

MOUNTAIN BIKE ACTIVITY IN NATURAL AREAS: IMPACTS AND IMPLICATIONS (CASE STUDY: THE CODRISOR FORREST PARK)

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ABSTRACT. An exploratory literature review was conducted into the biophysical and social impacts of mountain biking in Romania and around the world. This review provided the basis for an impact assessment method that could be applied to mountain biking in natural areas. Mountain biking is increasing in popularity in Romania and Bistrița-Năsăud county.

Keywords: *mountain bike, natural areas, implications*

REZUMAT. *Ciclismul montan, impact și implicații asupra zonelor naturale (studiu de caz: pădurea Codrișor).* Se discută tot mai mult despre implicațiile biologice, fizice și sociale induse de MTB, ciclismul montan care tinde să devină unul din mijloacele de bază ale motricității "outdoor". Și pentru că zona de desfășurare a activității specifice este mediul natural, trebuie abordat principial modul în care traseele MTB afectează echilibrul natural al zonelor de interes. Principalul mod de investigare este axat pe prelevarea probelor de teren, furnizate de tehnica actuală (GPS). Datele obținute trebuie să permită aprecierea justă a impactului pe care amenajarea unui traseu (cu una sau mai multe piste) îl are în contextul afectării mediului natural.

Cuvinte-cheie: *ciclism montan, arii naturale, impact, implicații*

Introduction

A literature review was conducted into the biophysical and social impacts of mountain biking in Romania and around the world. It provides the basis for an impact assessment method that could be applied to mountain biking in natural areas.

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Hypothesis

This report addresses mountain biking as a recreational activity by examining styles of riding and the corresponding demands of riders. It also identifies the major impacts of mountain biking and explores potential management techniques for developing sustainable mountain biking activities in natural areas. A method of assessing mountain biking impacts has been field-tested. The study was conducted in Codrișor Forrest Park a popular recreation in the area of Bistrița. Park rangers have previously identified areas in the Park where mountain bikers have created informal trail networks and technical trail features.

Mountain biking is increasing in popularity in Romania and this is adding to the demand for more space in natural areas for recreational activities (Goedt & Alder, 2001; Faulks, Richtie & Fluker, 2007; Standing Committee on Recreation and Sport, 2006; CALM, 2007). Mountain biking can affect the environment but the extent of the activity is not fully understood (Goedt & Alder, 2001; Chiu & Kriwoken, 2003).

This situation constitutes a problem for natural area managers, as impact information is needed to ensure mountain biking in natural and protected areas is sustainable. This report addresses mountain biking as a recreational activity looking at the styles of riding and the corresponding demands of riders. It also identifies the major impacts of mountain biking and potential management techniques for developing sustainable mountain biking activities.

A rapid assessment tool, using GPS, was developed to quantify the effects of mountain biking in natural areas and tested in Codrișor 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.

Objectives of Study

- To understand mountain biking as a recreational activity in terms of style and demand.
- To provide an initial determination main social and biophysical impacts of mountain biking in natural areas.
- To understand current methods for assessing and managing mountain biking in natural areas.

- To develop a trial assessment technique for quantifying the effects of the main biophysical impacts identified.
- To relieve the development of the mountain biking in Bistrița.

Methodology

An exploratory literature review was conducted to explore the styles of mountain bike riding, the attitudes that are typically attributed to each style and the impacts that these styles would have on a natural area. From this, important issues could be examined in order to determine the major effects of mountain biking in natural areas, the main management implications and what management strategies might be employed.

A GPS was used to track a previously identified informal trail network in GPS data was transferred into a GIS and overlaid onto a map of the Codrisor Forrest Park. The data was analysed on the GIS to quantify the impacts of informal trail networks. The methodology allowed the information to be displayed visually on maps.

