APAC08 Proceedings
Australian Protected Areas Congress 2008
Protected areas in the century of change

24–28 November 2008
Twin Waters, Queensland
AN APPROACH TO EVALUATING THE IMPACTS OF MOUNTAIN BIKE ACTIVITY IN NATURAL AREAS: THE CASE OF JOHN FORREST NATIONAL PARK, WESTERN AUSTRALIA

D. Newsome, C. Davies

Environmental Science, Murdoch University, Murdoch, WA, Australia

Abstract:
Recreational mountain biking in natural areas can cause physical degradation to the environment through informal trail development, informal modification of existing trail systems, erosion and disturbance to native vegetation. Although previous studies have tried to quantify the impacts of mountain bikes in natural areas, using general trail assessment methods to measure the physical degradation of trails, many impacts of mountain biking have not been included sufficiently in the research. Following a review of the literature and field testing it was determined that general trail assessment methods had limitations in interpreting the specific impacts of mountain biking in natural areas. Such methods determine the general condition of a trail but do not adequately quantify the impacts of mountain bike specific impacts such as informal trail development and trail modifications. Managers require a tool by which they can quantify impacts specific to mountain in natural areas in order to protect these environments through targeted management. A rapid assessment tool, using GPS and GIS, was developed to quantify the effects of mountain biking in natural areas. The tool was tested in John Forrest National Park, a popular place for recreational mountain biking in the peri urban area of Perth, Western Australia, where mountain bikers creating informal trails and modifying existing trail systems is acknowledged as a problem by Park management. This assessment tool can effectively quantify the actual area impacted by the creation of informal trails and trail modifications. It also provides management with informative and interpretive maps of the impacted area.
The rise of mountain biking as a recreational activity

Mountain biking is a rapidly growing activity throughout the world. In 2006 cycling was reported to be the 4th biggest physical activity in Australia for people over 15 years. Surveys in the US reveal that since 1998 about 50 million people have participated in mountain bike activities each year (Outdoor Industry Foundation 2006). According to IMBA (2007) mountain biking can be divided into several different categories namely cross country, touring, downhill, free riding, dirt jumping. It has been recognised, however, that there is overlap between the categories and riders may participate in more than one type of riding (IMBA 2007).

Downhill bike riding often involves the use of heavy bikes and shuttle services and push up tracks to the trail head are often provided in popular riding areas (IMBA 2007). Riders in the Southwest of Western Australia identified downhill as the most popular riding style in combination with features such as long curves, tight curves, steep slopes, jumps, rocks, logs and short uphill sections (Goeft & Alder 2001). Downhill riding generally has greater potential for trail impacts than cross country riding, due to more aggressive riding styles, steep slopes, heavy bikes and, where competitions take place, high spectator numbers (CALM 2007).

The free riding category of riders are often seeking technical challenges such as rocks, logs and elevated bridges, dirt jumps, drop offs and see saws, along with tough descents (IMBA 2007). Free riding has often involved off-trail riding. This tends to have high environmental impacts except on extremely tough surfaces like bare rock or un-vegetated stony ground (CALM 2007). Dirt Jumping riders are looking for dedicated jumping areas and a mix of jumping styles (IMBA 2007). Jumps can be provided as part of a designated skills area or part of a cross-country trail (IMBA 2007). Dirt jumpers use a variety of bikes, including some specialised models (IMBA 2007).

Activity in natural areas

Like many recreationalists mountain bikers prefer to ride in natural areas and because of access and proximity to urban areas the peri-urban reserve network that surrounds many cities in Australia is often a favoured destination for bikers. There has been a relatively sudden and massive growth in popularity in mountain biking which has out-stripped managerial capacity to plan and cater for the activity in protected areas. Mountain biking groups have now become significant lobby groups for trail access in many national parks and there is an increasing trend for commercial enterprises involved in outdoor activity equipment and bike retail to sponsor competitions and events in targeted protected areas. The combination of these two factors has lead to concerns, natural area user conflict and environmental impacts that require urgent and sometimes significant management responses.

Issues and impacts

The presence of mountain bikes on multi use trails is potentially a major source of social conflict (Schuett 1997, Carothers et al. 2001, Kerr 2003, CALM 2007). Many natural area users are concerned about the possibility of collisions with fast moving mountain bikes suddenly appearing along trails where visibility is low (Horn et al. 1994, Kerr 2003).

