



SOME ASPECTS OF CLOSED LAKES IN PATAGONIA

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GENERAL DESCRIPTION OF PATAGONIA

Patagonia occupies the southern third of Argentina. It is about the same area as New South Wales and lies between latitudes equivalent to Wilsons Promontory (39°S) and Macquarie Island (55°S). The Andes Mountains, rising to 2000-2500 m with occasional higher peaks, form the western fringe. To the east, a narrow, irregular foothill belt gives way to extensive plateaus which fall to limited coastal lowlands and are dissected by wide, flat-floored valleys. The area includes cratons of mainly volcanic and metamorphic rocks surrounded by Mesozoic and Cainozoic sedimentary basins that contains a significant proportion of pyroclastics (Volkheimer in Soriano 1983). Late Miocene and younger basalt flows form extensive plateau caps rimmed by slump features. Gravel sheets up to a few tens of m thick cover extensive areas of valleys and plains. Pleistocene glaciers debouched from the mountains in the north and centre while in the extreme south the ice extended as far east as the present coast.

The climate is cool, dry, and very windy (Table 1). Evaporation in the north and centre is comparable to that at Canberra despite temperatures some 3°C cooler in all seasons.

TABLE 1. Climatic data for Patagonian stations and Canberra

Latit. & Altit.	Maquinchao 41°S, 900m	Sarmiento 45°S, 270m	Rio Gallegos 52°S, 22 m	Canberra 36°S, 580m
Precipitation (mm)				
annual	170	130	220	620
distribution	Slight	autumn max.	Summer max.	Even
Temperature (°C)				
warmest month	17	17	13	20
coldest month	1	4	0	5
Wind (km/hr)	18	17	25	6
Evaporation* (mm)	800	1200	500	1200

* Pan correction factor of 0.7 applied.



were formerly much deeper and more extensive. For instance shore lines up to 68 m above the present intermittent lake have been reported at Lago Cari Laufquen in northern Patagonia (Coira 1979). In 1981 we found evidence for still higher, older shorelines over 100 m above the lake. Ferruglio (1949) reported seven strand lines up to 50 m above Lago Cardiel and we found gravel beaches still higher at 78 m. Lago Musters and Lago Colhue Huapi were formerly one body of water with strandlines up to 45 m above the present water level. This lake system is retained by a gravel and dune barrier which must have been a very impressive feature when the lake was full. Exposures indicate that the water level rose and fell several times.

LUNETTES

Lunettes are abundant in Patagonia. A typical example associated with an intermittent lake about 500 m wide is 3-5 m high and 100-200 m wide. It consists mainly of silt and clay with sand towards the base.

Some lunettes are developing today but growth does not seem very active and more are being destroyed. In February 1981 after unusually high summer rainfall the lakes were fuller than normal and formation and transport of clay pellets or crusts was impossible. Those lakes which were low or dry generally had coarse blocky, or smooth hard, clay floors unaffected by even violent winds. Any particles which were picked up were blown far beyond the basin unless trapped by bunch grass or bushes growing on the lunette. Some lunettes were being cliffed by waves. Gullying and sheet erosion are attacking many lunettes, doubtless aided by the severe over-grazing that the region has suffered in this century.

There is clear evidence that some lunettes are being destroyed by wind and only relics survive in the lee of bushes. It is suspected that some gravelly strandlines were formerly overlain by lunettes which have been entirely blown away.

Dangavs (1979) has described fossil lunettes from the Pampa Deprimida just to the northeast of Patagonia. He believed they were late Holocene but they may be older (Tricart n.d.). Silty clay dunes flanking basins have been noted all over the Pampa region which extends north to about 33°S (C.P. Movia pers. comm.). Dunes have been reported on the lee side of a closed basin in the high, arid northwest of Argentina (Igarzábal 1977) but it is not apparent if they are lunettes or irregular source-bordering dunes derived from former strandlines.

SOME POINTS RELEVANT TO AUSTRALIAN PALAEOCLIMATOLOGY

1. Large permanent lakes can exist in a dry windy climate despite high evaporation (Lago Cardiel).



2. Wave action in a windy climate can build substantial beaches in a few years and consequently major strandlines may represent only brief periods of anomalously wet seasons.

3. There have been many intervals in the Quaternary when precipitation was substantially higher in these southern latitudes. In view of the arid climate, it seems highly unlikely that larger lakes could result solely from a reduction in evaporation.

4. Lunettes occur at least as far south as 55° and this substantially expands their known range of occurrence.

5. It can be too windy for lunettes to develop. In extreme conditions the wind destroys rather than constructs these features.

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