2010	Floods in October and December.
2012	March – Flood 10.56 mts.

Compiled by Ron Pike from records held by Wagga Wagga City Council.

The 170 years of flood records on the Murrumbidgee detailed above demonstrate several truths.

A: Droughts of three and up to 16 years are a regularly recurring feature of the lower Murray-Darling Basin and in fact for all of southern Australia. From the recorded data we know they last an average of 8.2 years and recur every 10 to 13 years.

B: When droughts come to an end we usually have several years of above average rainfall and run-off and it is not uncommon to have several floods in a short period, with these wetter periods averaging 6.4 years in each cycle.

C: The building of Burrinjuck Dam has had no adverse effect on the recurrence of floods downstream, in the Murrumbidgee River. In fact they have increased, contrary to what is claimed by the MDBA.

The flood history of the Murrumbidgee River is closely mirrored in the Lachlan and Murray Rivers.

It needs to be appreciated that during higher rainfall periods (La Nina), even in years when there are no floods there is above average run-off and dams replenish following most irrigation seasons.

Water shortages for all users in NSW are always towards the end of drought periods for obvious reasons and therefore if we had more storage capacity to conserve some of the excesses from the recurring flood events we can overcome this problem to the advantage of “critters” and man.

However there is another very practical, operational reason why more storage is paramount in any discussion of water in NSW.

Because NSW Office of Water (quite correctly), decrease water availability to irrigators when dams and inflows are depleted and maintain this policy even when rainfall begins to increase (again quite correctly.) And because droughts don’t just go from very little rainfall to very heavy rainfall in a week or two; water managers have to adopt a “worst case scenario” in planning for future years.

As rainfall gradually increases before a full onset of La Nina and drought breaking rains, NSW Office of Water is prudently obliged to maintain stringent water use restrictions while in fact the depleted storage’s are slowly filling as a result of increasing inflows.

The result is that when the first flood event following drought occurs, most of the available storage is 40% or above full. This is exactly what happened following the recent drought and has following most previous droughts.

The situation in recent times at Hume and Blowering Dams was exacerbated by Snowy Hydro releases (see later comments.)

The NSW office of water cannot be blamed for this, but it highlights the need for more storage, as most excess water following the first flood all flows to the sea to waste. As has been happening for the last two years.

However there is another compelling reason for more storage Dams on most of our regulated rivers but the circumstances vary from valley to valley.

Murrumbidgee Valley:

In the case of the Murrumbidgee there is no storage of any consequence below Burrinjuck Dam. However there are twelve major creeks and numerous minor creeks that feed the Murrumbidgee below Burrinjuck Dam. These creeks are responsible for most of the flooding that occurs in the Murrumbidgee Valley.

There is a desperate need for water conservation measures upstream of Wagga on the Murrumbidgee River and several of the twelve streams mentioned, the Tarcutta Creek especially.

To overcome the in river water management problems detailed above, consideration should be given to a weir and low level storage east of Narrandera to be considered with a reappraisal of the Lake Mejum Scheme. (Details available from NSW Water.)

We should also look at the possibility of building a higher dam wall immediately downstream of the existing Burrinjuck Dam (because engineers tell us the existing dam cannot safely be raised) and increasing the capacity to at least 1.5M or more megalitres.

Water going over the spillway of Burrinjuck Dam following rain in the ACT in 1974 was sufficient to fill the dam from empty every one and a half days.
These events while unpredictable are not uncommon and cause huge problems with flooding downstream.

Providing we clear our minds of the false notion that dams destroy “wild rivers” and recognise that a non flowing river is useless to the environment and mankind and that in southern Australia all of our rivers fluctuate between raging torrents to times of no flow, only then can we plan for a better outcome for all species reliant on water in our rivers.

Murray Valley:

We have a similar situation in the Murray Valley where there are no significant storage’s downstream of Hume Dam (with the exception of Lake Victoria, with capacity of 600,000 megs.)

