

# Visitor Attitudes and Erosional Impacts on the Coast Walk, Royal National Park

DEIRDRE DRAGOVICH AND SUNIL BAJPAI

School of Geosciences F09, University of Sydney, NSW 2006  
deirdre.dragovich@sydney.edu.au; sunil.bajpai@sydney.edu.au

Published on 3 September 2012 at <http://escholarship.library.usyd.edu.au/journals/index.php/LIN>

Dragovich, D. and Bajpai, S. (2012). Visitor attitudes and erosional impacts on the Coast Walk, Royal National Park. *Proceedings of the Linnean Society of New South Wales* **134**, B113-B118.

National Parks preserve native fauna and flora and provide recreational opportunities for visitors. However, eroded and degraded trails threaten the ecological integrity of Parks and diminish their recreational, aesthetic, cultural and educational value. Pathway erosion has the potential to divert visitors' attention from the enjoyment of nature and to make travel uncomfortable, difficult or unsafe. Problems of recreational use in protected areas are known to be a function of user numbers and visitor attitudes and behaviour. This research surveyed 100 users of the 26 km long Coast Walk. Most Park visitors were from Sydney and nearby regions (88%), many were young adults (37%), and a high proportion of visitors had tertiary qualifications (66%). Visitors were mainly attracted to the Park for the beauty of nature (77%) and the desire to exercise (49%). Most visitors noticed erosion on the trails: 91% of 'Frequent' visitors were aware of erosion and 75% of 'First time' visitors. Almost half of the users (43%) indicated that they have sometimes trampled vegetation in their attempt to avoid uneven walking surfaces. A well-maintained, well-indicated and even-surfaced walking track will be perceived as safe and comfortable to walk on, thereby reducing erosion-related degradation of pathways and damage to surrounding vegetation.

Manuscript received 22 November 2011, accepted for publication 10 May 2012.

**KEYWORDS:** erosion impacts, recreation management, resource protection, Royal National Park, soil erosion, trails, trampling

## INTRODUCTION

Recent years have seen worldwide concern, growing public awareness of and a positive political will for nature conservation. In 1962, protected areas covered 3% of the Earth's land surface: by the early 2000s they encompassed 12% or 18.8 million km<sup>2</sup> (Bushell et al. 2007). However, the reality is that mere designation of an area as protected does not ensure its preservation. The conservation objective in protected areas can become seriously undermined due to adverse resource impacts resulting from overuse and/or inappropriate management (Hohl and Tisdell 1995; Wanhill and Buhalis 1999). In recent years, nature-based tourism, recreation and ecotourism have experienced significant growth (Coccosis, 2004; Worboys et al. 2005). This trend is expected to continue due to increasing environmental/nature awareness in people (Papayannis 2004) and the anticipated increase in leisure time for most working

persons. Thus, visitations to protected areas can be expected to grow significantly. Although an increase in tourism tends to reflect improvements in economic conditions and the generation of lifestyles with greater leisure time, protected areas are required to justify a dual mandate: they are legislated to balance both conservation and recreational objectives. An example of such legislation in Australia is the *Wilderness Act 1987 (NSW)*, Section 6(1). The Act states:

*An area of land shall not be identified as wilderness by the Director unless the Director is of the opinion that –*

- (a) *the area is, together with its plant and animal communities, in a state that has not been substantially modified by humans and their works or is capable of being restored to such a state,*
- (b) *the area is of a sufficient size to make its maintenance in such a state feasible, and*

## IMPACTS ON A TRAIL IN ROYAL NATIONAL PARK

(c) *the area is capable of providing opportunities for solitude and appropriate self-reliant recreation.*

Management plays a critical role in facilitating attainment of the dual mandate (Cole and McCool 1997; Bruner et al. 2001; Gager and Conacher 2001; Worboys et al. 2005). Therefore, it is imperative that protected areas be strategically and scientifically managed so that the challenges faced by these areas, such as adverse impacts arising from significantly increased visitations, are adequately addressed. This will allow the benefits from conservation to be maximized, and at the same time degradation and conflicts arising from recreational use minimised.

