



Perspective

Appropriate policy development and research needs in response to adventure racing in protected areas



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ABSTRACT

Adventure racing is a global activity occurring across a range of land tenures. Activities include running, mountain biking, kayaking and rope courses which may be commercially sponsored and involve hundreds of competitors and spectators. This paper raises awareness about the potential environmental impacts of such activities and sporting events taking place in protected areas. Participants in adventure racing are likely to be focused on risky, thrill-seeking activities where the overall goal is to complete the event as quickly as possible. Such a philosophical standpoint and competitive attitude towards the environment is therefore likely to be sub-optimal in terms of such visitors appreciating the natural values and conservation function of a protected area. The rapid increase of adventure racing and its possible impacts on the environment as well as social aspects are thus considered in the context of research needs and policy development. This analysis demonstrates that there is a lack of data concerning the impacts of adventure racing on conservation values, environmental resilience, wildlife disturbance and ecotourism importance where sporting activities take place in a protected area. Because protected areas, such as national parks, play an important conservation and passive recreation function the issue of appropriate use of such lands is a cause for concern. There is a call for a research agenda that explores the approvals process set amongst the context of appropriate park management capacity and existing recreational impacts. There is an urgent need for policy guidelines that can assist managers make the best environmental decisions.

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1. Introduction

Adventure racing is a global activity with widely publicised events taking place in Malaysia, Australia, New Zealand, Canada,

Spain, Costa Rica, Ecuador, Argentina and South Africa in 2013. Activities include running, mountain biking, kayaking and rope courses, which may take place over a period of 3–5 days (e.g. AdventureRace.com.au, 2013; Events.com, 2013). There can be several hundred competitors participating in such events, which are supported by crews and viewed by spectators ([Newsome and Lacroix, 2011](#); [Newsome et al., 2011](#)). Such events take place in a

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range of environments including urban landscapes, transportation corridors, along disused railway tracks, on private property, in mixed-use landscapes such as production forestry and in protected areas (e.g. Australia, [Adventure Race Calendar KMS events, 2013](#); Australia, [Glow Worm Tunnel Trail Run Weekend, 2013](#); Australia and New Zealand, [Jetstar Magazine, 2012](#); UK, [Men's Health Survival of the Fittest, 2013](#); Australia, [Tough Mudder, 2013](#)).

[Arnegard and Sandell \(2012\)](#) describe the adventure-racing trend in park usage as the 'sportification' of nature where being in the natural environment is characterised by a personal competitive attitude rather than a passive contemplative approach. [Arnegard and Sandell \(2012\)](#) also posit that alongside this trend is an increasing detachment from the environment. [Newsome et al. \(2011\)](#) and [Newsome et al. \(2013\)](#) have also expressed concern about sporting activities, and especially organised sporting events taking place in natural environments and raise questions regarding biophysical and social impacts, management capacity to adequately supervise such events and the appropriateness of such organised activities taking place in protected areas. In addition to this, [Newsome and Lacroix \(2011\)](#) have called for an increased dialogue in connection with the trend towards sportification and in relation to the dilemma faced by many protected area agencies as to whether to sanction an activity or event in a particular protected area.

The main objective of this paper is to highlight that adventure racing has become part of the recreation and tourism profile of a significant number of protected areas and to consider adventure racing as an environmental issue from the perspective of physical environmental impacts and the potential impacts on park values and other (non-sporting) protected area users. A further aim is to provide a perspective on the development of policy in regard to the approvals process when management and stakeholders are discussing whether to sanction such activities in protected areas in the future.

2. Adventure racing as an environmental issue in protected areas

Protected areas have been established for the purpose of conserving nature and related ecosystem services of which recreation and tourism are important uses ([IUCN, 2012](#)). In 2010, 12.2% of all terrestrial ecosystems were in designated protected areas across seven categories including wilderness areas, national parks and protected landscapes ([WDPA, 2012](#)). National parks, for example, are created and managed to conserve natural landscapes, protect flora and fauna and provide for recreational opportunities. Globally most protected areas, and especially national parks are the focus of substantial, and in many cases, increasing recreational and tourism interest. It is estimated that at the global scale there were 990 million tourists in 2011 with protected areas being key attractions to at least 20% of this group ([Buckley, 2009](#)). [Balmford et al. \(2009\)](#) also report that, despite some apparent downturns in park visitation in the USA and Japan, nature based tourism has continued to increase in most of the protected areas and countries sampled in their study.

This large group of people interested in visiting and recreating in natural areas constitutes a complex demographic of users. The intentions and attitudes of these users range from passive recreationists, such as bird watchers and those who are hiking for the enjoyment of nature, at one end of the spectrum, through to those people in search of excitement, action and adventure and extreme sports activists at the opposite end of the spectrum. In latter years the adventure category has become highly developed and is organised into locally to internationally marketed and commercially sponsored adventure racing and sporting events which can also

receive support from government agencies ([Arnegard and Sandell, 2012](#); [Burgin and Hardiman, 2012a](#); [Newsome and Lacroix, 2011](#); [Newsome et al., 2011](#)).

