



Crisis Update: A Call to Action

Lower Lakes, Coorong and Lower River Murray, South Australia

January 2010

The only sustainable solution to the problems of the Lower Lakes and Coorong is to return the Lower Lakes to an estuary. This can be accomplished by the following:

- Allow seawater to flush out damaging acidity and prevent further deterioration. Tidal inundation has been proven to remediate acid sulphate soils in Queensland.
- Modify the barrage gates to be operated remotely and quickly to take advantage of tidal cycles and wind induced heads of water.
- Remove accumulated sediments inside the Murray Mouth.
- Build a weir or lock between the Lakes and the River.

This would create a biologically diverse Ramsar wetland.

This solution is feasible and affordable.

There is no time to waste. The problems are urgent and potentially irreversible unless acted upon immediately. State and Federal Governments must put the necessary resources into the modelling and planning, but it needs political will to make the hard decisions in favour of the Lakes environment.

What follows is a summary of the facts that support the statements above. We appreciate your time and attention and welcome your feedback.

Sincerely,

LakesNeedWater Team

Summary of the Facts

Very Low Inflows

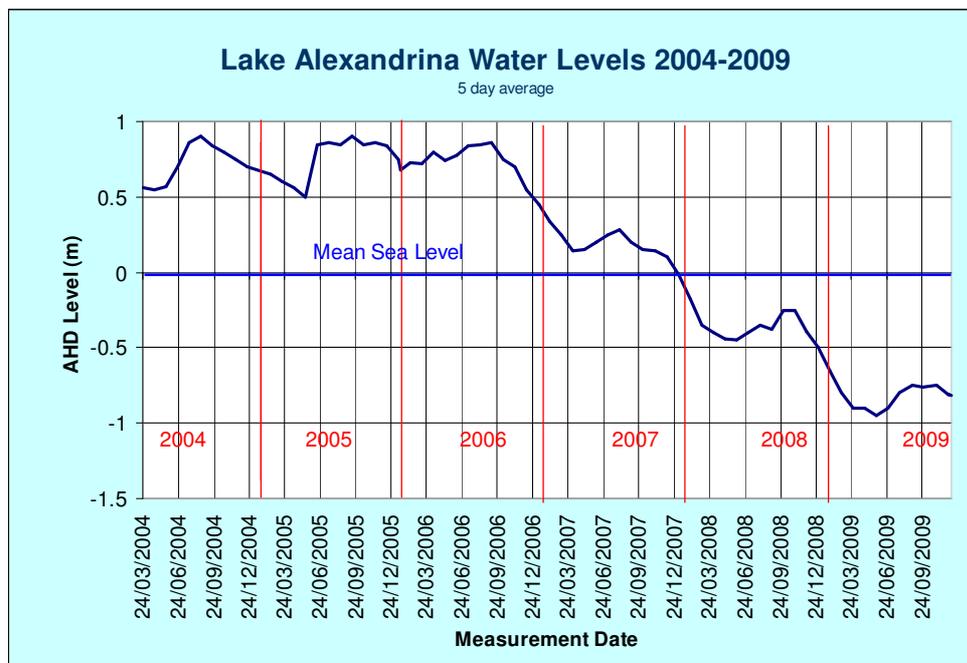
- Since 2002 River Murray inflows to South Australia have been less than 2,000GL per year, less than one-fifth the long term median catchment inflows. This is mainly due to the most severe drought in recorded history, since during this period extractions have been severely limited by restricted allocations. Global warming could result in a further fall in runoff of up to 40% in the next 25 years.

The Barrages and Evaporation

- The barrages (built 1940) have produced an unnatural, large, shallow fresh water storage which also allows high evaporation, estimated at 800-1100 GL per annum.
- This water could be used to raise river levels upstream, thereby restoring the riverine environment, if the Lower lakes were returned to an estuarine system by the opening of the barrage gates, and the building of a barrier at or near the junction of the river and the lake.

Lake Levels below Sea Level

- Presently -0.7m AHD for Lake Albert, and -0.93m AHD for Lake Alexandrina.
- SA government promises of 150-170GL for Lake Alexandrina and more recent announcements of 150GL of flood water, will only maintain the present levels at the best. There is not enough water on the Murray Darling system to save the Lower Lakes.
- Lake Albert has already reached a critical acidification level (see below), and is to be allowed to drop further to -1.0m AHD before 35GL allocated will be pumped into it.



Acid Sulphate Soils

- Widespread acid sulphate soils have developed on the exposed Lake beds due to the drying and oxidation of sulphidic sediments previously covered by estuarine waters before the barrages were built.
- Currency Creek, the Finnis River, Loveday Bay, and many other areas (photos 1 and 2) have been seriously affected, although the first two have been temporarily ameliorated by the Clayton and Currency Creek regulators.