Key Findings

Four different categories of mountain biking were defined: cross country, downhill, free and dirt jumping. It is recognised that there are similarities and overlap between the categories with some bikers riding in more than one style. The biophysical and social impacts of these rider groups were found to vary and understanding rider demands is paramount to providing appropriate facilities and management strategies.

Social conflict between hikers and mountain bikers is a potentially serious issue that needs to be addressed by natural area managers. Many research projects have focused on social aspects and the management implications and strategies are well understood.

The biophysical impacts of mountain bikers are less well documented and therefore are not so clearly defined.

Future Action

Conduct research into quantifying the impacts of more aggressive riding styles, skidding and breaking, on trails in natural areas. Use the GPS and GIS mapping assessment tool to determine the extent of the mountain bike

impacts in natural and protected areas, by tracking all known mountain bike impacted areas. All impacted sites can be plotted on a Park map to provide an overall baseline condition assessment of the Park that can then be monitored over time. Develop a management strategy and rehabilitation plan to ameliorate the most affected areas. Where mountain biking is a significant recreational activity a plan should be developed that considers closing off some trails for rehabilitation, instigates maintenance on other trails to make them suitable for the designated recreational use and examines alternative locations where facilities accommodating the more impacting activities, technical trail features, can be developed.

Display an impact map and interpretive signage at Park information areas to inform mountain bikers about the consequences of their actions.

Mountain Biking as a Recreational Activity

Mountain biking is a rapidly growing activity in the whole world (Goedt & Alder, 2001; Faulks et al., 2007; Standing Committee on Recreation and Sport, 2006; CALM, 2007), but there is little understanding of the size and scope of the market (Faulks et al., 2007; CALM, 2007).

In 2004, in Europe, 14% of men and 7.1% of women participated in cycling (Faulks et al., 2007). This represents a 15.3% increase from 2001 (Faulks et al., 2007). The survey, however, does not show what proportion of people are riding mountain bikes or riding in off-road situations. In 2006, cycling was reported to be the fourth biggest physical activity in Australia for people over 15 years. Of the 753,843 bikes sold in Australia in 2004, 69.8% were mountain bikes (Bradshaw, 2006). What is interesting to note is that Western Australia has 10% of the national population yet 14% of bicycle sales (Bradshaw, 2006).

At the retail level, one billion dollars is spent on cycling in Australia each year (Bradshaw, 2006). Surveys in the US reveal that since 1998 about 50 million people have participated in mountain bike activities each year (Outdoor Industry Foundation, 2006). In the US, the increase in the popularity of mountain biking has outpaced efforts to understand and therefore manage mountain biking in natural areas.

Mountain biking has many benefits appealing to different markets. It can be a source of fitness, fun, mental activity, technical challenge, recreation and entertainment in the natural environment (Horn, Devlin & Simmons, 1994; Goedt & Alder, 2001; CALM, 2007; IMBA, 2007). Cycling can provide a range of social and economic benefits to regional areas and the wider community by

stimulating tourism and recreational spending (IMBA, 2004; Faulks et al., 2007). The lack of research into cycle tourism may be inhibiting the development and marketing of cycle tourism (Faulks et al., 2007). Research in the US has shown that mountain biking contributes \$133 billion to the US economy; it supports nearly 1.1 million jobs and provides sustainable growth in rural communities (Outdoor Industry Foundation, 2006).

Research for the US Mountain Bike Plan (Bicycle SA, 2001) indicates that mountain bike riding will continue to increase in popularity, particularly in non-organised recreational mountain bike riding. Improvements in technology are making mountain biking in natural areas easier and therefore available to riders of all abilities (O'Donnell & Carroll, 2003). An increase in the number of riders may lead to increased recreational pressures on peri-urban natural areas. In the US, there is a popular belief that all mechanisation should be banned from wilderness areas (Scott, 2003; O'Donnell & Carroll, 2003). The International Mountain Bicycling Association (IMBA) encourage mountain biking in natural areas in the US. They aim to balance the social, recreational and environmental needs of various users so mountain biking can be sustainable.