[Newsome et al. \(2011\)](#) provide some insight into the scale and extent of such organised sporting events in one geographic area (Australia) and note that an unspecified, but a large, number of events take place in Australian protected areas each year (for example, [AdventureRace.com.au, 2013](#); [Events.com, 2013](#)). Such events usually comprise a running and mountain biking component but may also involve abseiling, rock climbing, canoeing, and horse riding. All of these activities can confer impacts ([Table 1](#)) and especially where individuals undertake them in natural environments (see [Newsome et al., 2013](#) for overview) but the nature of impacts will vary according to location, season, sensitivity of the environment and according to the nature and effectiveness of any management that is in place at the time ([Pickering et al., 2010](#)). But as indicated by [Newsome et al. \(2011\)](#) and [Newsome et al. \(2013\)](#) where the activity is part of an organised event the impact situation is potentially greater due to the presence of large numbers of competitors, spectators and support crews. Furthermore, there is the possibility of cross-country orienteering and rogaining segments where competitors may traverse untracked areas. Data pertaining to the biophysical and social impacts that may occur during these and other event activities are lacking.

The implications for protected area integrity could be significant where the visiting adventure oriented demographic is under pressure to win and where the sporting competitor wishes to finish in a good time and complete the course as quickly as possible. In such circumstances short cuts may be taken, care in avoiding sensitive vegetation may not be paramount and an aggressive competitive attitude towards the environment fostered ([Baker and Simon, 2002](#); [Newsome and Lacroix, 2011](#); [Puchan, 2005](#)). At the same time, managers appear to be under pressure from adventure racing organisers and lobby groups, tourism agencies, local communities and even politicians to approve sporting events and adventure racing on the grounds of protected area user equity, anticipated local community benefits and the wider economic benefits associated with international marketing and media exposure (e.g. [Queensland Government, 2012](#)).

Most protected areas are managed according to a management plan developed by supervising government agencies with some private reserves being managed by non-government organisations (e.g. [Lockwood et al., 2006](#); [Government of WA, 2013](#); [Australian Wildlife Conservancy, 2013](#)). Clearly, besides managing general aspects of the natural environment such as flora, fauna, feral animals, weeds and outside pressures, such plans also make provision for tourism and recreation. In protected area management plans there are often guidelines that specify recreation and tourism opportunities, the nature and mode of park access and visitor services. Accordingly there can be specific criteria for managing tourism and recreation such as providing for water-based activities, abseiling and rock climbing, cycling and special events. These criteria can include provision for site-based infrastructure for the management of a specific activity, determination of activity routes and codes of conduct (e.g. [DEC, 2010](#)).

Natural resource and park managers are responsible for supervising tourism and park rangers and support staff normally carry out recreation policy and environmental management and operations in the field, which includes liaising with the public. The management of, and issues associated with, recreation and tourism in protected areas encompasses a diverse and complex array of actual and predicted impacts, planning frameworks and management strategies. However in terrestrial protected areas there are already many widely recognised problems such as trail degradation, creation of informal trail networks,

Table 1
Environmental impacts that could be linked to adventure racing and sporting event activities.

Potential activities	Activity specific issues/impacts	Accounts of impacts	Impact research relating to adventure racing events
Walking/ Running	Trail degradation, trampling of vegetation and loss of soil cover Boots, socks and other clothing items can spread large numbers of weed seed from a wide variety of species. It is also likely that shoes spread fungal pathogens including root rot fungus (<i>Phytophthora cinnamomi</i>) in Australia. Spread of pathogens in human waste, increased nutrification from human waste	Kuss et al. (1990), Sun and Liddle (1993), Cole (1995a, 2004), Leung and Marion (1996), Liddle (1997), Buckley (2004), Marion and Leung (2004), Bridle and Kirkpatrick (2005), Potito and Beatty (2005), Turton (2005), Hill and Pickering (2006), Mende and Newsome (2006), Bridle et al. (2007), Randall and Newsome (2008), Hill and Pickering (2009), Pickering and Growcock (2009), Torn et al. (2009), Monz et al. (2010), Pickering et al. (2010, 2011), Pickering and Mount (2010), Steven et al. (2011) and Wimpey and Marion (2011)	No data on orienteering, rogaining and trail degradation associated with event activities (participation, spectator presence and presence of support crews and facilities)
Mountain biking	Trail degradation, damage to vegetation and loss of soil cover Likely spread of weeds and pathogens on tyres, but limited actual research Damage from the construction and use of trail technical features Wildlife disturbance	Liddle (1997), Marion and Wimpey (2007), Newsome and Davies (2009), Pickering et al. (2010), Pickering et al. (2011), Burgin and Hardiman (2012a,b)	No data on trail degradation associated with event activities (participation, spectator presence and presence of support crews and facilities)
Abseiling, climbing	Damage to fragile vegetation and lichens growing on cliffs. May also displace nesting birds depending on location	Giuliano (1994), Camp and Knight (1998), Kelly and Larson (1997), Cater and Hales (2008), Marion et al. (2011) and Vogler and Reisch (2011)	No data
Camping	Damage to vegetation and loss of soil cover, creation of informal trails and firewood collection. May involve deliberate alteration to the site such as creation of campfires and fire scar development	Cole (1992, 1995b), Liddle (1997), Smith and Newsome (2002), Cole and Monz (2003), Smith (2003) and Cole (2004)	No data on orienteering, rogaining and trail degradation associated with event activities
Canyoning, white water rafting, swimming	Often in remote 'pristine' water bodies where few other impacts. Damage includes aquatic system, but also to vegetation and soils at access points. Introduction of pollutants including from human waste, but also sunscreens etc.	Liddle (1997), Turton (2005), Hadwen et al. (2005, 2008), Hardiman and Burgin (2011)	No data on degradation associated with event activities
Horse riding	Trail degradation, trampling of vegetation and loss of soil cover. Has higher impact per user than mountain biking, walking and running due to large weight per unit area. Increased nutrification from horse dung and spread of weeds and pathogens in dung and on fur	Liddle (1997), Newsome et al. (2004, 2008), Pickering and Mount (2010), Pickering et al. (2010)	Few data available on a recent horse-riding event that took place on formed and hardened paths/roads in Australia. No data on events taking place off road in highly valued natural settings
Disturbance to wildlife	Impacts on behaviour (feeding and breeding activity), activity budgets, wildlife abundance, distribution and occupancy of wildlife and the survival of wildlife	Erwin (1980), Williams and Forbes (1980), Boyle and Sampson (1985), Korschen et al. (1985), Morton et al. (1989), Belanger and Bedard (1990), McNeil et al. (1992), Klein (1993), Knight and Gutzwiller (1995), Gutzwiller et al. (1997), Miller et al. (1998), Taylor and Knight (2003), Steven et al. (2011) and Burgin and Hardiman (2012a,b)	No data on wildlife specific impacts in the context of an adventure race/sporting event taking place in a protected area
Social impacts	Crowding, noise and littering	Manning et al. (1996) Tao et al. (2004) Vaske and Shelby (2008) Pilcher et al. (2009) Newsome and Lacroix (2011)	No data on displacement of passive users/user conflict

