

# WHO CARES ABOUT COASTAL DUNES AND VEGETATION NOW?

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## **Abstract**

Naturally evolving coastal dunes and vegetation play an important role in regulating shoreline processes. When dunes are constructed in highly developed coastal environments, shoreline managers can be faced with significant challenges. This is because the community often demands a diverse range of values from its coastal zone, not all of which can be easily achieved in such a setting.

In the mid 1980's, dune construction works were carried out at a number of Wollongong beaches following a long period in which development was allowed to encroach into the back beach and dune areas. There was significant community concern at the time about windblown sand and undermining of coastal infrastructure as a result of the exposed coastline. The dune construction works involved creation of a dune profile at the back of the beach and stabilizing the dunes with planted vegetation. In the absence of any recent major coastal storms, there has been a considerable increase in the width and height of these dunes, improving protection for the assets located behind the beach. In some places, the dunes have grown to such an extent that the community focus has now shifted from the value of the vegetated dunes for coastal protection to their role in reducing the recreational amenity of the beaches. Some interest groups are now questioning the merits of the decision framework for the original dune construction works and are demanding the removal of large sections of the vegetation.

The crux of the challenge for Wollongong City Council, as the shoreline managers for this area, has been trying to maintain a management regime in the face of changing, often conflicting, values and expectations from the community. Some future management strategies are being considered that will challenge conventional thinking on coastal dune management.

## **Introduction**

The values that are associated with the coast are many, and consist of various social, economic and environmental attributes and opportunities. For this reason, the coast is a highly desirable place for people to live, work and play. In Australia, about 85% of the population live within 50 km of the coast and this trend is increasing (ABS, 2004). Within this dynamic, the significance of coastal dunes and vegetation has often been challenged.

Coastal dunes and vegetation have traditionally not been considered worthy of protection, and along much of Australia's urbanised coastline, they were cleared to make way for development. Back dunes were also mined for sand in some locations, disturbing the sediment balance and ecology of these areas and creating degraded landscapes (Brewer and Whelan, 2003). These are examples of exploitation of the economic potential of the coast without careful consideration of the significance of the dunes and vegetation for the

maintenance of other coastal values important to the community. With increasing recognition of their significance, in recent times much effort has been directed towards restoring coastal dunes and vegetation in areas where they have been lost or degraded. One of the primary reasons for doing so is that coastal dunes and vegetation provide a protective buffer for coastal assets and infrastructure against the risks from coastal processes and hazards. These risks are expected to increase with climate change and rising sea levels in the future, and the restoring coastal dunes and vegetation is seen as a more desirable way of providing protection than through using hard engineering options (Arkema et al, 2013). The NSW Government has supported many dune restoration projects along the state's coastline, and has prepared a manual to assist shoreline for ongoing work in this area (NSW Department of Land and Water Conservation, 2001). Dune restoration projects also feature prominently amongst the grants awarded by the NSW Government through its Estuary and Coastal Management Program.