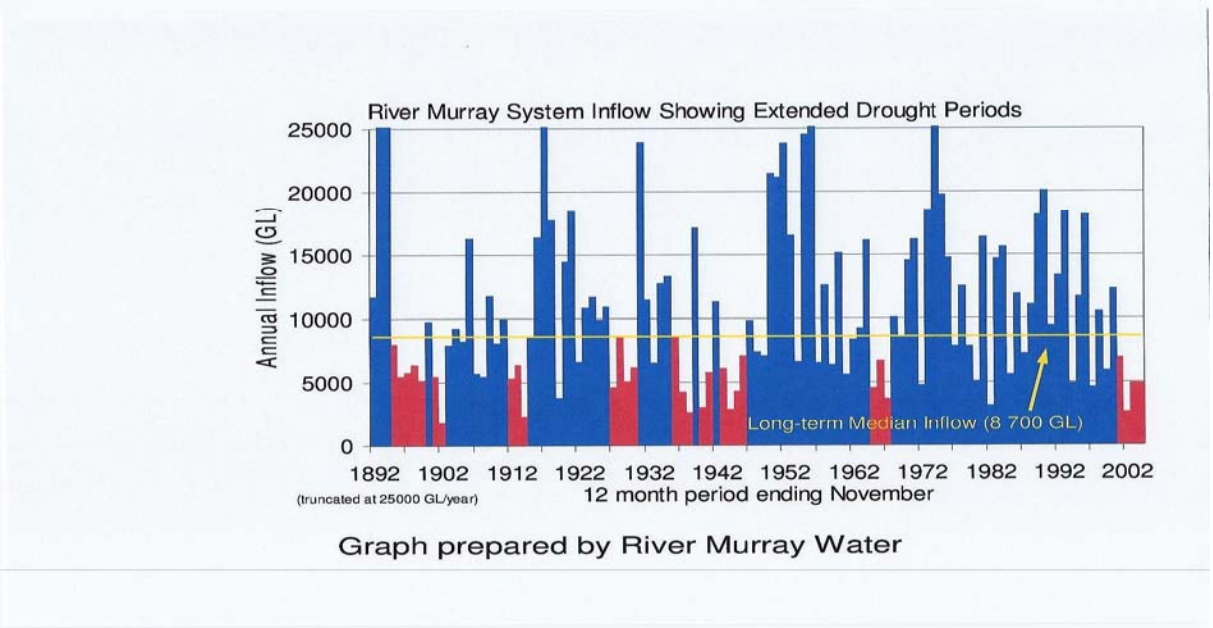
However the Kiewa, Ovens, King, Broken, Goulburn, Loddon, Campaspe and Avon rivers, all flow into the Murray River downstream of Hume Dam, as does the Murrumbidgee and Darling from the north. While most of these rivers have dams on them and in the case of the Goulbourn a very large dam (Eildon with a capacity of 3.3M megalitres), there is no capacity to store any of the vast amounts of water that flows from the many creeks that feed the lower reaches of all of these rivers and hence the vast floods that we have witnessed in the Murray valley in the last couple of years..

Because of the changed management of the Snowy Scheme, detailed below, we should as a matter of urgency build the previously planned but never built, Gateway Dam on the Murray River near Corryong. This would immediately increase storage on the Murray by over 1.5M megalitres.

We should also co-operate with Victoria to investigate the building of a dam on the lower Keiwa and several dams on the lower reaches of the rivers listed above.

We need to reconsider in conjunction with Victoria and S.A. the building of the Chowilla Dam in S.A. as a way of guaranteeing supplies for the lower Murray and SA forever.

The Chowilla Dam as proposed would have covered over 1000 square kilometres across three States and stored over 5M megalitres of water and if built would have presently been overflowing.



The graph above does not include the period from 2004 until now, but inflows remained very low until 2009, when there were increased flows from the Darling, followed by huge inflows through most of 2010 until present from all streams in the MDB. These above average inflows are continuing and likely to continue for some time given the ongoing good rainfall and snow cover..

To put recent river flow events in the Southern Basin (SB) into some context we need to appreciate that during the last two years storage volumes in the SB have increased by over 9M megalitres, all irrigation requirements have been met to grow two large summer crops. All natural and man made wetlands have been filled and saturated several times.

A further 30M plus megalitres has flowed into the sea from the Murray mouth and this flow is continuing at the rate of around 1M megalitres every three weeks.

It also needs to be appreciated that once a stream has broken its banks and floods, we have little idea how much water is flowing through the valley but it is undoubtedly very much more than recorded in the above graph as these figures are really confined to within banks flow.

This graph illustrates both the need for water conservation in the MDB and the adequate capacity to regularly fill more storage if built within the system.