Photo 1. Exposed Lake bed, northern Lake Alexandrina, November 2009



Photo 2: Close up of lake bed at left. Yellow crystals of indicate highly acidic soils

- Further incremental drying in situ, together with declines in water levels, will increase the acid production vertically downwards through the sediment profile, causing the previous "hot spots" to increase in concentration and expand as the water recedes. This accumulated acid will eventually overcome the natural alkalinity of the lake waters. This occurs when rainfall dissolves the acid and takes it into the main lake bodies. This would be disastrous for any living organisms still existing in and around the Lakes.
- The seriousness of this risk is shown by the decision to recommence pumping of water (35GL) from Lake Alexandrina to Lake Albert should the levels in the latter fall to -1.0m AHD .
- Presently estimated trigger points for this change are -0.5m AHD for Lake Albert, and -1.5m AHD for Lake Alexandrina. Lake Albert has already reached its trigger level. The SA Government has decided to allow the levels in Lake Albert to pass its trigger since there is presently not enough water to prevent it. Therefore fish kills in Lake Albert are expected, since no further "fish downs" are to be supported.
- The delay of the decision to build the weir at Pomanda until 2011 means that the two summers of 2010-12 will allow for even further declines in water level, with concomittant increase in acid production, should the river inflows stay at these all time lows. (It would take about one year to build a weir). Maintaining the Lakes at the present low levels will only serve to delay the eventual total acidification of the waters, as the already exposed areas will continue to increase in acidity with the continued drying, thereby raising the water level at which the trigger point occurs.
- Strong winds cause dust storms from the exposed lake beds. Health problems have been attributed to the dust which comprises fine Aeolian sands and corrosive material. Significant corrosion to zinc coated steel and corrugated iron structures has occurred and can be expected to continue as larger areas of lake bed are exposed.
- **In its recent "Securing the Future" document released in December 2009, the Government has mentioned the possibility of 'drying down the Lakes' if the seawater option is not practical. This would be a disaster of immense proportions, and the possibility of recovery to any type of wetland, freshwater or marine, would be put off for hundreds of years.**

Bioremediation

- Trials by the government have been only partly successful, and these presently cover a small proportion of the exposed sediments (about one quarter, not including what will be exposed this summer)
- Pre-germinated seed incorporated in November 2009 have been described as "successful", but this is yet to be proved effective in the longer term over the summer period. Seeding of the large number of highly acidic areas such as Loveday Bay will also require vast amounts of limestone to be spread (hundreds of thousands of tonnes), since the lowest pH tolerance of the *Puccinellia* grass used is around pH 5. Levels of pH <3 have been measured in Loveday Bay.
- Seeding and other bioremediation efforts have been concentrated around population centres where voters live or have large vineyards (eg Tolderol). There remain very large areas of exposed lake shores (see photos above) which are already highly acidic, and for which no immediate bioremediation can occur. These have low population densities, but will still contribute to the acidification of the lakes.

Salinity Problems

- Water salinities in the Lower Lakes have increased and the water cannot be used for irrigation. Lake Albert is currently around 15,000 EC units and is expected to reach that of seawater (55,000 EC units) by March 2010 at the latest, even with pumping of 35GL from Lake Alexandrina. Lake Alexandrina is currently over 6,000 EC units and expected to double each year making it seawater by mid 2012 (assuming River inputs are enough to maintain the current level only). Thereafter hypersalinity will develop.
- Some irrigators can now access water from a new pipeline from Tailem Bend, but this could be under threat from saline lake water intrusion as the result of wind blown slugs which went up the River past Tailem Bend last summer.
- Proposed "shandying" of lake water with minimal amounts of seawater will increase these problems, and will lead more quickly to hypersalinity, especially in Lake Albert, since there would be no opportunity for refreshing from tidal exchange.
- There has been a marked impact on wildlife. Bird numbers are significantly lower, much of the fringing vegetation around the former lake boundaries is now dead, and the Ramsar Treaty obligations have been ignored.
- The Coorong is in decline with hypersalinity in the southern lagoon causing drastic decreases in aquatic plants, fish and bird life. In this case, the main cause is the south east drainage scheme, which has sent fresh water out to sea rather than northwards to the Coorong.

Dredging the Mouth

- The vastly reduced area of the former estuary after the barrages were built has led to build up of sand accretions inside the mouth from the flood tide delta.
- No outflow to the sea has meant that continuous dredging of the Murray Mouth has been necessary to keep it open and allow tidal flow to the northern end of the Coorong.

Lower River Murray Problems

- Slumping and cracking of river banks downstream of Lock 1 has resulted in warnings to evacuate over 15 riverside homes. Even when water levels rise again, collapse of buildings into deep water could occur without warning thus posing great danger to inhabitants
- Many wetlands below Lock One are at high risk of turning acidic.
- A new weir located near Wellington or Pomanda Island, would alleviate these problems for the region between Lock One, Blanchetown and Wellington.