Mountain Biking Styles: mountain biking activities vary in terms of skills, exercise, motivation and equipment (Goeft & Alder, 2001; CALM, 2007; IMBA, 2007). Mountain biking can be divided into several different categories; cross country, touring, downhill, free riding, dirt jumping (IMBA, 2007). There are crossovers between the categories and riders may participate in more than one type of riding (IMBA, 2007). Bikers prefer to ride in natural settings and on trails with a variety of features such as slopes and curves (Goeft & Alder, 2001). They also found that males, approximately 30 years old, are the most common participants in mountain biking in New Zealand, UK, the US and Germany (Hollenhurst, Schuett & Olson, 1995; Goeft & Alder, 2001).

Impacts of mountain biking in natural areas: the impacts of mountain biking in natural areas can be arranged into four categories: social, biophysical, human safety, and political (Kerr, 2003). In the US, the political impacts are significant, as mountain biking is not permitted in wilderness areas. Therefore, people who wish to ride bikes in these areas often lobby against the creation of new wilderness areas (Kerr, 2003).

Social Impacts: conflict is a major social impact of mountain biking in natural areas (Schuett, 1997; Carothers, Vaske & Donnelly, 2001; Kerr, 2003; CALM, 2007).

Table 1. Distribution of the categories

Cat.	2015	2016	2017
Elite.	30	40	120
Wom.	0	5	35
Juni.	5	12	40
Master.	10	10	9
Chil.	6	16	7
TOTAL	51	81	270

Social conflict – perception and cause

a. Mountain biking causes unacceptable environmental impacts

- Bad trail design
- Heavy trail usage
- Bad riding practices
- Low maintenance of trails
- Erosion caused by other user groups
- Erosion caused by water

b. Mountain bike riders and other visitors are at risk from falls and collisions

- Potential collisions between different user groups
- High speeds
- High technology users and high risk riders
- Rider has a low skill level
- Blind corners and slopes
- Failure of cyclist to alert hikers of their presence

c. Mountain bikers have goals that are incompatible with the perceptions of other users

- Disturbance of wildlife,
- Intrusion into solitude of other users
- Intimidation of 'lower technology' user
- Low standards of etiquette
- Multi use trails for incompatible user groups (Derived from Horn et al., 1994; Moore, 1994; Carothers, 2001; CALM, 2007; IMBA, 2007)

Conflict can be related to the mode of travel, the focus of the trip, user expectations, attitudes and perceptions of the environment and the level of user tolerance (Moore 1994).

It is apparent that conflict is often asymmetrical, being greater on the side of the 'lower technology' user or the most vulnerable user, walkers feel conflict towards cyclists that cyclist do not reciprocate (Moore, 1994; Horn et al., 1994; Beneficial Designs, 1999; Carothers et al., 2001).

As mountain biking is often perceived as the 'new user', more traditional users may be less tolerant of it (Schuett, 1997; Mosedale, 2003). Similarly, mountain bikers were found to be content to share trails with anyone except motorised vehicles (Goeft & Alder, 2001). This is consistent with the theory that conflict is often perception based, with people being scared of being hit by a bike (Horn et al., 1994; Kelley, 1998).

Single or multi use trails?- The presence of mountain bikes on multi use trails can be a major source of social conflict (Schuett, 1997; Carothers et al., 2001; Kerr, 2003; CALM, 2007). Many mountain bikers are content to ride on rail trails, wide trails with relatively smooth surfaces (Goeft & Alder, 2001; IMBA, 2007), which are commonly designated multi use trails. Furthermore, multi-use trails have many advantages to the natural area manager as there is less of a trail network to maintain and more visitors can be directed on to one trail. This potentially reduces the number of trails required and hence the amount of land affected. However, some more adventurous mountain bikers may prefer the challenges and solitude provided by single track (Goeft & Alder, 2001; IMBA, 2007; CALM, 2007).