Lachlan Valley:

While the Lachlan River is better served for downstream storage's, there is capacity for extra storage on the Belubula River and the Mandagery Creek, both of which are ravaged by flooding.

Consideration should also be given to raising the height of the Wyangala Dam wall and increasing storage capacity by thirty to forty percent.

The Darling River and its Tributaries:

The many rivers that flow into the Darling River form what is called the Upper Basin (UB) of the MDB.

While this is far larger than the Lower Basin in area, the average flow from the Darling into the Murray River is only around 9% of the Murray's annual inflow.

It is also the most variable and most unreliable.
Most of the river valleys that are part of the Upper Basin have dams on them, which serve some of the most fertile and productive irrigated land in Australia and the world for that matter and it should be noted here that water conserved for irrigation is best used on the nearest and most suitable soils, which in the Upper Basin are extensive.
While there is less capacity in the UB for more storage, there is certainly the opportunity for storage's on the Culgoa and Condamine Rivers in Queensland as witnessed by the recent huge flood events that consumed this whole area.
Investigation should be undertaken of the water conservation possibilities on the Castelreagh and Barwon Rivers and possible extra storage on the Macquarie.
While the vast Darling flood plain contains some of the most fertile and potentially productive irrigated land in Australia, unless we divert water from coastal streams in Queensland, it is unlikely we can develop much of this resource, but I believe we can improve the water situation along the Darling quite cheaply.
Given the very flat meandering nature of the Darling River the construction of five or six weirs of only 5 metres in height (each weir would back water up over 200 kilometres) and would create a much more reliable, water source as well as environmental and recreational opportunities along the whole river. Each weir would hold around 20,000 megalitres.

Meandering Darling River.

Weirs are built on dry ground in a bend in the stream and the river then diverted.

To increase water level to top of bank for over a hundred kilometres of river.

THE EAST COAST RIVERS.

A Pristine Upper Manning River.

In general terms all of the rivers on the east coast of NSW have the following features:

1: By comparison with most rivers they are short.
2: Their catchments are relatively small but mostly pristine.
3: Their initial journey to the sea is quite steep, before opening into cleared, coastal valleys.
4: They are all subject to the highly variable Australian climate and can go from a trickle or no flow to raging floods filling whole valleys and doing extensive damage.
5: With the exception of some rivers near major population centres, most have no water conservation or Hydro power stations.

It is these five facts that make most of the rivers on our east coast ideal for future water conservation, flood mitigation and the production of hydro power.

If as a Nation we had not allowed ourselves to be blindly led by radical environmentalists down the path of "water shortage sensationalism" and as a result the most foolish and wasteful course of building Desalination Plants and instead invested that money in the building of Dams and Hydro Power plants, there would be no water or power shortage for generations to come.

We can and must redress this wrong.

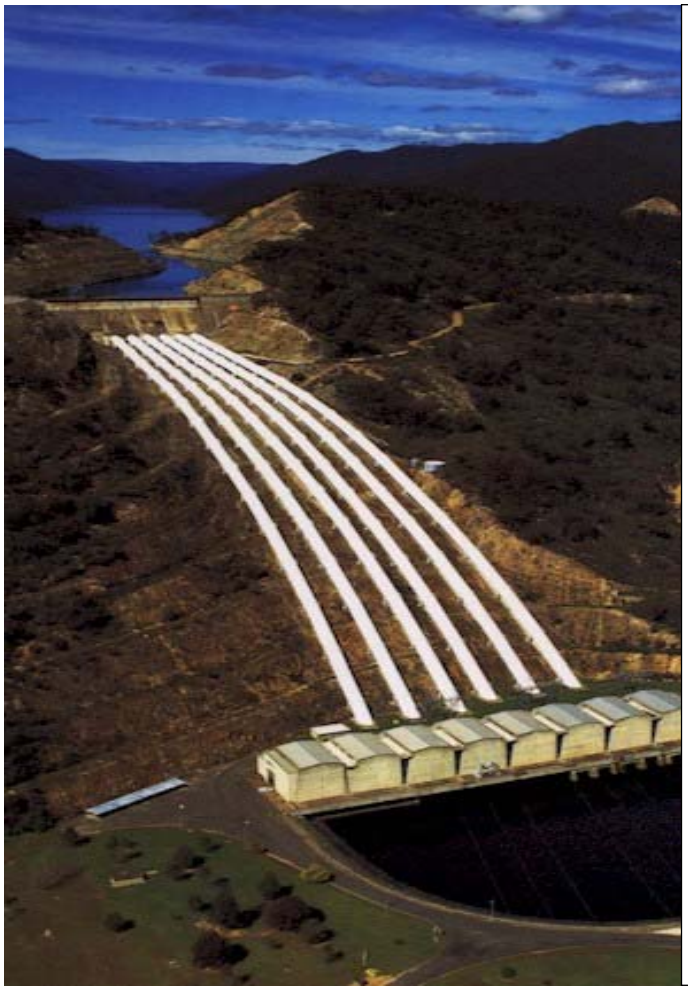
If we do this correctly there should be no need for any private house or home unit in NSW to even have a water meter.

