

Bondi: a case study in beach resilience

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Bondi is without any doubt whatsoever a national/ global beach icon. Not even nature would dispute this statement, at least for the last 6000 years!

It has iconic status for a number of reasons: one its proximity to the city of a great metropolis; two, it is bathed by the warm clear waters of the East Australian Current; three, Sydney experiences climatic conditions favourable to swimming and surfing; four, the topographic setting is conducive to excellent views and enjoyment of both the natural and built landscape; and five its geomorphic history.

Geology and geomorphology dictate conditions that have promoted the evolution of a beach-dune system that has made Bondi not just the way we see it today but also how it has been used and abused in the historic past. From the time of the formation and consolidation of Hawkesbury Sandstone rocks of the Sydney Basin of Triassic age to the opening of the Tasman Sea 60-80 million years ago, to more recent times, we see a series of steps leading to the subsidence and planation of the continental shelf, rising sea levels, and the eventual entrapment of marine sands rich in quartz in an ancient drowned valley system. The Post Glacial Marine Transgression and subsequent “stillstand” have been the last defining geologic events. High transgressive dunes, cliff-top dunes, small lagoons and a crescentic beach have formed within and on lowlands, headlands, cliffs and rock platforms of the Bondi embayment.

Since 6000 years ago this embayment has essentially functioned as a closed sediment compartment. The relatively pure quartz sands have been free to move in and out of the sweep zone formed by wave and wind action. Rip currents are a characteristic beach feature and involve the circulation of sands in the dynamic surf zone. Dunes have been constructed behind this beach strip and from time to time have been fed from the beach during periods of backshore erosion involving destruction of foredunes. These dunes have become stabilized by vegetation. Early 1870s photos show a partly stabilized parabolic dune at the north end of the bay. Small freshwater lagoons were trapped in the swales of dunes extending inland towards Rose Bay.

The dunal area has been disturbed by land management since early occupation by European settlers. The first land grant was taken up by Roberts in 1811 and held by him and his family in the name of “Bundye” till 1851. The Hall/ O’Brien families took possession of this grant in 1851 until 1882 when part of it was resumed for public use and the Waverley Council became the trustee. Other sections were sub-divided for housing. These grants and changes in tenure in the 19th century initiated a new landscape behind the beach, but the beach itself remained in place.

Early photos from the 1880s to the 1920s reveal the evolution of a highly modified dunal topography. Grazing of livestock helped to destabilize the vegetation in the 19th century and extensive sand drifts are recorded between the beach and Bellevue Hill some 2-3km inland by 1920. Shacks, tracks and lagoons are noted as being overwhelmed by moving sands. This became the first area in NSW for experiments in sand stabilization using brush fences and introduced plants. However, much of the drift problem was solved in the 1920s by the mining of sand, the flattening of the land behind the beach, and sub-division for real estate.

The fight to access to the beach, southern foredune and headland commenced in the early 1880s. O'Brien was forced to relinquish land under public pressure and the use of this part of the bay for public recreation took off after 1885. Photos of bathing, picnics and later promenading show an increased use especially after trams came to the area and daylight surfing and swimming in the baths built on the rock platform were permitted. The promenade was completed in 1923 along with recreational buildings including the Pavilion in the late 1920s. Bondi became a summer time mecca. Yet there were disruptions to the beach system.

Extreme storm events periodically stripped sand off the beach. Rocks were thrown up onto the rock platform at Ben Buckler including the famous "mermaid" rock in the huge storm of July 1912. Piers were built of concrete onto the beach in the 1930s but they were destroyed during World War 2 when the beach was declared off limits in fear of invasion and partly covered in barbed wire. The May-June storms of 1974 had the effect of uncovering the remnants of the piers and destroying sections of the seawall. The wall has subsequently been reinforced but barely touched by waves in recent years allowing the construction of a much maligned stadium for Olympic beach volleyball in 2000 lasting only a few months.

What we see today is a beach in more or less the same position as revealed in early photos. Despite 17cm of sea level rise and a vertical sea wall, Bondi's beach width has oscillated around a mean position with little evidence of sand loss of sand from the sediment budget in the embayment. It has survived some big natural and human-induced shocks over the last 150 or so years. What of the future? What will global warming mean for Bondi? Is there a tipping point when sand nourishment from offshore sources will be needed? It may be a resilient system today, but in the decades ahead it may require considerable public investment in order to retain its icon status.