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How The 2015 Sydney Cyclone Eroded Our Shores

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The April 2015 East Coast Cyclone

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(See more about CoastalCOMS Shoreline Position & Monitoring systems)

An intense East Coast Cyclone (ECC) hit the NSW coast between April 20-23 bringing torrential rain, gale force winds and huge seas. The greatest impact occurred along the Hunter-Sydney coast with strong winds, flooding rains and massive seas. The largest wave recorded at 3 pm on 21 April was a massive 15 m (Figure 1) (that's the height of a 5 story building) and would have closed out Sydney Heads. The waves also exceeded 6 m for 30 hours (Figure 2), the longest duration of such high waves since 1987. The strong winds also pushed up a 25 cm storm surge to top things off (Figure 3). When you combine all this – high waves, high tide, plus storm surge and strong onshore winds you expect things to happen and happen fast.

In addition to the heavy rain and flooding there were two major impacts at the coast. First the wind blew a lot of sand from the beaches onto the dunes, and where there are no dune onto the backing yards, car parks and roads. (The amount of sand blown increases exponentially with wind velocity, actually at the cube of the velocity – so strong winds can move a lot of sand). The

Bondi promenade became literally blanketed in 10's of thousands tonnes of sand, resulting in a hasty clean up before Anzac Day.

On the seaward side of the beach the waves were ripping the beaches apart and carrying huge volumes of sand seaward in massive rips systems to be deposited as offshore bars and beyond. Narrabeen beach, which had been unusually wide a week before, retreated at much as 30 m exposing old seawalls in places (Figures 4 & 5).

Figure 6 shows how the shoreline at Wetherill St, Collaroy eroded 25 m with 84 m^3 of sand eroded from every metre of beach, bringing to total amount of sand eroded from the entire Narrabeen-Collaroy to about 250 000 m^3. This amount of erosion is similar in scale to that caused by the 2007 'Pasha Bulka' storm.
The question is will this erosion continue? Well that depends on the waves. As a rule of thumb it takes the beach 10 days to recover for every metre of beach eroded, so 25 m equates to 250 days or 8 months, under ideal conditions. However there is another ECC forecast for this weekend, which could mean even further erosion, especially as our worst erosion always occurs when we have a series of ECC's. So things could get worse before they get better.

On the positive side, the waves take the sand offshore and build new bars as well as carving deep rip channels. This will mean some great beach breaks over the coming weeks.

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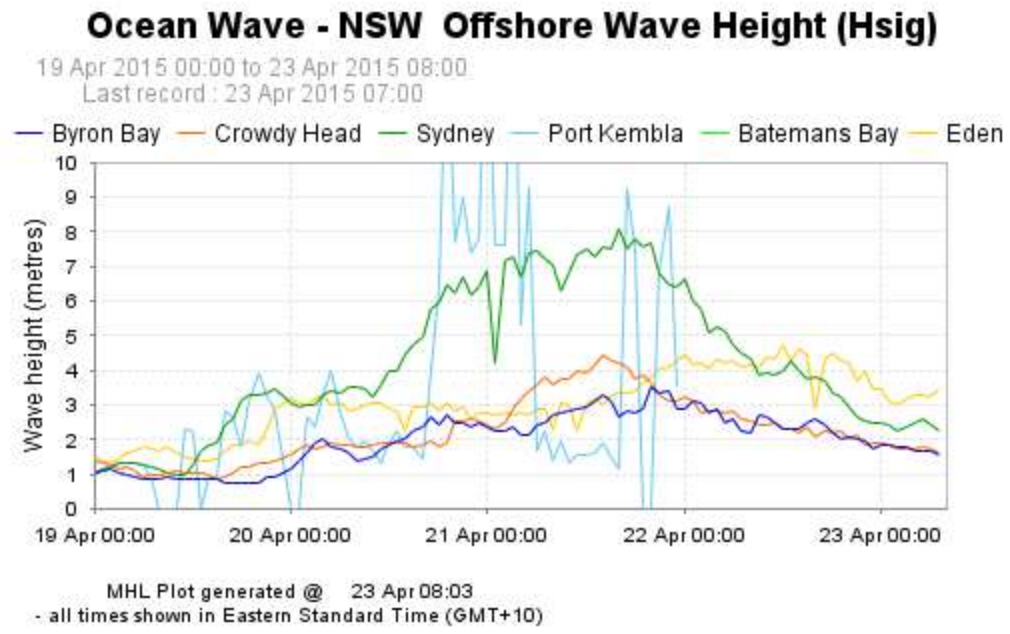

Figure 1. The 15 m high wave (trough to crest at 1580 hours). Source: Public Works, Manly Hydraulics Laboratory.