There should only be a yearly fee for water and power could also be much cheaper.

Given the very desirable living conditions along all of our east cost and the present growth patterns, which are likely to continue and possible increase, it is essential that investigation, planning and construction of these essential dams and integrated hydro plants begin immediately.

It will forever be a "black mark" on our rational capacity to plan for the future that we allowed the already planned dams such as the Tallowa Dam on the Shoalhaven and the Tillegra Damm on the Hunter to be abandoned because of deals done between Labor Governments and the Greens in return for election preference deals.

It is essential that these dams and many others along our east coast are examined, planned and built with as little interference from the Greens as possible.



THIS IS TUMUT 3 HYDRO POWER STATION

One of the biggest in Australia at 1500 mega watts. A head of 151 metres and annual volumes of around 1.3M megalitres.

NSW COASTAL RIVERS ANNUAL RUN-OFF.

RIVER	MEGALITRES P.A.
Clarence	5,100,000
Richmond	3,345,000
Manning	2,400,000
Hunter	1,900,000
Macleay	1,900,000
Hastings	1,850,000
Shoalhaven	1,560,000
Bellinger	1,450,000
Karuah	1,200,000
Snowy in NSW	1,317,000

THERE IS SUFFICIENT HEAD AND VOLUME ON THE RIVERS LISTED HERE TO REPLICATE THE TUMUT THREE HYDRO POWER STATION MORE THAN 20 TIMES!

THAT IS 30,000MW OR NEARLY DOUBLE NSW TOTAL GENERATING CAPACITY.

Snowy River:

No submission on dams and water management in NSW would be complete without reference to the Snowy River.

Many pages of report could be written on this subject and I have addressed this in another paper for those who may be interested. (*"The Scam from Snowy River."* Can be Googled. *)*

But for the purpose of considering where and why new Dams should be built, it is sufficient to say that much of what has been claimed regarding the Snowy River and the influences of the Snowy Scheme on that river have been sensationalized by those with no knowledge of the subject.

But it is true to say that in dry years not only is the Snowy River short of water but towns relying on it in both NSW and Victoria need extra water and an assurance of permanent supply.

This can be easily rectified by building Dams on several of the Rivers which feed the Snowy and a further Dam downstream of Jindabyne on the Snowy itself.

The capacity for extra hydro power on the Snowy is considerable, while at the same time improving stream flow and stopping the wasteful "environmental flows" that are being diverted from the Snowy Scheme where water is totally wasted to satisfy Environmentalists.

THE POLITICS AND HOW WE DO IT.

Australia cannot afford to put this off a day longer!

As stated in the Introduction, no Party or Government should present to the people of NSW or the Australian Public a plan for new Dams and Hydro Power Stations before first educating the Public that much of what has been claimed in relation to water and Dams and their impact on the environment is false.
All of the history and data support the facts that:
1: Neither NSW or Australia is short of water.
2: Dams and Hydro Power generation do not destroy rivers.
3: Our growing population demands more water storage and more power production.
4: Water conservation structures and irrigation infrastructure are our best and most reliable habitat for aquatic species.
5: As a growing Nation in a competitive world we cannot afford to squander our natural advantages of abundant cheap water and power. That is giving away our natural advantage to appease radical environmentalism.

This P.R. program if handled frankly and honestly will also destroy the diminishing credibility and following of the Greens and their **unsustainable policies.**
Sadly for many years whenever any authority has suggested the building of a dam or other water conservation structure all of the arguments and results from the inevitable inquiries seem to be totally about why it should NOT be built.
These arguments fall under four main headings.
A: Destruction of endangered species habitat.
B: Disruption of those affected.
C: Losses to evaporation.
D: Effects on downstream environment.