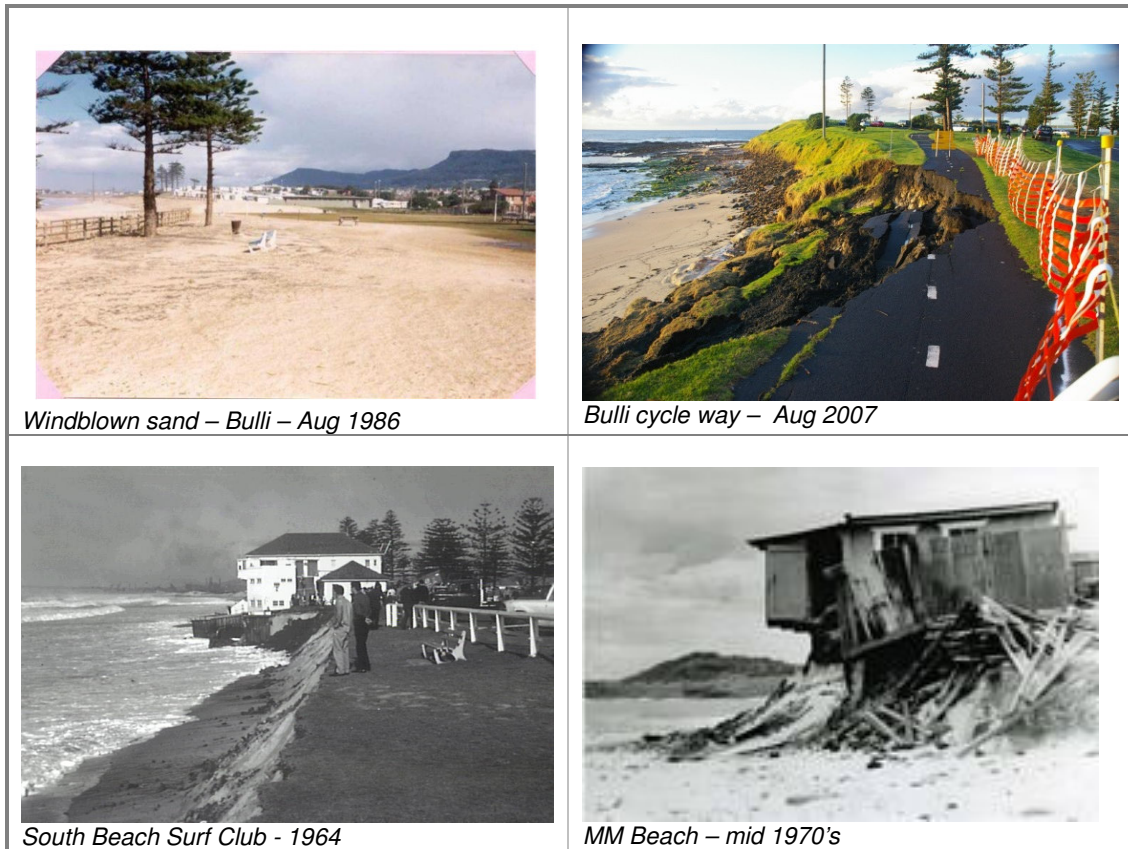
While the significance of dunes and vegetation for coastal protection for back beach assets is now widely recognised, their role in affecting the character and value of the beach itself is now coming into question. Concern is emerging that dunes and vegetation can conflict with other coastal values, in particular, the recreational amenity of beaches. This paper uses the experience of Wollongong City Council to explore the significance and management challenges of dune restoration works in sustaining the coastal values associated with urban coastlines.

## **The Wollongong Coastal Environment**

Wollongong is located on the NSW coast about 75 km south of Sydney. It is noted for its picturesque coastline, dotted with a number of attractive beaches and an imposing escarpment as the backdrop. The opportunities associated with this coastal setting are highly valued and are used as a major drawcard for promoting the area for tourism and other purposes.

The popularity of the local beaches is evident from the large number of people using the beaches and the beach facilities during the summer months. Seventeen of the beaches have surf life saving operations, and as in other parts of Australia, surf life saving culture is entrenched in the community. There is also a strong sense of belonging to the local beach by the community that lives around it. The community takes pride from the fact that a number of the local beaches have been recognised in Beach Care awards.

Many of the beaches are backed by a vegetated dune that was established about 30 years ago by Wollongong City Council in partnership with the NSW Soil Conservation Service. This was done largely in response to the impact of coastal processes and hazards on coastal infrastructure that is located at the back of the beaches (Fig. 1). The dunes and vegetation have now become remarkably well-established, and are considered important for mitigating the risks from further coastal processes and hazards.



**Figure 1. Photographs showing the impact of coastal processes and hazards on infrastructure**

### Changes in Dune Morphology

Historical aerial photographs of the coast available to Council date back to about the 1940's, and these do not show the presence of any significant vegetation in the areas where vegetated dunes now occur. Whether vegetation was there in earlier times is unclear, but what is clear is that the community have a memory of a long period when wide, open, sandy beaches and unobstructed views from back beach areas were present for them to enjoy. This situation has now changed.

