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Mountain biking, hiking and hunting

Review of the Literature

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Preface

This report is part of a preproject with the aim to solve user conflict between deer hunting and mountain biking in Sogndal municipality. The report is based on a literature study carried out by Steve Taylor at the Centre for Recreation and Tourism Research at West Highland College, University of the Highlands and Islands, Scotland in cooperation with Vestlandsforskning.

Sogndal, September 2016

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Summary

The purpose of this report is to give insight to outdoor user group potential conflict; mountain bikers' and other users' impacts on wildlife; the relationship of mountain bikers and hikers to hunting interests and other users; and management approaches to conflict resolution. Wherever there are different users competing for the same space at the same time in the outdoors the potential for conflict are ever-present. Conflict could be defined as goal interference attributed to another's behaviour; that is to say that a group's or individual's dissatisfaction can be caused by the actions of others. This conflict understanding has four principal components: tolerance of others' lifestyles; the importance placed on recreational environments; how people interact with those environments; and the meanings that people attach to their modes of recreation, such as kudos or how seriously people pursue their activity. Theoretically, *actual* conflict can occur when the presence of one user group interferes with these goals of another. Latent conflict has been recognised as one of first phases of conflict, where an *unstable peace* can exist, with differences between user groups not major enough to cause issues. In contrast to actual conflict, conflict may be more *perceptual*, resulting, to a large extent, from people's contrasting lifestyles, attitudes and values, or differences in norms.

A range of research has examined the conflict between mountain bikers and other users of the great outdoors; naturally, given the great numbers of recreationists who enjoy hiking, it is biker's conflict with this user group, whether real or merely perceived, that occupies most of the literature. There is a worldwide debate over potential conflict contingent upon the issue of mountain bikers' access to trails, or areas of land; trails that in many cases have traditionally been the preserve of hikers in particular. Although mountain bikers in the UK have been regular trail users for over 20 years, for example, acknowledge that even today between walkers and bikers there exists both harmony and tension in taking countryside access.

To enable conflict-free mountain biking, many countries have developed purpose-built biking centres to the exclusion of other users, conflict issues are avoided at source. However some scholars argue that such centres maintain the attitude of bikers as outgroup when isolating them from other outdoor users, and centre hinders the different contestant to adapt to each other when using the same trails.

The studies looking into the relation between hikers and bikers differ according to methods and theoretical perspectives, in addition to different physical environment and legal context in where the outdoor activity is carried out. The widths of the trails, the quality of the trails, trail surface, the ground besides the trail differ and make it difficult to compare studies. Such condition would influence the conditions for passing and therefore the ability for conflict. However, we have found a group of studies reporting conflict between hikers and bikers as substantial. In several studies about 30-40 percentage of hikers have felt dissatisfaction with bikers due to high speed and bikers emerge abruptly. But, several other studies report minor conflict between hikers and bikers, and that some few bikers could damage the reputation of bikers. The studies show less conflict between the two groups when: hikers get used to bikers on the trail, the respondents are mixed users (both hiker and biker) and hikers are young, less than 40 years.

Such factors may illustrate that some conflicts are perceived if bikers are experienced as “others” in relation to “we”. However, it is evident that trail improvement would reduce the frequency of conflict, e.g. with increasing width and quality of the trail, improvement for free sight etc.

Very few studies have looked into the relation between hunters and bikers/hikers. The few studies made from US and New Zealand, differ more or less to the Norwegian context due to differences in legal framework, hunting and weapon traditions and culture. The density of hunters and recreationists in the field would ofcause influence the ability for conflict. The studies detect perceived conflict to a large degree du to difference in culture and values. However, some of the same situations as in Western Norway are reported. When hiking trails are criss-crossing hunting areas tension and conflict is reported. An interesting management model is applied in Colorado where hunting is band near roads (or other infrastructure) where most of the recreationists stay. Another study from Scotland identifies the views of sporting estate landowners on threats and opportunities to their estates. Mountain biking was the most unpopular activity followed by canoeing and cross-country skiing due to the contestant cover large areas of ground and hence have the potential to disturb stalking activities.

The lack of research in environments representative to western Norway make it difficult to conclude from the literature according trail and vegetation damage caused by hiking or biking. One recently Norwegian study gave obvious results: increase in traffic, wet conditions and increase in the slope would normally increase trail damage. Trail width (vegetation loss) and trail deep were mapped. The general findings are the same in the forest as in the mountains. In dry and flat environment we could not expect more damage from biking than hiking, but exception is found in unfixed soils.