In answer to the above claims:

A: **Destruction of Habitat:**

Even if there are endangered species in the area where water is to be conserved (mostly there is not), then if they are aquatic in nature they will likely benefit, as has happening with the Lung Fish in dams in Queensland.

If the species are non-aquatic then other like areas may have to be found and it maybe necessary for removal, but it is rarely likely that this will be so.

These objections are mostly inspired by urban Greenies with dubious intentions.

B: Disruption:

This has been allowed to become a major issue in the defeat of dam construction in many areas and needs to be countered.

Wherever we plan a dam there will inevitably be someone affected. This will vary from forestry and grazing rights to in some cases valuable agricultural land and even homes and businesses.

We must appreciate that we have always and still do in the greater good, disrupt people for the construction of roads, rail and many other needs of a progressing society. We even moved whole towns to build the Snowy Scheme.

The cost of adequately compensating those involved is so small in comparison to the total cost of the construction and more importantly the ongoing good for the whole community, we can afford to be over generous and make it worthwhile for those affected to move.

C: Evaporation:

There is no more important link in the chain of life than evaporation.

In discussing water storage and conservation, rather than just seeing evaporation as a problem, we should recognise that where we store water that would otherwise run to the sea, we are not only increasing the volume of income earning water available to the State but we create better ecological and economic outcomes.

Evaporated water from storage's and irrigated crops, especially in a dry year, delivers benefits such as dew, more humid micro climates, cooler adjacent daytime maximums and likely increasing rainfall in other areas.

Wherever we store water in dams we lose some to evaporation and hence we have always sought to maximize the volume stored in relation to surface area.

However in recent discussions regarding dams there has been a totally irrational emphasis put on this to the point where some have claimed that there are no "efficient" dam sites left.

This is nonsense!

On the rivers of the MDB it is simply a matter of topography that any storage built away from the mountains or on the plains will have a lower volume to surface area ratio and hence the percentage of water lost to evaporation will be greater.

But if the downstream storage's suggested are not built, then all of the excess water is lost to the sea where it evaporates anyway. This is a loss to production, a loss to the environment and a loss to the economy.

As an example, the downstream dam I am suggesting on the Murrumbidgee River east of Narrandera would be built where the river runs through a natural fold in the earth but on relatively flat land.

If the Dam has a total capacity of 250,000 megalitres and an average depth of only seven metres, it would cover an area of around 4,000 hectares. In this area the net evaporation is around 1.3 metres per year.
Therefore the total evaporation from this storage would be about 40,000 megalitres per year.
In most years this storage would be full at the commencement of the irrigation season (from inflow below Burrinjuck) and would be drawn down whenever the water authorities needed water quickly to respond to growers needs in the MIA and the CIA.
If the State only sold an extra 100,000 megalitres per year from this storage it is worthwhile, because this water otherwise would run to the sea to waste and importantly there is another 100,000 megalitres still stored in Burrinjuck or Blowering (more efficient dams) for use in dryer times.
And we have created another wetland ideal for all native species and migratory birds.
This is a win for State income, a win for water conservation and irrigators and a win for the environment but most importantly gives the NSW Office of Water much more flexibility and efficiency in the management of our water resources.
So called less efficient water storage's have a vital part to play in the more rational use of our water resources across the MDB and everyone we build increases the area of wetland.
This debate cannot be divorced from both the AGW debate and importantly the debate surrounding the Federal Water Act 2007 and its creation the Murray-Darling Basin Authority (MDBA).
I do not intend to enter the AGW debate in this submission and in relation to the Water Act only say that it is the most ill-advised piece of legislation to ever be approved by Federal Parliament; sadly by both sides of Politics.
It has nothing to do with water reform; more like water torture.
However a new water policy that embraces the joint outcomes of increasing water availability, producing clean hydro power and increases aquatic habitat, IS water reform and should obviously have appeal to all Politicians and both sides of this debate.
Here is an opportunity for Politicians to present a visionary policy that would be to the everlasting benefit of our Nation while assisting the States in the planning, funding and construction of water and power requirements that are urgently needed.
This should be done by reforming Infrastructure Australia into a 'Snowy Mountains Authority Like" organization that would in collaboration with the States, research, plan, fund and manage the construction of all major Nation building schemes in the country, including of course dams and hydro power stations.
The MDBA and other Federal and State Bureaucracies associated with renewable power and the environment should all be disbanded in favour of the new Nation Building Body.