One of the serious management concerns connected with recreational use of protected areas is erosion on access trails (Fig. 1). Development of informal or unauthorised trails and deterioration of existing formal trails in such areas have damaging environmental effects through erosion and consequent degradation of soils, vegetation and water quality. Erosion rates on Park trails are accelerated by human

activities that amplify naturally-occurring erosion. In addition, eroded and degraded trails have the potential to diminish visitors' perception of nature and are uncomfortable, dangerous or unsafe for walking (Cole 1981; Grieve et al. 1995; Leung and Marion 1996; Gager and Conacher 2001).

Trails represent access networks in a Park. They are used by Park employees for management activities, and by Park visitors for recreational purposes. From a management perspective, trails are a means of presenting recreational opportunities to visitors along aesthetically pleasing routes in a Park. Moreover, trails play a vital role in resource protection. They keep visitors on a particular pathway and direct them to certain areas thereby shielding other valued and sensitive ecosystems (Leung and Marion 1996; Gager and Conacher 2001). However, trails start to erode and degrade under continuous use (Bayfield 1985; Lance et al. 1989; Legg 2000). A prime cause of accelerated rates of erosion on Park access trails is trampling. Trampling removes or significantly reduces the vegetation cover and exposes the underlying soil. Exposed soil surfaces are



**Fig. 1** An eroded and degraded sandy section of the Coast Walk, Royal National Park

considerably more vulnerable to agents of erosion – wind and water – than are vegetated surfaces. Moreover, trampling on clayey and silty soils causes compaction, the most common and prominent form of damage resulting from human activity. Trampling also leads to structural degradation by churning in saturated soils and sands. A compacted or saturated soil surface increases local runoff and leads to accelerated rates of erosion on access tracks (Quinn et al. 1980; Calais and Kirkpatrick 1986; Garland 1987; Bhuju and Ohsawa 1998; Toy et al. 2002), whereas loosened sandy surfaces become prone to both water and wind erosion.

Pioneering work relating to the impacts of recreational activities on natural ecosystems began with Bayfield (1971, 1973). His studies dealt specifically with the effects of trampling-generated erosion on vegetation and soil, and identified positive correlations between trampling and destruction of vegetation. The formation of unauthorised trails and degradation of existing trails was attributed to increased recreational use by walkers. Furthermore, most visitors exhibited a consistent track use pattern which added to the erosion impetus, including trampling of vegetation to avoid uncomfortable sections of a trail, and stepping laterally to avoiding wet surfaces on a trail thereby causing widening and/or creating additional “nested” paths. Hence, eroded and degrading trails seriously undermine both of the prime protected area management objectives of conservation and recreation.

The popular 26 km Coast Walk in the Royal National Park (RNP) has sandy, clayey and stony sections. On the basis of field observations, this study assessed erosion patterns on track sections (sites) on the Coast Walk by classifying sites as having low, moderate or high erosion levels. A visitor survey was conducted to investigate if visitor activities (attitude and behaviour) were related to the extent of pathway erosion.

## RESULTS AND DISCUSSION

One hundred visitors were surveyed with a questionnaire. The survey was conducted by the second author at various locations along the Coast Walk. Apart from visitors who were less than 18 years of age, everybody who was in the vicinity of the researcher was approached and requested to take the survey. Most visitors agreed to participate in the survey, only three people who were returning late to catch the ferry declined. The questionnaire had 22 questions designed to seek information about visitor

demographics, motivations for visiting RNP, activities in the Park, walking experience on the Coast Walk and desirable walking conditions on the Coast Walk.

