Appendix 1 : Submission to Senate Inquiry by Mike South

Senate of Australia: Inquiry into water management in the Coorong & Lower Lakes

Submission from Mike South, farmer & Irrigator

Dated 9 September 2008

Executive Summary;

1. 3 main determinants of the volume of water required:
    a. The level of the lakes required to avert acidification & for how long these levels need to be held
    b. The trigger levels for acidification
    c. The volumes of water that can be contribute from local rainfall and catchments: the local water balance
2. Estimates of the volume of water required vary from year to year, from none in "like years" 2001/2 & 2003/4 to less than 50Gl in a year like 2006/7.
3. Current season is good one around the lakes and it is argued that actions can be delayed until the season progresses further. Strategies & preparatory work should not be delayed
4. Sourcing small volumes of water from weir pools should be possible with replenishing of contributing weir pools coming from further upstream
5. Telemetry monitoring pH & alkalinity in strategic locations is recommended
6. High order Transmission losses are queried where water is already flowing to meet consumptive diversions.
7. Commonwealth should take control forthwith of the MDB. It probably has the power to intervene & certainly has the moral obligation to save Australia's River
8. Impacts on rural communities are unavoidable as climate change takes hold,: River inflows will decrease &/or become more variable. Adequate & appropriate assistance will need to be provided for a broad scale restructuring of the farmers & supporting river communities.

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Introduction:

It is generally accepted that the Coorong & Lower Lakes are on the edge of an ecological disaster. Little or no flows over the barrages in most years since 2000/01, a result of low Murray River flows to the Lakes giving rise to unacceptable levels of salinity in both the Coorong and Lower Lakes. The region has been progressing towards ecological collapse since the 1981 closure of the Murray Mouth. It is not a recent phenomena but something that needs to be remedied if the River System is to be healthy into the future. The river & its estuary have withstood past droughts (periods with little or no flow) but not one that has continued since at least 1981 & is likely to continue for possibly a further 15-20 years, or at least until we successfully address the problems of over allocation & the vagaries of variability in inflows exacerbated by likely future Climate change. We need a healthy & sustainable river system to pass on to future generations. A more detailed submission on Part 2 of the Terms of Reference relating to the "long term sustainable management of the Murray Darling Basin" will be made at a later date. The closing date for these submissions is not clear.

The immediate & pressing problem, the subject of this submission, is that falling lake levels will expose a lake bed of sulfidic materials which may result in the acidification of the waters and the demise of all living fauna & flora: the basis of the ecosystem. This cannot be allowed to occur: The health of the river system both upstream of the Lower Lakes and in the Coorong depends on a healthy (non acidified) lake system. Ramsar, CAMBA & JAMBA treaty obligations would not be fulfilled & the backlash, adversely effecting international trade with the loss of our "clean green image" would be significant. Local economies, land values etc would plummet if the Lakes were to acidify.

Volumes of water required to avert the acidification disaster depend on:

The actual level below which the lake should not be allowed to fall and the period of time it is necessary to maintain at least that level:

1. The objective is only to maintain lake level above A-S trigger points, whatever that might be, and to maintain those levels until the 2009 rainfall season is underway in the local catchment. Say July 1 2009. It is not to fill the lakes to achieve barrage outflow.

2. To buy time until we have a better idea of the 2009 local winter rainfall

3. If the lakes can remain above acidification levels until the local winter 2009 it is probable (not certain) that this would give the Lakes a reprieve until we know more of the quantum of Southern catchment MDB inflows in late winter early spring 2009

The "trigger levels" for acidification:

1. Updated modelling (advised by DWLBC) suggests that L. Albert would acidify -0.5m AHD (previously -0.6m AHD): MDBC is funding the pumping of water from L. Alexandrina to L.

Albert in order to maintain a lake management level of -0.3m AHD. Current level of L. Albert (9/9/08) is about -0.18m AHD., which is .12m higher than it should be if the stated objective is to maintain lake level, by pumping to keep pace with evaporation & diversions. Pumping should therefore be managed more closely to achieve stated objectives & not a rise in levels at the expense of L. Alexandrina. The amount of water above requirement is in the order of 15 to 18 Gl , & the extra evaporation on the increased lake area is probably not significant, however as will be agued later every Gl may be important to the future viability of the lakes.