D: Downstream Effects:

While consideration must always be given to likely impacts of dam construction on downstream eco-systems; in most recent arguments about dams we have had to endure the most absurd claims.
None more so than the claim that the lack of flow in the lower Murray is responsible for increasing salinity in the Coorong. The Coorong is isolated from and unaffected by the flow of the Murray River.
We had similar claims regarding the building of the Tillegra Dam on the upper Hunter and the Kooragang Wetlands, which are tidal in nature.

Politicians who wish to carry new policy in relation to water conservation must be more open to seeking practical advice on these matters from people who do understand, to be able to counter the flood of misinformation that has become accepted by many people and will continue to be pushed by the Greens and championed by the Media.

WE HAVE TO DEFEAT THE BANANAS!

Bananas are people who grow as a group closely joined at the ideological stem who believe we should:

BUILD ABSOLUTELY NOTHING ANYWHERE NEAR ANYTHING.
These Bananas mostly thrive in inner city environments where they have ready access to sensationalist driven journalists and these two groups have misled the public for decades.
It is essential that Politicians and those with practical knowledge combine to adopt a more positive and visionary approach to policy that is in both the State and National interest and trust their capacity to convince the public of the long term benefits of water conservation in times of excess flow for all Australians.
Bananas are virulent, aggressive and need to be constantly countered with common sense and logic or they take over debates and stifle progress.

Politicians cannot do this alone!

SNOWY HYDRO.

The building and commissioning of the Snowy Mountains Scheme changed Australia for ever; from a mostly British agricultural society to a multicultural industrial and growing Nation.
For both those desperately seeking to leave a war ravaged Europe and start a new life and the people of this vast, sparsely populated and then power starved country, the Snowy Scheme and the work and vision it offered, made both Man and Nation.

The building of the Snowy Scheme was only possible because the Federal Government implemented it under the Defense Act which gave the Commonwealth control over State assets.
While the initial purpose of the Snowy Scheme was to provided additional water to the western streams and allow further growth in the irrigation regions. This purpose has become secondary to the production of hydro power and this has been enshrined in the Snowy Hydro Agreement of June 2002.
The 75 year license granted to Snowy Hydro (SH) as a result of that agreement gives SH the rights to the collection, storage, diversion and release of the Schemes water.
While SH, other than in exceptional circumstances, is obliged to release each Water Year (1 May to 30 April) 1062 gigalitres into the Murray River and 1026 gigalitres into the Murrumbidgee River via the Tumut River.
There is no obligation on SH to consider the consequences of these releases or to time them to maximise there effectiveness for water conservation and future water needs for stream flow.
The SH water license is weighted towards the use of the Scheme's water for electricity production and trading and SH has no responsibilities in relation to ensuring water supplies for future dry years. **This needs urgent amending or increased storage westward, or both.**

Tumut Three Power Station the biggest in the Scheme.

It was because Snowy Hydro had been generating power through the likes of Tumut Three above and the Murray stations that both Blowering Dam on the Tumut river and Hume Dam on the Murray river were near full before the rains and floods began and this meant that huge volumes of water simply added to the floods and flowed to the sea to waste; (Water that should have been conserved for future dry years.) This is another reason that more storage is now urgently required on the western rivers as outlined above.

SUMMARY.

1: NSW is not short of water and there is huge potential for water conservation and the production of hydro power on most of the rivers in our State.
2: The subservience of our decision making processes in relation to major infrastructure, to radical environmentalism and Green ideology has made NSW less competitive, truncated our standard of living and made water and power both scarce and costly.
3: Within NSW there are numerous sites to build further water conservation structures that

will increase the volume of stored water and improve stream flow reliability for all users.

4: Visionary practical policy that is affordable and in the longer term revenue positive will only be possible when those proposing it can counter the decades of misinformation that has become accepted especially by younger generations and city voters.

5: Rather than dams and associated structures interfering with Nature and aquatic species in particular, these developments actually increase the areas available to our Native aquatic Flora and Fauna.

Aerial view of Colombo Creek on the Dry Riverina Plains.