Gender composition of the visitor mix was found to be approximately equal, with the 47% (n=47) of females closely matched by males (53%, n=53). A total of 39% of female and 34% of male visitors were in the age group 18-30 years, making this age category the principal one, with a total of 37% of all surveyed visitors. However, if the age group categories of 31-40 (male 23%, female 22%) and 41-60 (male 30%, female 22%) were aggregated into one category for the “middle aged”, this amalgamated group would have the single largest proportion of visitors, namely 48% or nearly half of all the visitors. These results suggest that recreation in natural areas is popular among young adults and middle aged visitors of both genders.

Most visitors (88%) were from Sydney and nearby areas, with only 12% of visitors from elsewhere (1% from other states in Australia and 11% from overseas). At 11% the number of international tourists was of interest because, although the number of their park visits throughout NSW is much lower than for domestic visitors, the proportion of international tourists visiting a national park (75%) is relatively high (NSW Department of Environment and Climate Change 2008).

Most visitors (60%) had used a car as their mode of transport to reach RNP. However, nearly one-third of visitors (30%) had made use of public transport. Such details are useful when planning resources such as parking places and/or public transport facilities. The majority of visitors (66%) had tertiary qualifications (degree holders) and were professionals by occupation; 12% of visitors had vocational qualifications (TAFE) and were tradesmen; and 5% of the visitors were retirees. Most visitors (73%) were in the company of friends when in the Park, and their group sizes ranged from 2 to 4 persons. Family groups (13%, usually a group size of 4), were found to be the next most popular formation in which visitors were found in RNP. However, there were also visitors who accessed the Park independently i.e. alone (10%).

The questionnaire provided various possible reasons for visiting RNP and respondents were asked to indicate how important each reason was to them. The beauty of nature was deemed to be the most important motivation of those listed: 77% of the visitors indicated that they were mainly attracted to RNP for this reason. The desire to exercise was given by 49%. Also, “to get away from the pressures of life” (48%) and “to relax with family and friends” (47%) were important considerations for visitors (Table 1).

## IMPACTS ON A TRAIL IN ROYAL NATIONAL PARK

**Table 1 Motivations for visiting Royal National Park**

Reasons	Very Important	Quite Important	Not Very Important	Not Important
To observe the beauty of nature	77	18	1	4
To exercise	49	29	14	8
It's a peaceful and spiritual experience	43	34	11	12
To relax with family and friends	47	32	6	15
To picnic with friends or relatives	18	26	23	33
To observe aboriginal art forms	9	20	35	36
To observe native plants and animals	51	33	9	7
To get away from the pressures of life	48	29	8	15

Many visitors (27%) went to the Park four or five times a year and were classified here as 'Frequent' visitors. Another 11% visited weekly, fortnightly or monthly. Thirty-eight percent of the surveyed visitors were visiting RNP for the first time and are here referred to as 'First timers'. Although it is not known what proportion of these 'First timers' will become frequent visitors, their numbers suggest that RNP visitation is likely to continue increasing and that the Park's managers need to monitor resource use in preparation for this eventuality.

Visitor perceptions relating to erosion and degradation on the Coast Walk also were investigated. A large majority of visitors (84%) confirmed they noticed erosion on the Coast Walk: 91% of 'Frequent' visitors were aware of erosion and 75% of the 'First time' visitors. As responses were anonymous it was not possible to conduct a follow-up investigation to determine whether the same 'First time' visitors became more aware of erosion after repeat visits to RNP. A subsequent question related to visitors' understanding about this erosion and was assessed by a description of the Coast Walk surface. A majority of visitors (77%) described the Coast Walk surface as 'Occasionally rough and with boulders, but more or less safe to walk on' and 6% considered the surface as 'Even and safe to walk on'. Of the remaining visitors, 16% described the Coast Walk as having 'Some sections quite rough and unsafe to walk on' and 1% as 'very damp and slippery'. However, no visitors indicated 'The track is not safe to walk on'.