Table 2

Examples of adventure racing events that take place in protected areas, national parks and World Heritage listed areas.

Country	Protected area	Event/s	Activities
Malaysia (Sabah)	Kinabalu National Park	Sabah Adventure Challenge (2013) Mt Kinabalu International Climathon (2013) Kinabalu Challenge-Jungle Adventure Race (2011)	<i>The Kinabalu Challenge-Jungle Adventure Race:</i> Running Trekking Mountain biking Kayaking Rafting Helicopter transport
Australia	Porcupine Gorge National Park (Queensland) Vicinity of Baw Baw National Park alpine environment Leeuwin-Naturaliste National Park	Porcupine Gorge Challenge (2013) Mt. Baw Baw Trail Run Festival (Brooks Trail Run Festival, 2014) Anaconda Adventure Race (2012)	Trail running Three days of trail running events Running Mountain biking Kayaking
Chile	Torres del Paine National Park	Patagonian Expedition Race (2012)	Trekking Mountain biking Kayaking Orienteering
United kingdom	Brecon Beacons National Park	10 Peaks Brecon Beacon event (Clif Bar 10 Peaks, 2013)	Ultra distance running/ hiking. Navigation important as there are no marked trails and competitors plot the quickest, safest route between the 10 highest peaks. Courses vary from 48 km to 89 km with up to 5600 m of ascent to be completed within 24 h
Iceland	Icelandic highlands	Iceland Running Adventure Race (2013)	Long distance running
South Africa	Mokala National Park	Mokala Rhino MTB Classic (2013)	Mountain biking
South Africa	Kgalagadi Transfrontier Park	Kgalagadi Desert Classic Riverbed Cycle Challenge (2013)	5 day event over 155 km. Support in the form of off-road vehicle access, use of mobile water tanks and toilets and camping activity
Canada	Canadian wilderness in Ontario	Wilderness Traverse (2013)	Wilderness racing and navigating a 150 km race area Trekking Mountain biking Kayaking

trampling of vegetation, soil erosion, the dispersal and spread of weeds and pathogens, disturbance to wildlife, conflicts between different park users and social impacts such as littering, crowding and the loss of tranquillity. Recreation and tourism activities that can result in these impacts include hiking, camping, patronage of day use area sites, mountain biking, horse riding and the use of all terrain vehicles (see [Table 1](#); [Newsome and Lacroix, 2011](#); [Newsome et al., 2013](#)).

Given the risks of impacts described above and that adventure race is becoming a well-established recreational use in many countries it may be prudent to question whether adventure racing is an appropriate activity for a particular protected area. If running and mountain biking events are sanctioned by managers and influential stakeholders the question arises as to what criteria should be employed in the decision making process? Does management have the resources and capacity to manage such events and how do we gauge the acceptability of impacts or otherwise of such events taking place over time?

3. Suggested criteria for policy development, identification of research needs and associated management actions

The impacts highlighted in [Table 1](#) provide a platform for raising concern, investigating protected area integrity and understanding the possible impacts of adventure racing and commercially sponsored sporting events that are sanctioned in protected areas. The environment/activity relationship can be understood in terms of briefly profiling some events that take place in a contrasting range of protected areas ([Table 2](#)).

3.1. Conservation value of the site

The need to preserve conservation values, and the risks associated with recreational use in reserved areas, is highlighted by [Landsberg et al. \(2001\)](#), [Pickering \(2010\)](#) and [Newsome et al. \(2013\)](#). For example, in developing principles to guide the management of horse riding in remnant vegetation [Landsberg et al. \(2001\)](#) suggested the exclusion or physical separation of horse riding activity in Canberra Nature Park in Australia. [Pickering \(2010\)](#) considers conservation value as a factor in understanding and predicting the severity of visitor activity in protected areas. In particular she notes that the type of activity is also significant and that the relative importance of hikers, cars, bikes and horses need to be taken into account. Given that adventure racing frequently comprises runners and mountain bikers who may compete overnight in a natural area, coupled with spectator presence there is the risk of trampling trailside vegetation and competitors going off-track. Where large numbers of people are involved there is the potential for widespread trampling damage of vegetation and if declared rare flora or restricted plant communities are present any damage could be especially significant.