2. Updated modelling for L. Alexandrina (previous advice was -1.2m AHD for the whole lake) suggests that the wetlands fringing the lake near the islands close to the barrages and the tributaries of the Finniss & Currency Creek, are likely to acidify at about -1.0m AHD while the main body of the lake is predicted to acidify at about -1.25m AHD. The management level for the fringing wetland is -0.75m AHD and the main body of the lake -1.0m AHD. Effectively this means that L. Alexandrina cannot be allowed to drop below -0.75m AHD, unless all the fringing wetlands are disconnected from the main body of the lake. Engineering a man-made barrier would be a difficult & possibly impossible task for the Island wetlands bordering the barrages. However it is likely that these fringing wetlands and the Finniss area will naturally disconnect as the level of L. Alexandrina approaches -0.75m, obviating the need for any manmade structures. If this is the case then the effective management level of the lake would become -1.0mAHD
3. An accurate determination of these trigger levels, and a complete understanding of their reliability/meaning (error bars etc) is important as the difference between the current level 9/9/08: -0.27m AHD) and management level determines the amount of water that can be lost from L. Alexandrina before there is a need for additional inflow of water. E.g. if Management level is -0.75 & current lake level is -0.27m AHD then the lake can fall to -0.75mAHD before need for additional inflow. Using current modelling of Lake volume/AHD relationships supplied by DWLBC/MDBC a fall to -0.75m AHD represents 265Gl. If effective disconnection of wetlands occurs naturally & the management level becomes -1.0m AHD then a total of 393 Gl could be lost as the level drops to -1.0m.
4. It is understood that a peer review of A-S modelling is underway and will be complete by about the end of September 2008. It is important to ensure that this peer review also establish the reliability of the “trigger point” estimations and what is a actually meant by them. Is it that at the trigger level, modelling shows that there is zero chance (with 100% certainty) that acidification will not occur? If so at what level AHD is there a 10 % risk? Also important is the rate at which acidification occurs once it starts and when it does start, is the process reversible by addition of water & can an appropriate quantity be supplied in enough time to stop the process. It could be advisable for pH & alkalinity telemetry /measuring devices to be strategically placed in the lake to monitor changes.

The water balance of the lakes as affected by the season locally:

1. The current local season has been good with above average rainfall. Rainfall incident on the lakes, & local catchment inflows & Murray inflows together with not excessive evaporation have contributed to an improvement in lake level from a minimum of approximately -0.55m AHD to the current -0.27m AHD. We do not know whether this good season will continue, however in a number of years, the river flow of the local tributaries tends to peak in the second half of the year as the catchment wets & the dams are filled.

2. We do not know what 2009 will bring

3. We do know that the seasons can vary markedly and under these critical circumstances it is unwise to base assumptions on the median year, or worst case scenarios. Rather decisions should be based on the actual year as it unfolds & final decisions delayed until the outcomes are obvious.

4. In the meantime strategies should be developed to cope with all possible scenarios. Any required preparatory work that those strategies may require in order to be successfully implemented should be commenced in a timely fashion.

Estimates of the quantity of water that may be required:

Based broadly on the Discussion Paper prepared by Brooks & South 18/08/2008 *"Applying a localised Water Balance approach to estimate losses from Lake Alexandrina and Lake Albert for the years 1970 to 2006", copies of which have previously been supplied to Senators Wong, Farrell and Xenephon. Briefing summary attached as Appendix 1 to this submission.*

Table 1 below details the amount of extra water required if we were to get over the period 10/9/08 to 30/6/09 the rainfall and evaporation that occurred in the periods 10/9/01-30/6/02, 10/9/03-30/6/04 & 10/9/06-30/6/07.

The 01/02 year was chosen as in that year similar sea surface temperatures were experienced as we are currently experiencing in 07/08. 06/07 was chosen because it was very high evaporation year and overall a low rainfall year.

Assumption & data sources used in compiling the table:

Pan coefficient of 0.7 is deemed as appropriate for Lake Alexandrina as Kotwicki in his study observed evaporation on the L. Alexandrina and derived a Coefficient of 0.67 for the period 1990, 91 & 92. A Literature search confirms that a coefficient of this order is appropriate for a large body of water. For the benefit of skeptics of the validity of Kotwicki research and indeed the literature, I have also completed the analysis using a Coefficient of 0.9 which is little more than the correction needed to account for the bird guard on top of an Epan. SILO data is used for evaporation and rainfall.

The table contains assumptions of 20 Gl inflow from the local catchment for the whole period, as well as diversions.Incident rainfall is taken as falling on the water area of the lake: probably an underestimate.For further details of the methodology & general discussion on Evaporation & Pan Coefficients please refer to the discussion paper above, copies can be emailed on request.

Using a Pan Coefficient (PC) of 0.7, the study indicates that if we were to get years like 2001/2, 2003/4 and 2006/7 and we were prepared to let L. Alexandrina fall to -0.75m AHD: then in only one year (one like 2006/7) would we need to find extra water for the Lake (approximately 35 Gl). Using a PC of 0.9: in all "like" years we would need to find additional water (41 Gl in 2001/2, 124, Gl in 2003/4 and 241 Gl in 2006/7).

