Emergency Coastal Protection Works – Practical Lessons For The Future From The Past

Angus Jackson[1]
[1]Principal Engineer, International Coastal Management
a.jackson@coastalmanagement
www.coastalmanagement.com.au

INTRODUCTION

Many sections of the Queensland coastline are very vulnerable to short-term storm cut in severe conditions. To add to the problem, increased local erosion often occurs in hot spots. Long term weather conditions are highly variable and there have been very few severe erosion events requiring short term emergency protection works along the southern Qld [and northern NSW] coastline since the early 1970's.

With the "seachange" developments, the type of public and private assets along the beachfront is now very different (Figure 1) and the risks are now much higher. There are now large numbers of coastal dwellers, particularly in the SE, who have no real appreciation of what will happen when we again experience extensive and rapid erosion events from a large or multiple back to back cyclones.

was a typical response using easily obtainable local timber logs that could be easily transported and installed. Such walls were leaky unless suitable gravel was available to place behind them as a filter to retain the sand but allow the elevated water table behind to escape. They are also very reflective and, if not driven deep enough, fail by toe scour. However, they were often a reasonably successful short term measure. Remnants of early timber pile walls are still evident in many areas along the coast. A few years later, the Pacific Highway linking Brisbane and Sydney was threatened at Narrowneck near Surfers Paradise. Timber groynes proved ineffectual and eventually a very substantial bitumen-coated timber log wall was constructed, with a rock toe and gravel behind. This was successful and was reinforced with a boulder wall along the front many decades later when the wall was extended. The wall was far enough landward so as to only be exposed during storm events after which the beach built up again to seaward. Up to the late 1990's this wall was still protecting the road, now not a highway but a local road [and part time Indy race track].

A severe cyclone in 1931 caused extensive erosion and, with the rainfall, substantially altered the entrances to creeks, such as Currumbin Creek, where an island near the entrance was completely washed away. [This type of problem occurred "recently" at Maroochy where the entrance broke through causing widespread damage and loss of some of the council caravan park – a huge asset that was protected.] Another severe cyclone in 1936 caused widespread damage and more timber walls were constructed. Cyclones and severe erosion were noted in various records regularly up to 1974.

The 1967 cyclones, 7 of them, back to back, caused extensive damage to all of the southern Queensland beaches. In areas with wide well vegetated dunes, the erosion was slowed but eventually the dunes collapsed during the batterings on every high tide (Figure 2).

Figure 2 Dune cut

It was not just private beach houses and lifesaving clubs that were threatened - the public esplanade roads that had been designed well back from the beach by the early State Government planners were severely damaged. This meant that services such as power and water were cut and access to properties was cut off. Surfers Paradise esplanade is shown in Figure 3.


Figure 3 Surfers Paradise Esplanade 1967

No action was not a real option. Emergency protection works aimed at reducing the erosion of the dunes were varied in both their type and effectiveness. Measures taken included:

- Boulders
- Car bodies
- Concrete rubble
- Concrete slabs [including collapsed swimming pools]
- Drums filled with concrete
- Gravel
- Masonary bricks and blocks as rubble
- Plastic sheeting
- Sand
- Sand bags
- Timber walls and groynes
- Prayers

Inadequate walls were next to useless. The most successful were well constructed boulder walls. However, poor quality or overtopped boulder walls failed quickly. Areas where adequate boulder walls had been constructed over a long length during earlier severe erosion events were the best off. While they lost the beach, the extent of the erosion was curtailed. Erosion occurred unabated up and down drift without any significant increase in the extent (Figure 4). Recovery of the beach occurred after the storms in all areas. One problem was that with the cyclonic rains, access to quarries for suitable rock was limited.

Other measures that had some success were:

- Rubble, where at a flat angle and thick enough
- Sandbags, where well interlocked and well filled.

The army were dispatched to deal with the disaster. They brought with them their familiar tool, hessian sandbags (Figure 3 and 5). Larger plastic fertilizer bags were also used by Council and residents but proved less effective due to their low coefficient of friction. Gold Coast City distributed sandbags to owners who filled them using readily available sand, from their yards.

Figure 4 Erosion without protection compared to with adequate protection.

Figure 5 Sand bags

The behaviour of residents under stress was not always uplifting. Pilfering of sand bag stores and diverting council trucks loaded with rock to protect roads by residents was commonplace. Requests (demands) by influential beachfront owners on politicians were widespread. Commitments to pay for Council rock were often avoided after the event.

LESSONS

Even short-term erosion can have severe economic and social impacts. However, emergency protection works can be done quickly, effectively and efficiently with the right materials and techniques without adverse impacts. Timing is critical and works generally need to be able to be done at low tides for safety and to achieve the best results. The observation of the behavior of various protection works has lead to better wall designs that are easy to install and can cope with very severe events.

To minimize the economic impacts to the tourist economy and need for emergency Gold Coast City Council maintained a large stock of bags for emergencies for many years and may still have them. Beachfront parks were seen, at least by the coastal engineers, as an emergency supply of sand for filling sand bags. They also established a boulder wall line and required all new works (then over $25,000) to be protected by a well designed and constructed wall to be covered by a dune. These walls lie buried ready for the next severe erosion. Long-term works to widen the beaches have further reduced the risks to the economy and properties.

Other areas of the Queensland coastline have had similar experiences to the Gold Coast and well constructed emergency walls are common along the Queensland coastline. The emergency rock wall (Figure 6) constructed by Noosa Shire saved Hasting Street while major beach improvement works were designed and implemented. The wall is now buried at the back of the beach where it will limit future severe erosion events, when they next happen.

Figure 6 Noosa rock wall 1972-73

Sand is a readily available material along the coast and the use of sand bags has also evolved. In recent times, Maroochy Shire used modern “sand bags” to protect their caravan park (Figure 7). This allows the works to be done quickly and easily removed after the event, if required.

Figure 7 Maroochy sand bag wall

TAKE HOME MESSAGE

Some Queensland coastal areas will suffer again from erosion “disasters” and the political expectations and demands by residents on all levels of government for temporary protection works will be very high.