Single track does not necessarily mean single use but the nature of the trail and the rider style may make it incompatible with non-mountain bike users (CALM, 2007). These trails often cover rough terrain and include natural technical trail features (TTFs), drop offs and jumps. Accommodating hikers and bikers on a single track.

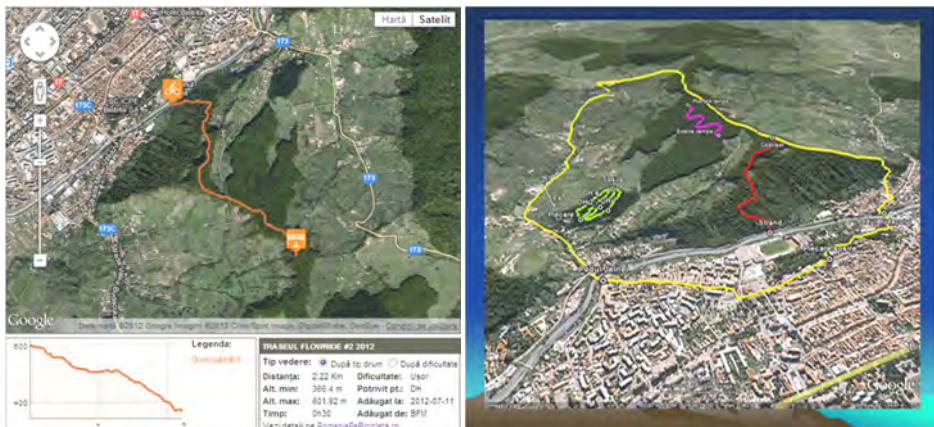
Human Safety Impacts: many natural area users are concerned about the possibility of collisions with fast moving mountain bikes suddenly appearing along trails where visibility is low (Horn et al., 1994; Kerr, 2003). Another risk of mountain biking is the potential of injury from falls when tackling more technical trails or TTFs. Informal trails and TTFs that are not built to an acceptable standard can be a danger to the unsuspecting rider (CALM, 2007). There are many examples of lawsuits in the US where riders who have suffered injuries on trails have attempted to prove that the natural area management was at fault (IMBA, 2007).

Biophysical Impacts: the biophysical impacts of mountain biking in natural areas have not been clearly understood until very recently (see Newsome and Davies in press). Comprehensive reviews of the literature by Sprung (2004) and Marion and Wimpey (2007) concluded that mountain biking is no more damaging than hiking, although at the same time, it is agreed that bikers, and hikers, would cause some environmental damage from their presence in natural areas.

Such impacts can be general trail erosion, reduction in water quality, disruption of wildlife and changes to vegetation. Hikers and bikers have similar impacts on vegetation, preventing vegetation growth close to the trail centreline (Thurston, Reader, 2001). By comparison, horses, cause more damage than bikers do, as they dislodge more material and use wider trails (Wilson & Seney, 1994).

Nonetheless, in natural areas, it can be difficult to attribute erosion to a particular user group. Use levels are often unknown and vary between user groups. Bikers also ride in a variety of styles, each style having different impacts. An inexperienced cross-country rider on a wide, clear multi use path is likely to have less impact than a more aggressive rider cutting off trail through native vegetation. The impacts of informal trails and the creation of TTFs along paths have been identified as problematic but have rarely been documented (Marion, Wimpey, 2007).