Returning the Lower Lakes to an Estuary

This idea has been met with much opposition about its supposed deleterious effects, and continues to be called 'last resort' or a 'temporary measure', despite the fact that tidal inundation has been successful in remediation of acid sulphate soils in other Australian states. There has been no evidence published in the public realm to support claims made by government consultants and public servants as to why this proposal could not work. The main objections could be overcome with engineering solutions. They are as follows:

Use of the Tides

- The development of hypersalinity would not occur with adequate circulation and replenishment of seawater in the lakes. The present low tidal signal at the barrages would be greatly increased up to that of the open ocean (1.5m spring tides) if the sand accretions inside the mouth (caused by the barrages) were cleared and channels dredged. Some natural scouring would occur when heads of water which have been built up and held in the Lakes after high spring tides are allowed to flow out at low tide. (Sediment cleared by dredging would need to be disposed of carefully where it can be treated with limestone, since it would be highly sulphidic).

Modify Barrage Gates

- The barrage gates would need to be changed from their present configuration to a design which could be operated remotely and quickly to take advantage of heads of water on either side. The five barrages could be operated independently according to the patterns of wind induced water movement ("seiching") within the Lakes to allow water in or out.
- The change from the previous artificial fresh water system is only a reflection of the dynamism which is part of the natural system. The system would fluctuate back and forth according to the flows coming down the river, as in several other semi land locked marine systems around the Australian coast, such as the Gippsland Lakes.

Seawater Does Not Make Sulphidic Soils Worse

- The presence of seawater will not make the acid sulphate worse, since the sulphidic soils will be covered with water, and in time, reducing chemical reactions will resume. Acid sulphate will only worsen if the lake beds are exposed as they are now.
- The recent successful remediation of 800 ha by tidal inundation at Trinity Bay by the CRC Care group proves beyond doubt that seawater and tides can be used to manage acid sulphate soil problems and create a healthy estuarine ecosystem.
- There is no evidence that to allow seawater to cover already acidified sediments would cause mass precipitation of iron oxides, but even if some did occur, these are relatively benign to living organisms.

- Although release of metal ions etc has been shown to be greater with seawater than freshwater inundation, this would gradually be flushed away by tidal action. These short term problems arising from the effects of seawater on the acid sulphate sediments are vastly outweighed by the problems which will arise from letting them dry further, and which have been exacerbated by the South Australian Government's delay in using the seawater option. Two years have passed since the problem became obvious, and during this time, acidification has reached a runaway state.
- Incremental release of acidified water to the ocean is unlikely to have any lasting deleterious effects, since the high wave energy in the area of the Murray mouth would give quick dilution and dispersion, and the buffering capacity of seawater would rapidly neutralise it. In time, the concentrations of acid released would decrease to zero.
- The local water tables used for irrigation will not be affected since they are deep and confined, and there is very little leakage from the overlying unconfined saline aquifers.

Estuaries Are Natural

- An estuarine system is more "natural" than the artificial system caused by building the barrages, and certainly more desirable than widespread acidified soils. A new wetland based on rich species diversity adapted to estuarine conditions would develop, a far cry from the present paucity, and marine fish would gradually take over from the damaging European carp. The Ramsar Treaty obligations would be kept, since there is no requirement that any particular wetland should be fresh or marine.
- Species which can only endure fresh water would migrate to the refuges behind the regulators, or into the river.

Conclusion

Although the possibility of seawater entering the Lower Lakes has been mooted by the State Government, we have yet to see any detailed plans of how this would occur. Valuable time for system development has been lost over the last two years with the unrealistic insistence on a fresh water solution. How is it that we could have allowed such a crisis to happen in our supposedly enlightened country? What is looming now is comparable with the Aral Sea problem which occurred many years ago in Soviet Russia, and has always been the source of derision of the bad management which led to this disaster. Lack of political will, too much attention to vested interest groups, and lack of balanced scientific input are all to blame.

If the concept of the Lower Lakes returning to their estuarine state were to be explored with open minds and scientific rigour with our best engineers assisting, we have no doubt that it is possible to accomplish this dramatic improvement towards a healthy estuarine system. By openly discussing this option, the public will in turn be able to come to grips with a new reality.

It is the only win-win, sustainable solution that South Australia has, given the change in our climate.

The above report has been prepared in consultation with a number of people associated with the LakesNeedWater group and others with appropriate expertise.

Dr. Elizabeth Gordon-Mills is the primary contact person for enquiries arising from this report. Please contact her on egordon-mills@lakesneedwater.org. For further information, please visit our website: www.lakesneedwater.org

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