If we find on further investigation that at-risk wetlands in Lake Alexandrina will become disconnected and the lake can fall to -1.0m AHD: no extra water is required in any of the three "like" years using a PC of 0.7. Using a PC of .09: In only one "like" year, 2006/7 would we need to find water (approximately 113Gl).This demonstrates the need to fully understand the results of the modelling of trigger levels: a difference of 0.25m in level, from -0.75m AHD to -1.0m AHD makes a difference 128Gl to the amount of water that may or may not be required to maintain the levels above acidification.

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TABLE 1: All figures are in Gl, red figures indicate a requirement for extra water to L. Alexandrina,

	"like year" 01/02		"like year" 03/04		"like year" 06/07	
	Coefficient .7	Coefficient .9	Coefficient .7	Coefficient .9	Coefficient .7	Coefficient .9
INFLOWS:						
Murray past Wellington	264 Gl	264 Gl	264 Gl	264 Gl	264 Gl	264 Gl
Incident rainfall						
Catchment Inflow	20Gl	20Gl	20Gl	20Gl	20Gl	20Gl
TOTAL INFLOWS	401	401	387	387	403	403
OUTFLOWS:						
Evaporation	454Gl	584Gl	494Gl	636Gl	578Gl	744Gl
Diversions	3	3	3	3	3	3
L. Albert Pumping	89	120	103	138	121	162
TOTAL OUTFLOWS	547	707	601	775	702	908
Net Water Balance	-146	-306	-213	-389	-300	-506
If L.Alex drops to -0.75mAHD gain 265GL	265	265	265	265	265	265
Water required to maintain at at least -0.75m AHD	(119 Gl) none	41 Gl	(52 Gl) none	124 Gl	35 Gl	241Gl
If L.Alex can drop to -1.0m AHD gain further 128Gl	(247 Gl) none	(87) none	(180Gl) none	(4Gl) none	(93Gl) none	113 Gl

b (ii): Alternative Options for the acquisition of sufficient water:

1. If the amounts of water are in the order of that indicated in the table above ie none to 35Gl then this should be readily available in the various weir pools upstream from the Lakes, with upstream storages replenishing the contributing weir pools

2. If the requirement is for considerably more, say up to 250Gl (as is the estimate when a Coefficient of 0.9 is used rather than the more likely 0.7) then this is a different matter. The river from source to mouth should be the responsibility of all party governments & all should contribute.

3. In considering sources of the water thinking should not be restricted to MDBC controlled water, but expanded to all Government controlled water and also private water that could be purchased . This water should be supplied as part of an Australian emergency response & not be "on account" of South Australia & have to be repaid at some time.

4. The use of salt water to maintain levels would result in further environmental damage by increasing salinity in the Lower Lakes & it would perpetuate the inequity licence holders are already experiencing. Having an allocation but not able to use it as the water is unacceptable. Stock & Domestic water would have to be supplied to all relying on the lakes and possible compensation for loss of feed , amenity & property values.

b(iii): Transmission Losses

1. It is hard to believe that water flowing from the Menindee lakes as a "trickle" not a flood flow would have excessive transmission losses. One would have thought, given that the Lower Darling High security irrigators have an allocation & that the river is already flowing through South Australia to meet the demands of Urban use, that most of the losses are already accounted for in the delivery of water for existing diversions.

2. The MDBC should be more transparent in its estimation of Transmission losses

b(iv): Commonwealth Powers:

1. I am told and believe that the Commonwealth has the power to take over control of the MDB in its entirety. It may be difficult & messy & involve court action, but it is necessary & should occur forthwith.

2. In addition the Commonwealth has the moral responsibility to ensure that Australia's river is managed for the benefit of all, including future generations of Australians. This requires that it remains a healthy and sustainable river from source to Murray Mouth, where diversions for consumptive use are maximised but not at the expense of the river, lakes & Coorong & adjoining environment.

3. A difficult task in times of drought and with climate change likely to result in lower inflows. A task that is unlikely to be successfully completed under the current & proposed COAG structures, within the necessary timeframes. Decisions in the interest of the MDB need to be

made urgently & not be delayed or influenced by negotiation. A strong and independent authority is needed to take control with minimum political interference.

b (v): Irrigation infrastructure brought forward

1. Very necessary but it cannot deliver water to maintain levels & prevent acidification

2. If acidification is prevented, the next phase is to build lower lake levels to an extent where flow can start to occur through the barrages. This is essential for the health of the river lakes & Coorong. Normally 2,000,000 tonnes of salt pass through the barrages to the sea. Since 2001 little flow to sea has occurred & this salt remains in the river system. The Coorong requires fresh water from the Lake to provide the estuarine environment essential for the ecological character of the region

3. Water is required to build lake levels. The amount of water required can be minimised by infrastructure expenditure that will enable water from the lakes to be discharged safely into the Coorong at lower lake levels than currently possible. There is no reason why, with appropriate design that the lakes could not discharge between tides. Automatic gates that responded to changes in Coorong water levels caused by wind or tide would be required if we are aiming to discharge water at levels approaching 0 mAHD.