Mount Kinabalu, Sabah, Borneo is a World Heritage listed site exhibiting high biodiversity and high endemism. The mountain is a centre of plant diversity for the south-east Asian region and contains threatened and vulnerable species of plants and animals ([Jacobson, 1979](#); [Sabah Parks, 2012](#); [UNESCO, 2013](#)). The park functions as an important conservation reserve and tourism destination and is one of the most important *in situ* conservation sites in south east Asia and an iconic tourism destination for botanists, birdwatchers and hiking ([UNESCO, 2013](#); [WWF, 2003](#)). However,

part of the tourism recreation profile of Mt. Kinabalu involves the operation of a number of annual adventure racing events that comprise running, mountain biking and rafting (Table 2).

Given that adventure activities and extreme sports seek thrill, associated with speed, endurance and competition, as end products of the experience the likely attitude toward nature that is being fostered is moved away from appreciation/experience to one of mastery and competition (Baker and Simon, 2002; Carnicelli-Filho et al., 2010; Ewert et al., 2006; Newsome and Lacroix, 2011; Newsome et al., 2011). Local environmental conditions predispose the mountainous protected areas such as Mt. Kinabalu to degradation risk. Important environmental criteria include steep slopes, high rainfall and specialised edaphic communities such as on ultramafic rocks. Accordingly, the risk of environmental damage is likely to be significant if trails become degraded, competitors leave trail networks and due consideration not given to fragile plant communities such as the tropical zone alpine scrub zone on Kinabalu. Moreover, the same risks apply in different geographic contexts where adventure racing takes place as in the Australian Alps, Torres del Paine National Park (South America), Brecon Beacons National Park (UK) and in the Icelandic highlands (Table 2).

The putative impacts documented in Table 1, especially when combined with traditional tourism pressures, therefore can become a risk to ecological values and the conservation importance of protected areas where adventure racing takes place (e.g. Table 2). Buckley (2002) in discussing principles for tourism in protected areas made the important point that parks are critical for conservation and that parks are underfunded. Most important, Buckley (2002) also stated that parks are for conservation first with recreation being secondary to this important function; that only low impact tourism should be allowed and that commercial interests should meet the costs they impose on parks. This view has recently been reiterated by Ritchie et al. (2013), who are of the opinion that Australia's reserve system is underfunded, and the focus should be on conservation rather than using protected areas as playgrounds. Accordingly the conservation value of a site is a critical factor in deciding whether to sanction sporting events and adventure racing in a given protected area.

3.2. Ecological sensitivity and capacity for recovery

Newsome et al. (2011) provide an overview and identify key literature (also see Table 1) on the variables surrounding the impact potential of various types of recreation and adventure racing activities and under various environmental conditions. For example, the impacts of a race/event are likely to vary according to the number of participants involved, type of activities, location of the race and the attitudes of support crews and spectators. The response of different ecosystems will depend on seasonal factors as the risk of trail degradation and soil erosion will be greater in sloping environments and under wet conditions (e.g. Liddle, 1997). The season in which an adventure-racing event operates could determine the severity of particular impacts, for example in locations like Mount Kinabalu situated in the humid tropics with a marked wet season.

Where events take place is a particularly important consideration as ecosystems vary in their sensitivity (resistance and resilience) to trampling disturbance (Bernhardt-Römermann et al., 2011; Hamberg et al., 2008; Hill and Pickering, 2006, 2009; Liddle, 1997; Malmivaara-Lämsä et al., 2008; Pickering et al., 2010; Turton, 2005). Many adventure racing events target mountain environments (Malaysia, Australia, Chile, UK and Iceland; Table 2) that are of high conservation and passive recreational value. Furthermore, such environments contain rare and fragile plant communities, especially in subalpine and alpine zones

(e.g. Hamilton, 1995). Because of low temperatures and high soil leaching conditions facilitating the loss of nutrients many species exhibit slow growth patterns and low resilience to damage (for example, Bell and Bliss, 1973; Liddle, 1997; Wahren et al., 2001; Willard and Marr, 1971).

Torres del Paine National Park in Chile is subject to trekking, mountain biking and orienteering activities as part of the 10-day endurance Patagonian Expedition Race. Information derived from the event website indicates that the race traverses remote wilderness and 'dense forest far from any path' and 'a battle through dense forest, constantly going over and under logs, up and down steep mud slopes' and finally 'a kind of wetland you sometimes bounce across on soft vegetation but usually go through to the ankle or if unlucky to the knee' (Patagonian Expedition Race, 2012). The website description raises concerns regarding the behaviour of users, their attitude towards the environment and the creation of impacts. Moreover, recent work by Barros et al. (2013), focusing on mountain environments in Argentina, indicates that the trampling of wet organic soils can result in significant damage to soils and the plant community. They also note that the Andes have a distinct flora containing many unique genera and species and with low precipitation and cold temperatures conferring a slow recovery from disturbance.