Figure 2 shows an example of the change that has occurred since the dune restoration works were carried out in the 1980's. In the absence of any major storms in recent years, the spread of the vegetation has been rapid, and on some beaches, more than half of the original beach space has been taken up by vegetation. The decrease in the amount of open sandy beach space available for recreational purposes is one of issues that is of concern to some in the community now.



**Figure 2. Aerial photographs of Woonona beach (not georectified; for illustrative purposes only)**

In addition to the spatial spread of the vegetation, the foredunes have also increased in volume and height, and have prograded to within easy reach of moderate wave run-ups that are not necessarily associated with coastal storms. At some beaches, the increases have been more than twofold following the dune restoration works. With steep scarping and damage to beach access ways at beaches with vegetated dunes, and no such detrimental effects apparent at a small minority of beaches where dune works were not carried out, the community further questions the value of the dunes in their present form. Some impacted beaches are very slow to recover, even after a long period of fair weather, and sometimes the beaches need to be closed as a public safety measure.

The growth in the vegetation and dunes also obstruct sightlines from surf life saving viewing areas, creating another public safety issue of concern to the community. Some years ago, viewing towers were installed in some locations as a result of sightline being affected from surf clubs further back on the beach. But now, sightlines from the towers are also being impacted. The community concern with all of these issues means that dune management has become one of the major focus areas for Council.

## **Coastal Values and Conflicts**

An assessment of the significance of the coastal dunes and vegetation in the values associated with the Wollongong coastline was considered a useful starting point for addressing the community concerns in this area. This assessment shows that potential conflicts may exist with some values.

### ***Economic Value***

A coastal hazard study completed for Council (Cardno, Lawson, Treloar, 2010) shows that, from a coastal protection perspective, the dunes in their present form are providing a very positive outcome. The presence and growth of the dunes means that the risks from coastal hazards are not as significant as in other places along the NSW coastline, where hotspots or emergency situations have been declared. Council therefore considers the retention of the dunes to be very important because they provide protection for the assets located at the back of the beach. The dunes and vegetation are therefore not at odds, and in fact considered essential, for maintaining the economic value of the coast. This value, however, relates to housing development and infrastructure (residences, surf clubs, cycle ways, etc) that are located at the back of the beach. There is further economic value associated with the recreational use of the beach itself, and this aspect also needs to be considered.

### ***Recreational Value***

The assessment of the impact of dunes and vegetation on the recreational amenity of the coast is not as straight forward, as no benchmarks could be found on the beach conditions considered acceptable or unacceptable for recreational purposes. This obviously does not apply to the loss of sightlines from surf life saving viewing areas, as this is a serious public safety issue and is clearly unacceptable. However, this safety issue can be addressed with the use of relocatable towers and does not need to involve removal or alteration of the dunes and vegetation, given their importance for coastal protection. The impact of the dunes and vegetation on the useability of the beach itself is the issue that needed further consideration.

A number of NSW coastal policy documents have the maintenance of beach access and amenity as one of their core objectives, recognising the importance of the recreational value of the coast for the community. Therefore, the question for Council has been whether the present state of the dunes and vegetation in Wollongong is seriously compromising the recreational value of the local beaches. In answering this question, Council identified two criteria that can help determine the recreational amenity value of a beach – beach width, and scarp height and persistence. Beach width was selected because wide open sandy areas are preferable as they increase the opportunities for recreation, and scarp height and persistence, because steep scarps that do not recover readily, pose a public safety threat. A preliminary assessment was carried out of beach width at high tide and the persistence of scarps on beaches. This has been somewhat subjective as there was not a great deal of quantitative information to inform this assessment.