Experiment: Bistrița Codrișor Bike Park Evolution



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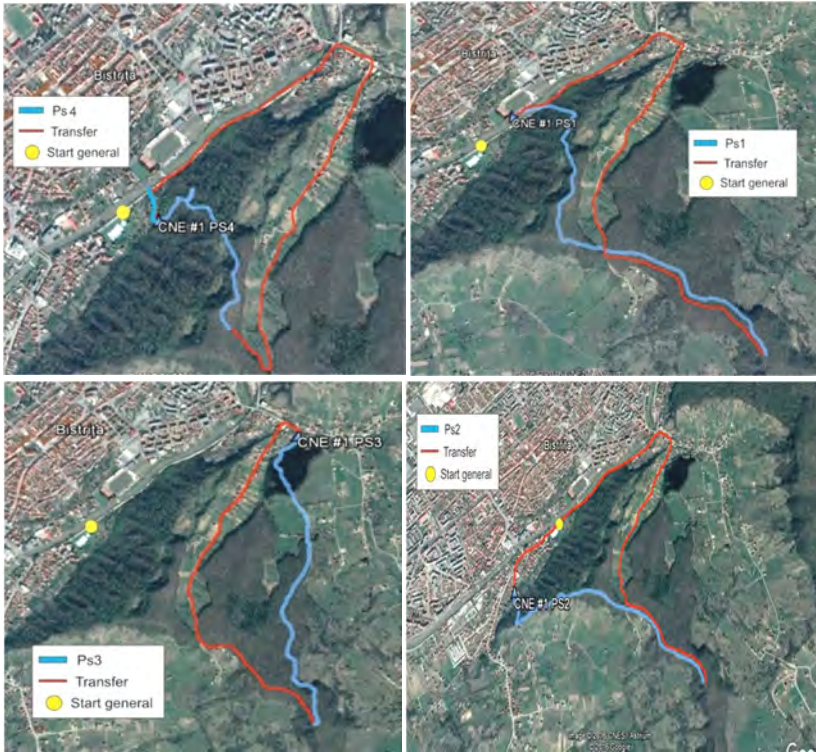


Fig. 1. Bike track evolution between 2010-2017



Fig. 2. 2017 Enduro Cup, national contest, map of the racetrack

Conclusions and suggestions

The tracks had all been created from natural materials found close by in the forest, such as fallen trees, rocks and dirt and blended into the environment. The GPS assessment method can provide an accurate and informative assessment of the impact of mountain bikers in Codrisor Park and similar areas. The method can quantify the impact on a natural area by calculating the amount of land cleared. This information can then be displayed on an informative map. This process should be repeated to assess each informal trail identified by trail inventory or from ranger knowledge.

The total area impacted can then be calculated by summing the individual areas from each assessment. This will give a total area impacted for the natural area. Each assessment can be displayed on a map of the natural area to give visual representation of the impact.

This study explored the research on mountain biking and its impacts on natural areas. Past research has indicated that the relative impacts of bikers and hikers in natural areas are similar. However, previous research has used controlled passes of hikers and bikers along with general trail assessment methods to determine mountain biking impacts. Furthermore, previous research has not adequately catalogued the impacts of mountain biking in natural areas.

A recurring theme in these observations is the perceived degradation of the Park by the user and their response to that. Many of the fire management tracks are severely degraded. There are large water channels running along the tracks and the surface is unstable in many areas. If Parks are to be managed in a sustainable manner and want to support recreation then they need to be given the resources to do so.

Park management needs to demonstrate to the users that it is doing all it can to maintain the Park, such as to rehabilitate degraded areas and badly eroded or unused fire management tracks. Effort is also required to educate users about environmental issues and management strategies. Without these measures, users may continue to be unaware of the damage they are causing and will have no incentive to change their behaviour.

Recommendations

Use the GPS mapping assessment tool to determine the extent of the mountain bike impacts in protected areas by tracking all known mountain bike impact areas. All impact sites can be quantified and plotted on a Park map to provide an overall impact assessment of the activity.

Develop a management strategy and rehabilitation plan to ameliorate the most affected areas. This plan should consider closing off some trails for rehabilitation, maintenance of other trails to make them suitable for the designated recreational use and consideration of alternative locations where facilities accommodating more impacting activities, such as technical trail features on designated mountain bike trails, can be developed.

Display an impact map and an interpretive notice at Park information areas to inform mountain bikers about facilities, trail use and the consequences of their actions in non-designated areas.

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