Visitors were then asked about their walking experience on the Coast Walk, and specifically whether they sometimes had to trample vegetation in order to avoid unsafe or uncomfortable surfaces. Nearly half of the respondents (43%) agreed to having done this and most of these (86%) went on to say that erosion makes some track sections difficult or unsafe

to walk on. Such a pattern of walking behaviour allows existing erosion to continue on the main pathway and adds further opportunity for erosion on the widened revegetated areas. Where erosion is in the form of rills or gullies, these may enlarge laterally as a result of adjacent new pathways also becoming loci of erosion.

In order to further understand visitor attitudes and behaviour, visitors were asked if they would like the track to be more direct and shorter, or wider. The majority of visitors (94%) did not want the track to be shorter or more direct and most of the visitors (74%) indicated that they do not wish the track to be wider. Of those who would prefer a wider track, 11 of the 26 were 'First time' visitors. Lack of familiarity with RNP therefore did not appear to influence attitudes about this aspect of track provision.

Visitors were then asked to give their opinion about information systems and signage in RNP. Signage was found to be particularly important and informative. A large number of visitors endorsed the importance of 'Signs on the track' (85%), 'Information boards' (75%) and 'Pathway direction indicators' (82%). Such a response from visitors seems to indicate that they would like to remain on the track and find signage in this regard very useful.

Based on responses visitors provided in this survey it would appear that: (a) a majority of walkers or track users do not wish the track to be wider or shorter, and would remain on the main pathway so long as they continued to meet favourable walking conditions in the form of comfortable and even walking surfaces; and that (b) signage and information systems in RNP help visitors to remain on the main track. Conversely, visitors stray from the track or step laterally when uncomfortable or unsafe conditions are present on the track, when they do not know which of the tracks is the main track, or where a poorly signposted track is

not obvious. These situations lead visitors to trample vegetation adjacent to the track, thereby contributing to trail widening, formation of nested trails and/or informal trails.

The key implication for management is that a well-maintained, well-indicated and even-surfaced walking track will most probably keep walkers on a track, hence mitigating erosion-related degradation. It is most likely that an even track surface would be perceived by walkers as safe and comfortable to walk on.

### CONCLUSION

National parks are required to meet both conservation and recreation objectives. People visit parks primarily in order to enjoy the beauty of nature but also to exercise, get away from the pressures of life, and to relax with family and friends. Although they provide visitors with access to parks, walking trails often contribute to accelerated erosion and vegetation loss through trampling. Also, the majority of 'Frequent' and 'First time' visitors noticed erosion on trails but they did not favour wider trails or more direct routes. Visitors' appreciation of signage suggests that well-indicated and well-maintained tracks improve visitor experience and safety. By limiting informal trail widening and formation of new or parallel paths, clearly indicated and smooth-surfaced trails also will assist in minimising damage to sensitive ecosystems in the RNP.