Newsome et al. (2002, 2011) highlighted the sensitivity of Australian ecosystems primarily due to the extensive presence of soils with low nutrient levels, very low levels of organic matter, poor cation exchange capacities and a dominance of arid conditions. Many soils are also rich in colloidal iron and can be dominated by quartz with a medium and coarse sand content of 95% or more which make upper soil horizons prone to desiccation. Where clay is present it is composed of kaolinite, which has very poor surface properties and in many cases soils exhibit a duplex profile where sand overlies clay and lower soil horizons are prone to waterlogging (McKenzie et al., 2004). Flora has become highly adapted to these difficult soil conditions and many plants are characterised by surficial root networks and root clusters which are subject to trampling disturbance. Furthermore, Australian flora has developed many symbiotic relationships, for example near surface mycorrhizal root associations that are also subject to damage as a result of trampling (Newsome et al., 2002). The evolution of Australian plants under poor soil conditions renders the flora highly susceptible to damage in that they have low resistance to, and recover slowly from trampling (Costin et al., 2000; McDougall and Wright, 2004; Pickering and Hill, 2007; Pickering and Growcock, 2009). Hopper (2009) points out that the biodiverse plant communities of Western Australia and South Africa are particularly susceptible to soil disturbance and for effective conservation of such plant communities human disturbance should be minimised.

Given that the site selection process undertaken by the organisers of an event will be oriented towards accessibility, maximising challenge and excitement and then the location of control points and the viewing needs of spectator groups there may be not a lot of thought given to soils and vegetation which are susceptible to impact along the route. Some protected areas are going to be more sensitive to damage than others based on overall estimates/measures of resistance and resilience. Such information, however, in many instances is lacking (Buckley, 2013; Monz et al., 2013). Moreover, in most cases park staff will not have the baseline data on site condition for monitoring purposes that would allow effective estimates of impacts on highly sensitive ecosystems and populations of rare species to be made (Leverington et al., 2010; Newsome et al., 2013). The philosophical standpoint and specific requirements of an adventure racer is therefore likely to be, at best, sub-optimal in terms of the conservation function of a protected area.

3.3. Capacity of the event to disturb wildlife

Wildlife disturbance has been investigated in the context of ecotourism and wildlife viewing situations (or example, see [Higginbottom, 2004](#); [Newsome et al., 2005](#) for overviews) and this work is likely to be directly applicable to other types of recreational disturbance such as adventure racing. At the same time and relevant to the issue of adventure racing (see [Table 1](#)), wildlife responses to recreational disturbance such as impacts on animal behaviour and activity budgets, wildlife abundance, distribution and occupancy of wildlife and the survival of wildlife have been considered by [Burgin and Hardiman \(2012b\)](#), [Knight and Gutzwiller \(1995\)](#), [Steidl and Powell \(2006\)](#), [Steven et al. \(2011\)](#) and [Taylor and Knight \(2003\)](#). In particular there has been a number of studies concerned with the effects of recreational activity on birds (for example, [Burger, 1981](#); [Henson and Grant, 1991](#); [Kahl, 1991](#); [Klein, 1993](#); [Korschen et al., 1985](#); [Miller et al., 1998](#); [Owen, 1973](#); [Sekercioglu, 2002](#); [Steven et al., 2011](#)).

Work by [Taylor and Knight \(2003\)](#) was revealing in the observation that little relevant research had been conducted on the specifics of recreational disturbance to wildlife. Their work on bison, pronghorn antelope and mule deer showed that these species are displaced by mountain bikers and hikers and that 7% of the study area was deemed unsuitable for wildlife due to recreational disturbance. Perhaps more significant were the results of a social survey that indicated some 50% of recreationists were of the view that their activities were not impacting the wildlife.

Accordingly, given the characteristics of adventure racing and especially an organised event (large number of competitors, competitor attitudes related to personal achievement, noise, spectators and support crews) it is highly likely that disturbance of wildlife occurs. This situation also presents as a data deficient area in the context of adventure racing events taking place in protected areas. This point is especially relevant given the recent trend to organise such events in wildlife reserves in South Africa ([Table 2](#)).

3.4. Social and ecotourism significance of the site

In most countries one of the (or perhaps the most important) stated purposes of national parks is the protection of flora and fauna, and to enable people to learn about, and enjoy the natural environment and experience of parks ([Parks Australia, 2013](#)). Such a purpose centres on passive recreational pursuits. Protected areas are thus valued for their natural attributes such as naturalness, the capacity to see wildlife and scenic qualities. Recreational activities that centre on these values include short and long distance walking, cycling on formed tracks, visits to view points and areas of wildlife interest as well as visits to day use areas, camping and participation in small scale organised activities such as night walks, bird watching and guided touring ([Newsome et al., 2013](#)). Many protected areas are highly valued as tourism resources in that they provide the opportunity to see wild animals, natural vegetation, natural landscapes and opportunities to recreate for solitude and psychological rejuvenation. Many national parks are part of the destination image/experience profiling of many countries whose tourism agencies market passive outdoor activities, nature based tourism and wildlife experiences (for example, USA, South Africa, Australia, New Zealand, Sri Lanka, Malaysia, Ecuador and Costa Rica) (see [Nature Tourism Planning, 2005](#); [Lockwood et al., 2006](#); [ASEAN, 2012](#); [South African Tourism, 2013](#); [State of Queensland, 2013](#)).

[Caffyn and Prosser \(1998\)](#) list the positive terms that have been used in policy development in the management of British national parks. These terms include: quiet, remote, wild, solitude, peace, unspoilt and tranquil. Such terms also reflect the natural attributes of most protected areas in that human disturbance and

modification is at a minimum relative to agricultural and urban landscapes. These terms also form part of natural experiences as considered by [Newsome and Lacroix \(2011\)](#) that are to be enjoyed as part of a visit to a natural/protected area.