Totally controlled by man for over 100 years and maintains water supply for towns and farms as well as hundreds of miles of wetlands where man relaxes and aquatic species all thrive.

Part of water ski course on the Colombo Creek in an otherwise dry environment.

SO WHERE DO WE BUILD OUR NEW DAMS.

Obviously the ultimate decisions of where, how, capacity and type of dam to be constructed must be the decision of engineers and hydrologists in consultation with local authorities. However without wishing to suggest any order of preference for the construction of water conservation and similar works I submit the following are all necessary, economically feasible and would provide benefits for centuries.

1: The planned dams on the Shoalhaven River south of Sydney and the Tillegra Dam on the Hunter River.
2: A dam on the Murrumbidgee River east of Wagga Wagga.
3: The Gateway Dam above Hume weir to conserve the haphazard releases from S.H.
4: Dams on the Tarcutta, Jugiong and Kyamba Creeks, feeding the Murrumbidgee.
5: Dams on several of the tributaries of the Snowy River.
6: A dam on the lower reaches of the Kiewa River in Victoria.
7: Building the abandoned Chowilla Dam on the Murray.
8: Dams on the Belubula River and the Mandagery Creek that flow into the Lachlan.
9: Increasing the wall height at Wyangla Dam, increasing storage by 25%.
10: Dams on several of the Queensland Rivers that flow into the Darling.
11: Investigate sites for further storage on streams that flow into the Murray below Hume Dam.
12: An investigation of the water conservation and HP potential on all East Coast Rivers.
13: Building a downstream storage on the Murrumbidgee east of Narrandera.
14: A dam on the Billabong Creek near Holbrook.
15: Investigate the feasibility of extra storage's on the Macquarie, Castlereagh, Barwon and other Northern rivers that flow into the Darling.
16: Build several weirs on the Darling River.
17: A new Burrinjuck Dam increasing capacity by at least 50%. Possibly unnecessary if all of

the downstream dams suggested above are built.

THE GRAND SCHEMES:

For many years there have been proposals for grander water schemes which may have some merit and much of the research is on file at NSW State Water.

Clarence Water-Power Development: Proposed by Sir Earle Page and researched by Rankine & Hill (Consulting Engineers) in 1982.

While I believe that many aspects of this proposal are uneconomic and impractical there is no doubt that the hydro power potential on the upper Clarence could rival the Snowy Scheme. However the topography does not in my opinion allow much water to be gravity diverted to the west. The original plan needed considerable pumping, resulting in very expensive water.

Before concluding I would like readers to consider the following in relation to the MDB.

The total storage capacity of the entire Basin including the Snowy Scheme is just under 29M megalitres.

However it needs to be appreciated that as the Commonwealth buys water and State Authorities earmark more water for environmental flows (all unnecessary,) we actually decrease the available storage for productive water (the reason the dams were built in the first place.)

As near as I can determine this has already decreased the productive storage by 1.4M megalitres and this figure is rising as Canberra buys more water.

If we were to just implement the following list of dams within the MDB this would be the likely result:

Murray River:	**Likely Capacity in megs.**
Gateway Dam near Corryong on upper Murray	1,500,000
Dam on lower reaches of Kiewa River	700,000
A downsized Chowilla Dam.	3,000,000
Dam on Billabong Creek.	50,000
Total Extra Storage on Murray River	**5,250,000**
Murrumbidgee River:	
New dam east of Wagga Wagga	750,000
Downstream dam east of Narrandera	250,000
Dams on Jugiong, Tarcutta and Kyamba Creeks	210,000
Total Extra Storage on the Murrumbidgee	**1,210,000**
Lachlan River:	
New Dam on Belubula River	60,000
New Dam on the Mandagery Creek	40,000
Raise Wyangla Dam wall and increase capacity by 25%	300,000
Total Extra Storage on the Lachlan	**400,000**

Just from doing this we would increase MDB storage by 6,860,000 megs.

That is an increase of 24% and would have everlasting benefits for man and the environment.

It should also be noted that if these dams were in place during the last two years they would presently all be full.

Doesn't this make more sense than creating a needless Canberra Bureaucracy, buying pieces of paper with some entitlement to water in some years that MDBA have no idea how to put to any use other than flushing water down the rivers to the sea?