### REFERENCES

- Bayfield, N.G. (1971). A simple method for detecting variations in walker pressure laterally across paths. *Journal of Applied Ecology*, **8**, 533-536.
- Bayfield, N.G. (1973). Use and deterioration of some Scottish hill paths. *Journal of Applied Ecology*, **10**, 633-644.
- Bayfield, N.G. (1985). Effects of extended use on footpaths in mountain areas of Britain. In 'The Ecological impacts of outdoor recreation on mountain areas in Europe and North America' (Eds N.G. Bayfield and G.C. Barlow) pp. 100-110. (Nature Conservancy Council: Peterborough, UK).
- Bhujju, D.R. and Ohsawa, M. (1998). Effects of nature trails on ground vegetation and understory colonization of a patchy remnant forest in an urban domain. *Biological Conservation*, **85**, 123-135.
- Bushell, R., Staiff, R. and Eagles, P.F.J. (2007). Tourism and protected areas: benefits beyond boundaries. In 'Benefits Beyond Boundaries: Proceedings of the 5th IUCN World Parks Congress' (Eds R. Bushell and P.F.J. Eagles) pp. 1-11. (CAB International: Wallingford, UK).
- Bruner, A.G., Gullison, R.E., Rice, R.E. and Da Fonseca, G.A.B. (2001). Effectiveness of Parks in protecting tropical biodiversity. *Science*, **291**, 125-128.
- Calais, S.S. and Kirkpatrick, J.B. (1986). Impact of trampling on natural ecosystems in the Cradle Mountain-Lake St Clair National Park. *Australian Geographer*, **17**, 6-15.
- Cole, D.N. (1981). Vegetation changes associated with recreational use and fire suppression in the Eagle Cap Wilderness, Oregon: some management implications. *Biological Conservation*, **20**, 247-270.
- Cole, D.N. and McCool, S.F. (1997) Limits of acceptable change and related planning processes: a workshop. In 'Proceedings - Limits of acceptable change and related planning processes: progress and future directions' (Eds P. McCool, F. Stephen and D.N. Cole) pp.1-2. (U.S. Department of Agriculture, Forest Service: Rocky Mountain Research Station, USA).
- Coccosis, H. (2004). Sustainable tourism and carrying capacity: a new context. In 'The Challenge of Tourism Carrying Capacity Assessment: Theory and Practice' (Eds H. Coccosis and A. Mexa) pp. 2-14. (Ashgate: UK).
- Gager, P. and Conacher, A. (2001). Erosion of access tracks in Kalamunda National Park, Western Australia: cause and management implication. *Australian Geographer*, **32**, 343-357.
- Garland, G. (1987). Rates of soil loss from mountain footpaths: an experimental study in the Drakensberg Mountains, South Africa. *Applied Geography*, **7**, 41-54.
- Grieve, I.C., Davidson, D.A. and Gordon, J.E. (1995). Nature, extent and severity of soil erosion in upland Scotland. *Land Degradation and Rehabilitation*, **6**, 41-55.
- Hohl, A.E. and Tisdell, C.A. (1995). Peripheral tourism: development and management. *Annals of Tourism Research*, **22**, 517-534.
- Lance, A.N., Bough, I.D. and Love, J.A. (1989). Continued footpath widening in the Cairngorm Mountains, Scotland. *Biological Conservation*, **49**, 201-214.
- Legg, C. (2000). Review of published work in relation to monitoring of trampling impacts and change in montane vegetation. *Scottish Natural Heritage Review*, No. 131.
- Leung, Y-F. and Marion, J. L. (1996). Trail degradation as influenced by environmental factors: a state-of-the-knowledge review. *Journal of Soil and Water Conservation*, **51**, 130-136.
- NSW Department of Environment and Climate Change (2008) 'New South Wales Taskforce on Tourism and National Parks: Final Report'. (New South Wales Department of Environment and Climate Change: Sydney).

## IMPACTS ON A TRAIL IN ROYAL NATIONAL PARK

- Papayannis, T. (2004). Tourism carrying capacity in areas of ecological importance. In 'The Challenge of Tourism Carrying Capacity Assessment: Theory and Practice' (Eds H. Coccossis and A. Mexa) pp. 151-161. (Ashgate: UK).
- Quinn, N.W., Morgan, R.P.C. and Smith, A.J. (1980). Simulation of soil erosion induced by human trampling. *Journal of Environmental Management*, **10**, 155-165.
- Toy, T.J., Foster, G.R. and Renard, K.G. (2002). 'Soil erosion: processes, prediction, measurement, and control.' (John Wiley & Sons Inc.: New York).
- Wanhill, S.T. and Buhalis, D. (1999). Introduction: challenges for tourism in peripheral areas. *International Journal of Tourism Research*, **1**, 295-297.
- Worboys, G., Lockwood, M. and De Lacy, T. (2005). 'Protected Area Management: Principles and Practice', second ed. (Oxford University Press: Oxford, UK).