[Newsome and Lacroix \(2011\)](#) also discuss the degradation and potential loss of natural experiences (reduced solitude and tranquillity, reduced capacity to view wildlife, damage to biodiversity) especially in the context of regular, unmanaged and un-monitored adventure racing. Terms listed by [Caffyn and Prosser \(1998\)](#) that are used in a negative sense include: noisy, intrusive, disturbance, intensive and disruptive. Such terms may reflect the actual and perceived impacts of adventure racing in a protected area. Social impacts considered by [Newsome et al. \(2011\)](#) include noise, crowding and littering. Both noise and crowding are especially likely to impact on important protected area attributes such as quiet, perceptions of solitude, peace and tranquillity. Adventure racing therefore, needs to be placed in the context of likely impacts on the passive users of protected areas. Such users are people seeking natural experiences such as the appreciation of biodiversity, particular wildlife, quietness, solitude, peace, tranquillity and areas that are unspoilt rather than being disturbed, disrupted and noisy.

Many traditional and existing national parks users prefer solitude, engaging in wildlife observation and benefitting from an environment free of noise, littering and a dominance of human made structures (For example, [Ankre, 2009](#); [Bentrupperbäumer and Reser, 2001, 2002, 2003](#); [Deming, 1996](#); [Eagles, 1992](#); [Hvenegaard and Dearden, 1998](#); [Grau and Freimund, 2007](#); [O'Brien, 2005](#); [Pilcher et al., 2009](#); [Schanzel and McIntosh, 2000](#); [Tao et al., 2004](#); [Vaske and Shelby, 2008](#); [Vaske et al., 1996](#)).

The nature and philosophy of adventure racing is such that it is likely to result in crowding at designated start and finish points and spectator viewing areas. This will be especially so if it is a well recognised long standing and/or commercially sponsored and televised event. Noise may be derived from cheering and exuberant participants and spectators, organizer amplified announcements and vehicle noise. There is the capacity to generate wastes and litter especially if food outlets have been set up to provide for all in attendance. The commercialisation of a protected area for such purposes is counter to traditional passive uses and is likely to result in displacement of those visitors who prefer to engage in more eco-focused activities but this aspect of visitor use of protected areas remains unstudied in the context of any conflict between passive users and adventure racers.

Such conflict between adventure racing and traditional eco-focused use is evident in South Africa ([Table 1](#)). Mokala National Park is a new protected area located in the northern Cape. Promotional material advertises seclusion and wildlife viewing. In 2013 part of the tourist route was the setting for the The Mokala Rhino Classic Mountain Bike Race. A review of on-line discussion reveals that there are concerns about tourism accommodation being booked out by competitors, damage caused by the race and people indicating that they will not visit the park because of such events ([Africa Wild, 2013](#)).

Similarly there has been disquiet over the Kgalagadi Desert Classic Riverbed Cycle Challenge in the Kgalagadi Transfrontier Park. Public discussion centres on the loss of wilderness qualities and the 'real' purpose of national parks. On-line discussion notes the discordance between park rules and requests for visitors not to drive up sand ridges that are easily damaged. This is because at the same time park management is prepared to approve the mountain biking event. There is a call to ban such events from national parks ([Africa Wild, 2013](#)). Further analysis of on-line material (e.g. [Kgalagadi Desert Classic, 2011](#)) reveals that park management supports the event on the grounds that it is a way of marketing the park and generating funds for conservation. Marketing content includes the offer of a unique experience, the

opportunity to ride in the vicinity of predators and freely amongst animals in the park. Park managers and supporters of the event were of the opinion that they hoped that the Kgalagadi Desert Classic Riverbed Cycle Challenge would become a premier event in South Africa. Other stakeholders have noted that the event was not subject to formal Environmental Impact Assessment and that the riverbed where the event takes place is a sensitive habitat and that there was a lack of consultation with relevant experts (Reid, 2012).

The increasing trend for adventure racing groups to target protected areas may relate to the continuous search for new experiences that can be shared instantly via mobile phones, Facebook and Youtube (e.g. Burgin and Hardiman, 2012a). Various activities can be promoted this way and events organised very quickly at the local level. Events that are profiled via the Internet have the capacity to become bigger and more global in their scope as indicated by the wide availability of events from all over the world being promoted and visually accessible via Google. New activities may arise in this way as they are seen via websites and then trialled where they have not taken place before. This makes controlling and managing adventure racing a rapidly evolving and difficult activity to anticipate from a park management point of view.

4. The approval process and management capacity

Ritchie (1998) explored the issue of appropriate human use in Banff National Park, Canada. In particular he was interested in how the judgement of 'what is appropriate' is made. Ritchie (1998) posited that several considerations could be applicable, the first being scientific and functional and relating to ecological and social integrity. Ritchie (1998) termed the second consideration as value driven where an activity is judged according to accepted park values and the third, an experience driven factor, is where positive economic and social impacts such as visitor enjoyment can be realised. He then went on to acknowledge that because of these three different aspects of human interest the management of human presence in protected areas such as Banff National Park is likely to be very challenging. Burgin and Hardiman (2012a) recognise that the sportification of nature and especially the rising trend in extreme sports presents considerable challenges to protected area managers at the present time.