4. The Lakes could be held at lower levels not the surcharge level of 0.85m AHD but vary between say 0.6mAHD & 0.3mAHD. This would require work to be done on the barrages to stop entry of sea water & also a change to the MDBC agreement & upstream infrastructure works so that SA could source flows that better matched demands for diversions & the environment.

C: Impacts on rural Communities

1. There is little doubt, that with Climate Change we will see a likely reduction in the water available for consumption, & increasing variability of run-off & river flows. This will necessitate changes to the use of water: to higher value crops, to less perennial crops that require water when the river is at its lowest, to more opportunistic cropping of annuals. Marginal areas requiring high water usage to produce a given crop could disappear altogether. These are only some of the changes that will be pressed upon those currently relying on the Rivers. Communities will suffer.

2. Funding will be required to enable those farmers who wish to exit their current business as a response to these changes, so that they can exit in a reasonable and appropriate manner.

3. The funding will need to extend to communities, not to maintain status quo but to encourage establishment of viable alternatives occupations & activities.

4. Existing EC support does not extend widely enough to non agricultural industry and it tends to support the “battler”, assisting them to stay on the farm longer than possibly they should, rather than support the farmer who is successful & the future of the industry.

5. The restructuring packages should be generous enough to encourage the “battler” to move out of the industry or relocate to a more profitable area.

D: Related Matters

1. The river system is not only the “lifeblood” for many in the MDB but it is also the “drain” for the whole basin.
2. Waste from the MDB ends up going into this drain. Some of it passes downstream to the sea while some accumulates in the river beds & irrigated soils. It is a natural process that eventually much of this waste, salinity being the most obvious does end up in the river. Salinities are increasing in many catchments. River flows are essential to discharge this salinity to sea.
3. If the river does not flow it will die.
4. In these times of drought there are many competing needs for the little water that is available. The possible acidification of the lakes is a national issue, and an immediate issue that needs to be addressed now.
5. So too is the issue of no river flow across the barrages to revive the Coorong .

Briefing Notes 31/8/08 (v2):

Discussion Paper by Brooks and South, 19 August 2008

"Applying a localised Water Balance approach to estimate losses from Lake Alexandrina and Lake Albert for the years 1970 to 2006"

1. Median net water loss from the Lower Lakes between 1970 and 2006 was calculated to be 400GL per year.

2. This is half the Murray Darling Basin Commission (MDBC) estimate of 800GL median loss per year, and up to 70% less than the loss of 1000 to 1400GL per year often reported in the press.

3. The authors are working with MDBC to reconcile the difference. It is most likely that the correct amount of net water loss is somewhere between 400GL and 750GL.

4. Annual net water loss from the Lower Lakes varied considerably over the study period, although the median loss was about 400GL. Losses peaked in the dry year of 1982 (700GL) and were at a minimum in the exceptionally wet year of 1992 (no loss but a gain of 100GL).

5. Environmental benefits of 1992 are still apparent today with the whole food chain benefiting from extra flows which encouraged fish to complete an additional breeding cycle as a result of local catchment inflows.

6. The variation between good and bad years should also be considered when making decisions regarding the future of the Lower Lakes, and the discussion should not focus merely on worst case scenarios or median values.

7. Using the same methodology, at current lake levels of approximately -0.3m AHD (rather than using the study level of normal pool level: 0.75m AHD) and using data from the same span of years, median net water loss reduces by 25%. This demonstrates the importance of basing decisions on estimates of losses at current lake levels and not basing decisions on losses estimated at a pool level of 0.75m AHD.

8. The study looks at the Lower Lakes as a storage where rain falling on the lake surface and run-off from the eastern Mount Lofty streams and rivers should be considered along with evaporation from the lake surface.

9. Net groundwater flow has not been considered due to lack of data; however available scientific literature regards groundwater flow as insignificant.

10. The methodology used is a direct estimate of net water loss based on the limited actual Lake Alexandrina data and on very few assumptions. In essence "this is what the science tells us should be the answer".

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For clarification of matters arising from the attached discussion paper, please contact the authors:
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