The results of the beach width and scarping assessment show that at some popular beaches, the beach width at high tide can be as narrow as 5 to 10 metres, and steep scarps of 2 m high or more can persist for long periods of time, seriously limiting the extent to which the beaches can be used for recreation. In other parts of Australia and elsewhere, such beach widths would be considered unsuitable for recreational purposes and could warrant remedial action to restore beach amenity (Department of Environment and Heritage, 2005). This suggests that the recreational amenity of the beach in some locations in Wollongong is being compromised by the current state of the dunes and vegetation, and therefore a conflict may exist. If this situation is allowed to continue or get worse, it could eventually start having a negative impact on the economic value generated from the use of the beach as well. This suggests that the condition of the dunes and vegetation has the potential to conflict with not only the recreational value of the coastline, but its economic value as well.

### ***Ecological Value***

The role of the dunes and vegetation in determining the ecological value of the coastline is another matter that has generated some community interest. Some people believe that the dune vegetation has improved the ecological value, by providing habitat for wildlife in areas that were previously degraded. This is, however, contested by other sections of the community who question the suitability of the vegetation in a highly utilised area, as the vegetation can provide harbours for anti-social behaviour, and get infested with pests and vermin. The predominance of one particular vegetation type, the Coastal Wattle, in the dunes is another reason why some in the community do not consider the ecological improvement to be particularly significant. The importance of the dunes and vegetation for the ecological value of the Wollongong coastline is therefore less settled, although Council recognises that a suitably vegetated back beach area can enhance the ecological value of the coastline.

### ***Values Summary***

Council's analysis of the significance of the dunes and vegetation shows that they are essential for protecting the economic value of the back beach assets and can improve the coast's ecological value, but there is a conflict with the recreational amenity value of the beach in some locations, and potentially also with the economic value of the beach itself over the longer term. Within the community, the significance of the dunes for coastal protection and for long term economic impacts is less well appreciated, and their focus has generally been on their detrimental effect on recreational values. The reason for this view could be that there has not been a major storm in recent years to demonstrate the significance of the dunes for coastal protection. So the community's attention is on what is here and now, rather than on the bigger picture or on risks that have a low probability of occurrence. Whatever the case might be, Council recognises that intervention is necessary to resolve the conflicts where they exist, as doing nothing could result in the community taking matters into their own hands, or in a potential adverse impact on the very features that define the Wollongong coastline and are used as a major drawcard for the region. The challenge is how this can be done while protecting all the values important to the community, in the short as well as in the longer term.

## Management Challenges for Council

Council's view is that the existing conflicts can be resolved by restoring a balance in the extent of the dunes and vegetation so that all the values (economic, recreational, and ecological) can be realised and protected. However, the challenge is in determining what this balance is, as there can be no guarantee that any proposed design will deliver the desired objectives.

Even if the optimum balance can be determined, the next challenge is in creating and maintaining these conditions on the ground. This could involve stripping back of some of the vegetation, reprofiling and creation of new dune and vegetation profiles in the affected areas. These sorts of activities are not conventionally done in dune management programs, and there are a number of risks associated with this approach:

- Removing vegetation from one section of the dune could undermine the integrity of the entire dune, and increase the exposure of the back beach assets to coastal hazards;
- The onset of a storm during the works or before the new profile has time to get established could undermine any remedial work undertaken.
- The remedial works could result in an equilibrium dune profile that creates further problems elsewhere; and
- The maintenance requirements of sustaining the preferred dune profiles are difficult to predict.

In spite of these risks, Council has resolved to trial some remedial actions in a limited number of places. These trials are to be accompanied by an intensive beach and dune monitoring program to assist in understanding the effectiveness of the intervention actions, and in planning future dune management actions.

## Conclusions

A values-based assessment of the community concern about the condition of dunes and vegetation along the Wollongong coastline showed that there is some justification that they can have a negative impact on the recreational amenity of the local beaches. However, a response to this concern requires careful consideration of the impact of any action on all the coastal values of this area, and not just its recreational value. Council is conscious of the need to proceed with caution, and that in solving one problem, other serious problems are not created for the community. Monitoring the response to trialled management intervention can assist in achieving sustainable outcomes for future actions.

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