Ritchie (1998) went on to identify criteria that could be used in determining which activities may be appropriate in such a protected area. A questionnaire designed to capture the views of people from a wide range of backgrounds was used to establish the criteria for determining appropriate use and activities. He found that respondents gave high importance to the criterion of 'risk of damage to the environment'. Furthermore, it was found that respondents indicated that hiking, picnicking, bird watching and wildlife photography were deemed appropriate and ranked higher than activities such as mountain biking, relay or running races and outdoor concerts. For Calgary residents ($n = 400$), wildlife reserves, hiking, picnicking, bird watching and wildlife photography were judged to be highly appropriate for a national park, relay races moderately appropriate and activities like outdoor concerts and team Frisbee not appropriate. Ritchie (1998: 310) stressed, that in relation to policy development and effective environmental management, it was important to: *measure and understand the nature and intensity of all the impacts related to the behaviours/activities of all persons in the region at any given location and point in time*. Given the rapid rise in event activity in protected areas and the trend towards the sportification of nature there is an urgent need for such data (see Table 3). More than a decade ago Ritchie (1998) called for a better understanding of the environmental impacts of permitted activities in national parks.

Ritchie (1998) also asserted that all stakeholders must make an effort to reach a consensus about how various activities might be managed. This view did and still pertains to traditional passive and active (thrill seeking/event oriented) users alike. The current problem centres on the approval of certain uses in protected areas where conservation is an important function. It poses the question as to whether views on the use of protected areas have changed over time and given shortfalls in funding, such views are driven by economic considerations (e.g. Kgalagadi Desert Classic, 2011).

Commercially oriented decision making was identified by Coffey (2001) in the Australian context where a market segmented customer focus was being implemented where certain visitors will have their expectations met. Coffey (2001) went on to observe that such an approach changes the decision making process to one where values that the 'customer' sees (e.g. adventure experiences/thrill seeking) as being good may be at the expense of park values such as conservation.

It is useful at this point to return to Buckley (2002) who is of the view that conservation is the most important purpose of a park and that recreation should be secondary to this purpose. If sporting events and associated adventure racing meet approval by management what rules need to be applied to ensure that management of the activity is effective?

Given that Buckley (2002) recommends only low impact recreation because of the risks of certain recreation specific impacts it raises the whole question of appropriateness (as considered above by Ritchie, 1998) of event activity in protected areas such as national parks. It may be that certain parks are seen as more suitable to hold events than others but such a basis needs to be scientifically determined rather than just being a particular manager's view or sporting oriented value laden decision. Moreover there needs to be the capacity to manage such events in the form of appropriate facilities such as patent trail networks and ranger presence to oversee compliance. Management capacity is thus an important consideration. Leung and Marion (2000) have raised the important point that certain activities may be contained or prohibited when managing visitors and that the prohibition of high impact activities is an option in park management. Alternatively management can deem that an event takes place on approved trails according to an event management plan. For this strategy to be successful, however, trail networks need to be sustainable and able to resist the potential impact of an event.

Farrell and Marion (2001) in the context of Torres del Paine National Park (see Table 2) reported that trails in the Park were eroded and many informal trails were present. Furthermore, many trails in the Park were also poorly located, designed and managed. In addition to this Barros et al. (2013) note that trails in Aconcagua Provincial Park in Argentina have been poorly designed and the park agency lacks the funds to repair degraded trails and rehabilitate informal trails. Both examples highlight the importance of management capacity in the context of approving adventure activities in protected areas.

Baseline data and assessments of trail networks, which may be used for such adventure activities and events, are thus very important management requirements (Table 3). Event proposals need to be assessed in the light of resource and facility conditions. One mechanism to encourage/ensure compliance with set management guidelines, for example on crowd activities and event routes, could be via formal environmental impact assessment. Such EIA's need to cover event site options, the environmental criteria previously considered and social impacts including stakeholder views of the wider message that is being sent to the community as to how a protected area is valued and used. There is a need for a systematic process initially based upon conservation value and ecological sensitivity and capacity for recovery and then according to resource and facility condition assessment and management capacity such

Table 3

Analysis of the issues and research that need to be addressed in determining the acceptability of sport and adventure racing in protected areas.