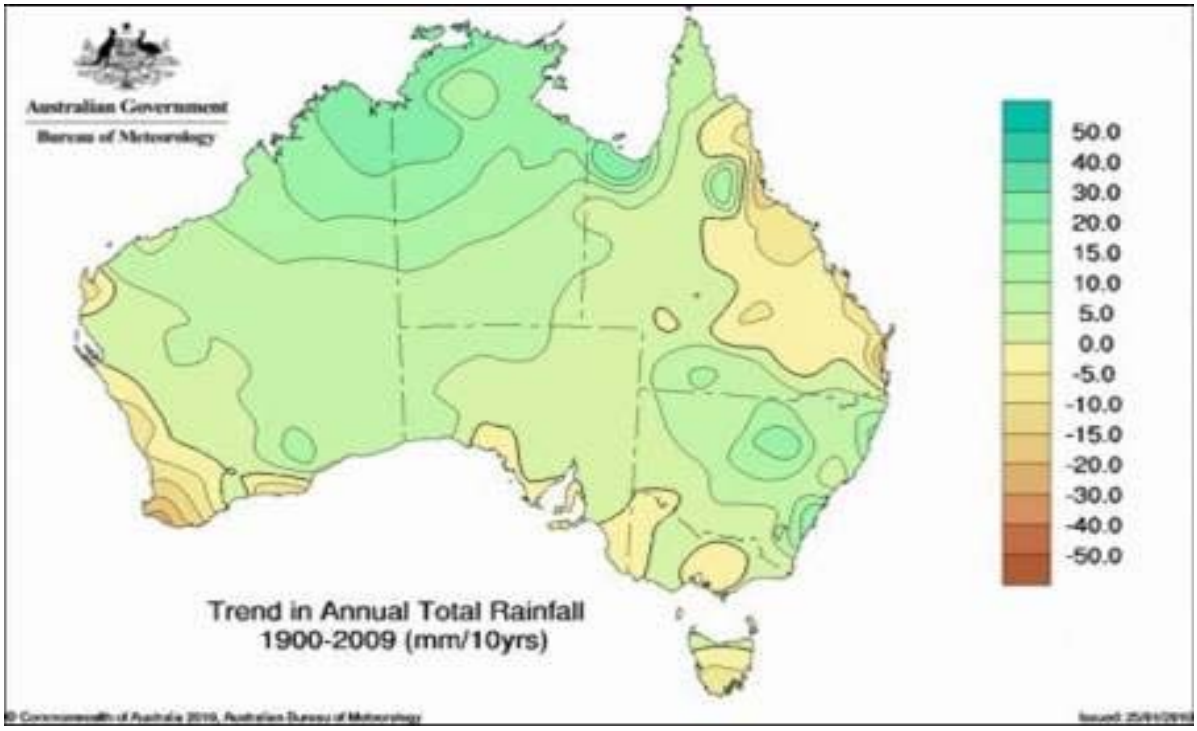
The likely capacities quoted above are simply my estimates and some detailed hydrological work would need to be done and appraised. However much of this work is on file with both the NSW and Victorian Water Authorities.

In conclusion I pay tribute to the many people who have had input to this submission; sometimes unknowingly as many of the observations and thoughts have been collected and fashioned over decades of exploring, relaxing on and working on the waterways of the MDB and coastal rivers with many environmentally aware people.

I pay special tribute to the practical and dedicated people from the NSW Soil Conservation Service who taught me much when I worked with them as a young man.

All of these people at all times were mindful of the environment and how it could be improved for man, all flora and fauna and the future of Australia.

Ron Pike.



The over 100 year rainfall map from the ABM disproves the often made claim that annual rainfall is diminishing.

This map shows that in the catchment of the MDB, rainfall has in fact been increasing.

If we look at rainfall data for the 40 years prior to 1900, (which is available, but has been removed from the ABM site), the rainfall increase is even more obvious.

I strongly support the hypothesis that this is because of the increasing area of water as a result of mans need to conserve water, in everything from small farm dams to huge areas like Menindee Lakes.

This leads to greater evaporation and likely more rainfall.

However it seems that the rainfall in SW Western Australia is on the decline.

The Man made Aquatic Wonderland that is Menindee Lakes, where in a mostly dry environment, man has conserved water for productive use, provided permanent water for industry and domestic use at Broken Hill and Menindee and created one of Australia's best wetland environments.
We can and must repeat the vision of previous generations in conserving water for future generations.

Ron Pike.