Tyre tracks can form continuous erosion ruts and gullies on trails through which it is easier for water to flow exacerbating erosion (Horn et al. 1994, Foreman 2003). Breaking, skidding and sliding activities loosen the track surface, displace soil down slope and create ruts, berms or cupped trails (Cessford 1995, Foreman 2003, IMBA 2007). Mountain bikers are also capable of travelling much further per trip than hikers. Therefore they may have a higher spatial capacity for impact, increasing their relative impact when compared to hikers.

In some cases the increase in demand for mountain biking facilities and the slow response from natural area managers to adjust to this recreation activity has lead riders to create their own informal trails or to ride on trails designated for hikers only (CALM 2007). Informal trails may be user created because riders want more challenging trails to those provided, as a short cut to reach specific destinations or to connect existing tracks. The creation of informal trails increases the amount of land subject to impact by adding ‘new’ unmanaged trails or widening existing trails (Cessford 2003). Technical trail features (TTF’s) are trail elements that enhance the character and difficulty of a trail. They are constructed by mountain bikers and come in the form of ladders, drop offs, ‘skinnies’ and see saws. They are seen as important to the free riding style adding technical skill and challenge to a trail (Figure 1) (CALM 2007, IMBA 2007). Informal trails and TTF’s, however, are often badly located, poorly built and represent a significant hazard to many riders (CALM 2007).

Figure 1: Examples of informal TTF’s, bridge structure and see saw in John Forrest National Park, Western Australia

Assessing the impacts of mountain biking in natural areas

Study area

John Forrest National Park (JFNP) is a ‘A’ class reserve (Fig. 2) approximately 2676 hectares in size (CALM 1994). When the JFNP Management Plan was written in 1994 there were comparatively few bikers using the park, but this number has increased significantly since then.
Figure 2 John Forrest National Park, Western Australia

JFNP has an extensive network of multi use trails that have primarily arisen from the need for fire management. Cycling is permitted on a scenic drive, an old rail line and fire management tracks. Park users have reported conflict issues when meeting bikers on walking trails. Rangers are also aware of a number of informal trails that bikers have made to access the Park and to create more exhilarating riding experiences. These trails have had TTF’s built on them that rangers have removed for the safety of other users.

Approach taken

An informal trail network previously identified by Park rangers was identified as a preliminary study site. The study commenced at point B (Fig. 2) where this informal trail left a fire management track. A GPS was mounted on a bike and was set to ‘tracking’. The trail was cycled and each TTF passed was marked in the GPS as a waypoint, with a corresponding description recorded in a notebook and a digital photo taken. Intersections were also marked on the GPS and recorded in the notepad along with the direction turned. Whenever a fire management track was reached, at the designated the study boundary, the researcher returned to a previous intersection and tracked off the different route. In this way the whole trail network within the boundary was tracked. Some of the TTF’s had a bypass trail around them or were built on a bypass trail. The distances of these bypasses were measured using a tape along the trail centre line to prevent numerous back tracks on the GPS. An image of JFNP was downloaded from Google Earth, imported into a GIS and geo referenced. The GPS data was downloaded into the GIS and the tracked map overlayed onto the JFNP image (Figure 3). The informal trail length was calculated by digitising the trail track on GIS at high resolution. The locations of the TTF’s (eg. Fig 4) were displayed as waypoints on a separate layer. A map of the informal trails and the TTF’s was produced to give a visual indication of the impacted area.

Results and discussion

The main informal trail was 2.34 km long with 199 m of bypass trail making an informal trail network of 2.54 km. Using an approximate trail width of 1m it can be shown that 2,540 m² of forest area has been cleared to create this informal trail network. The informal trail network included 18 TTF’s. Riders had created 1 TTF every 140 m or 7 TTF’s every kilometre of informal trail.

This process can be repeated to assess informal trails throughout a park identified by a trail inventory or from ranger knowledge. The total area impacted can then be calculated by summing the individual areas from each assessment. This can then provide an evaluation of the total area impacted within the national park.

Conclusion

A rapid assessment tool, using GPS and GIS, was developed to quantify the effects of mountain biking in natural areas and tested in John Forrest National Park, where mountain bike created informal trails and modifications to existing trail systems is acknowledged as a problem by Park management. This assessment tool can effectively quantify the actual area impacted by the creation of mountain bike specific informal trails and associated trail modifications. It also provides management with informative and interpretive maps of the impacted area.

Figure 3 Informal trail network (dark lines) and TTF’s (circles) from Point B. John Forrest national Park
a) log ride b) sand ramp over fallen log

Figure 4 Examples of TTF’s in John Forrest National Park using natural materials

(8) IMBA, 2007. Managing mounting biking, IMBA's guide to providing great riding, IMBA, Boulder, Colorado, United States