Shortcomings of approaches to the determination of appropriate activities as determined by Ritchie (1998)	Relevance and importance in the context of adventure racing and sporting events taking place in protected areas
The focus almost exclusively on environmental choice criteria	This is an important consideration given the importance of protected areas for the conservation of flora and fauna. Biophysical, ecological and social criteria need to be employed in regard to understanding the wider environmental issues associated with the sportification of nature
There is a tendency to emphasise the impacts of activities and behaviours while neglecting development related impacts	Behaviours and attitudes employed (or neglected) during an event may pose a greater risk of environmental damage
Focus very single-mindedly on one time, and/or immediate impacts rather than long term and/or cumulative impacts	May be interactions with normal visitation pressures and illegal (other) recreational activities that place in a particular protected area
Concerns with impacts which are immediately apparent, as opposed to those which are more subtle, although perhaps equally, if not more significant	There may be delayed responses of plant and animals to disturbance. Trail surfaces may be destabilised initiating soil erosion and trail degradation which then occurs under differing seasonal conditions
Considerations are often include subjective, value-laden rather than more objective, measurable criteria	Emphasises the requirement for the collection of baseline data to enable monitoring of putative impacts (Table 1). Newsome et al. (2013) observe that data is lacking in many areas that may be part of an adventure race/sporting event occurring in a natural area. Data is required concerning activities such as rogain, orienteering, mountain biking and the social and ecological impacts of using conservation reserves for such events
Focus is on individual activities viewed in isolation rather than on clusters of related or interdependent activities as they naturally occur. This may provide somewhat unrealistic assessments, particularly when the appropriateness of a given activity may depend on both context, and the presence/absence of other similar or complementary activities	Important to consider approvals given to repeat events, other different events and interaction of events with passive recreational activities and any issues associated with wider tourism pressures
Importance of the geographic or physical context of the activity or development can be overlooked. The concept of 'zoning' now emphasises that activity or development may be benign in one location, while being disastrous in another setting	Peri-urban settings may impact on the integrity of a protected area Fragile/sensitive ecological communities are at greater risk of damage Climate change is an added stressor and may hinder the recovery of damaged ecological communities
There is difficulty in integrating the varying, often strongly held positions that tend to emerge from more traditional forms of public involvement	The social impacts of events need to be investigated. Displacement of some users may not be limited to the day(s) of the race, because race participants may use the same or similar protected areas for training prior to the race Newsome and Lacroix (2012) assert that it is important to consider the views of all relevant stakeholders. Adventure racing events may bring social and economic benefits to local communities and tourism operators but potential impacts on a wider range of stakeholders, including park visitors, need to be investigated. Newsome and Lacroix (2012) state that research into social impacts occurring in protected areas usually focuses on visitors present; such an investigation fails to account for the experiences and views of potential visitors or displaced users who may choose not to visit due the presence of sporting events. Research, therefore, needs to consider the full suite of stakeholders, including people who do not visit, or have chosen not to visit, protected areas where adventure racing events are held. Stakeholder perspectives should go beyond what are typically considered to be 'user concerns' to account for the views of the broader community who, especially in the context of an urban society, have a vested interest in the conservation of protected areas regardless of whether they visit or not

as staff available to manage activities and monitor impacts. The Kgalagadi Desert Classic Riverbed Cycle Challenge is a case in point where a lack of transparency has been reported, questions raised about the social impacts and wider perception implications of the event and the lack of a formal EIA (Reid, 2012). It was also noted that organisers of the event anticipated growth and continued interest in the Kgalagadi Desert Classic Riverbed Cycle Challenge. As indicated in Table 3, and given the rapid rise in sporting events taking place in protected areas, there is an urgent need for baseline data and research into the potential impacts of such events (see Table 1).

Burgin and Hardiman (2012a) suggest the use of legislation and educational strategies in the management of adventure and sporting events in protected areas. They make the important point that environmental degradation is likely to be an important problem and there needs to be a strategic planning approach, which has a focus on sustainability, in regard to the location of such events. In relation to this point Burgin and Hardiman (2012a) note that production forests are alternative settings and report that land managers in Tasmania, Australia have shifted the focus away from national parks and identified production forests as alternative sites for adventure and sport (e.g. Forestry Tasmania, 2009). Private lands are also a viable alternative and are currently used by many groups wishing to engage in risky, thrill seeking outdoor activities (e.g., Tough Mudder, 2013).

Notwithstanding the encouraging developments reported from Tasmania many protected areas in Australia remain the focus of adventure racing activities. Moreover, the plethora of outdoor sporting activities and organised events continues to rise globally. Some resource-starved managers may see such events as an avenue for raising funds thus reflecting the current poor state of protected area funding around the world (e.g. see Leverington et al., 2010).

5. Conclusion

Adventure racing is a rapidly growing global activity that is increasingly targeting protected areas for regular activities as well as seeking out new experiences. Recent trends include mountain bike racing in African national parks with numerous mountain environments now exhibiting a long history of fun runs associated with commercial sponsorship and global exposure and advertising via the internet. Event activities commonly include running, mountain biking, kayaking and sometimes rope courses. These events may be commercially sponsored and can involve hundreds of competitors and spectators in association with support crews. The participating demographics' primary aim is to complete an event and ultimately win. A strong commercial and social network surrounds adventure racing and there is a continuous search for new ways and combinations of racing in different and more challenging environments.

Information derived from websites indicates that adventure racing competitor's focus their attention on thrill-seeking activities and the spirit of competition is fostering personal achievement goals culminating in completing the event in the best time possible. Such a competitive attitude towards the environment is not conducive to or in any way optimal in terms of event participants appreciating the natural values and conservation function of a protected area. Furthermore, such a philosophical approach to recreating in the natural environment is likely to be environmentally damaging and impacts have been demonstrated even when passive recreation takes place in protected areas.

There is a dearth of knowledge pertaining to the ecological and social impacts of adventure racing. National parks and other protected areas play an important conservation and passive recreation

function and this paper has raised further attention regarding the question of appropriate recreational use in conservation estates. There is an urgent need for policy guidelines, along the lines of the conservation importance of targeted sites, a particular area's sensitivity to recreational damage, capacity of an event to disturb wildlife and the social and ecotourism significance of the selected site, that can assist managers make the best environmental decisions.

The view presented in this paper is in agreement with Burgin and Hardiman (2012a) who caution that in the absence of appropriate policy and planning frameworks protected area managers will find it very difficult to balance recreational demand with conservation objectives and the preservation of natural experiences. Without a scientifically informed environmental assessment and policy direction on adventure racing national parks will become further degraded in terms of their environmental integrity and biodiversity values. Moreover, social conflicts are likely to occur where adventure racing and sporting events take place in protected areas. One unforeseen socio-cultural impact and trend towards sports activities taking place in protected natural environments is that it is possible that over time the wider visiting public may lose sight of the conservation values of such areas.

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