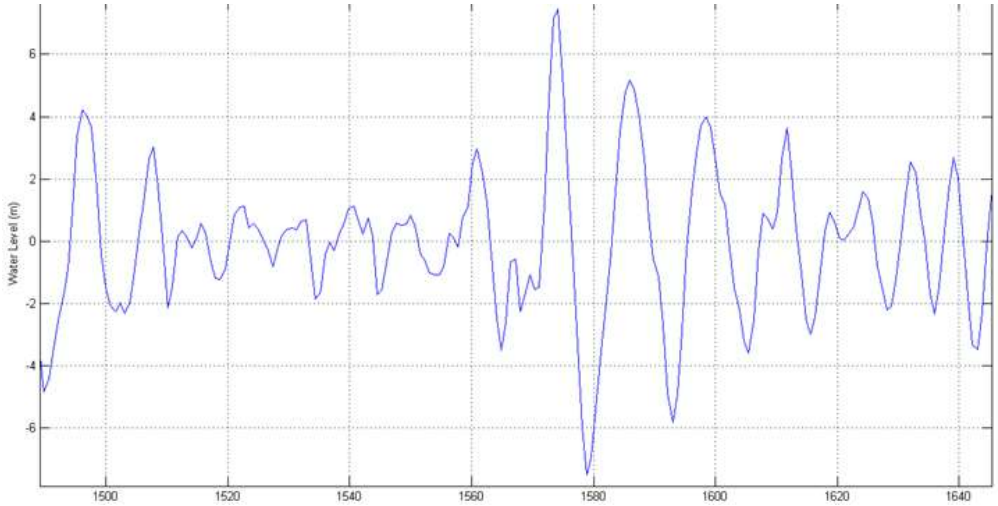

Figure 2. Wave height during the peak of the East Coast Cyclone., Green line is significant wave height which exceeded 6 m for 30 hours straight, peaking at 15 m. Source: Public Works, Manly Hydraulics Laboratory

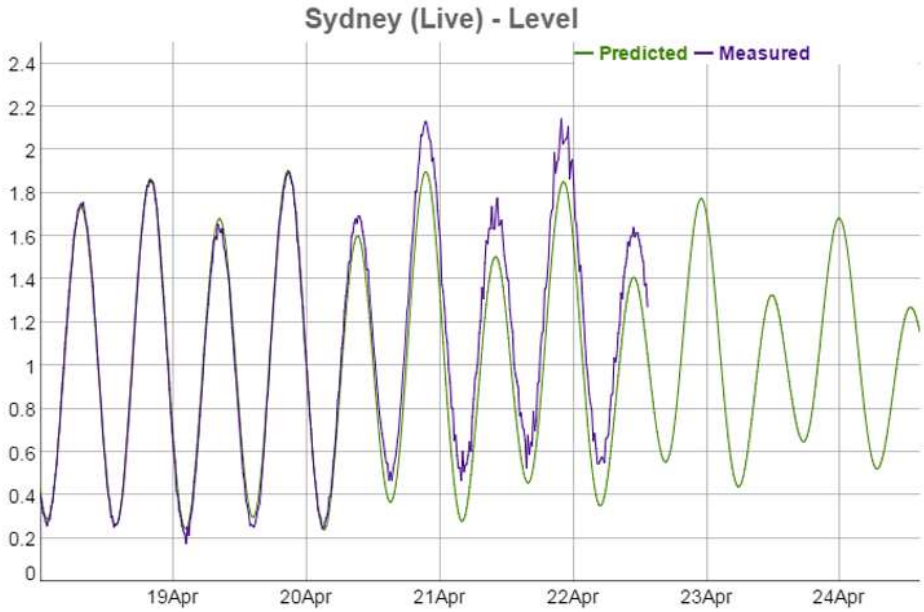

Figure 3. The 25 cm storm surge (purple line) producing higher high tides on 21 & 22 April. The green line is the predicted tide. Source: Public Works, Manly Hydraulics Laboratory.

Figure 4. Collaroy Beach on 16 April 2015, as wide as it gets (Photo: A D Short).

Figure 5. Collaroy Beach a week later on 23 April 2015, following 25-30 m of shoreline retreat (same pine tree as in Figure 4) (Photo: A Gordon).

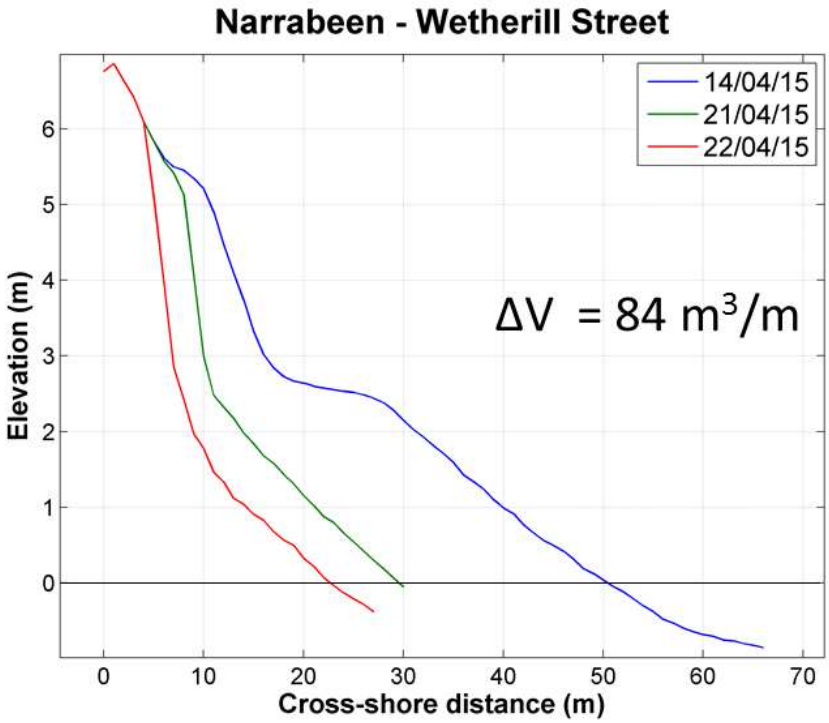

Figure 6. A cross-section of Collaroy beach (same area as Figure 5) before and after the storm. Source: Water Research Laboratory, School of Civil and Environmental Engineering, UNSW.