Recreation traffic influence on wildlife is depended on several factors as distance to the animal, recreation time of day and year, and kind of terrain and of cause kind of species. It is probable that high speed and little noise from biking could make disturbance due to bikers suddenly on the animal. Biking and hiking on trails would make fewer disturbances to wildlife than traffic in the field (out of trails) due to the animal possibility to foresee the recreationist motion.

Several strategies are described to hinder conflict and to decline conflict as direct management focusing hard or direct approaches as restricting access for specific user groups, trail improvements to stimulate mixed use of trails, separate trails or other forms of visitor control, such as closing trails if necessary or dispersing riders over a greater number of trails if they become too crowded. Such strategies are relevant where actual conflict is present. When the situation between the different users is a result of different values or attitudes (perceived conflict) indirect strategies and measures fit better. Then information, education, and attitude forming could stimulate self-regulation. In addition, Bridge Building and Negotiation which is a more progressive management tool, which reflects possible budget restrictions and a more collaborative and integrated approach. In Scotland, Developing Mountain Biking in Scotland organizes its regional development into specific cluster groups. Bringing together a range of interests, including public bodies, landowners, local businesses and mountain bikers, and with an overarching aim of developing sustainable mountain biking facilities, these clusters serve as a platform to openly discuss issues and collaborate on

resolving issues and implementing goals. Such approaches emphasize board participation with early involvement of all key stakeholders.

All conflict management strategies must be grounded on a comprehensive understanding of the problem, what is the actual problem. Understanding the sources of conflict is important for natural resource managers because the solution to conflict depends on the cause of the problem. Management claim a well-developed understanding of the relationship between the stakeholders affected, as well as the social and cultural context of both the conflict and the options for managing it. Seeking the source of conflict formation you have to look for prior change that disturbs a social hierarchy as a driving force. In this search problem have been brought into the open and examined. Neglecting of certain elements of the issue can lead to an incomplete understanding of the problem and frustrated attempts to resolve it. In this work different information has to be gathered to understand motivations, desired experiences, settings preferences and other needs of the user groups in question, as well as mapping the different recreation and other use of the area, and of cause the change in use during a certain period of time.

Before solving the conflict you may improve the situation by mitigate the conflict, or at least not escalate it. This approach focus on the relationship between change and conflict: what changes have created the conflicts, what changes may mitigate the conflict and what change may transform the conflict.

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1. Introduction

The purpose of this literature review is to conduct a broad search of the extant scholarly literature of relevance to the issues faced in the Sogndal area, namely: outdoor user group potential conflict; mountain bikers' and other users' impacts on wildlife; the relationship of mountain bikers and hikers to hunting interests and other users; and management approaches to conflict resolution. Although much of the literature on these subjects dates back a few years, the nascent nature of the issues in the Sogndal region determines that earlier studies, pertaining to the sport's development in countries such as the USA and New Zealand, are still appropriate.

2. What is Outdoor User Group Conflict?

It is apparent that wherever there are different users competing for the same space at the same time the potential for conflict between different people or different user groups is ever-present (Moore and Barthlow, 1997). In the context of outdoor recreation, conflict has been defined as: "goal interference attributed to another's behaviour"; that is to say that a group's or individual's dissatisfaction can be caused by the actions of others (Jacob and Schreyer, 1980: 369).

The early works of Lucas (1964), Lime (1975) and Adelman et al. (1982) did examine asymmetric conflict between recreationalists, principally paddlers and motorboaters in the Boundary Waters Canoe Area (BWCA) in Minnesota. Other authors examined a similar issue between other recreationalists, such as Knopp and Tyger's (1973) work on ski-tourers and snowmobilers. The findings of Adelman et al.'s (1982: 58) study in the BWCA demonstrated clear asymmetric antipathy between canoeists and motorcraft users, as "71 percent of the paddlers disliked meeting and/ or seeing motorcraft users in the BWCA, while only 8% of the motorcraft users disliked meeting and/ or seeing paddlers".

The majority of academic studies on outdoor recreation conflict, however, cites Jacob and Schreyer's (1980) model as the most influential work. While Tumes (2007: 46) agrees that there is difficulty in agreeing on a definition of outdoor recreational conflict, the author does go on to acknowledge that: "the majority of the outdoor recreation conflict investigations have been based on Jacob and Schreyer's (1980) conceptual framework".

Jacob and Schreyer (1980) identified four principal components: tolerance of others' lifestyles; the importance placed on recreational environments; how people interact with those environments; and the meanings that people attach to their modes of recreation, such as kudos or how seriously people pursue their activity. Theoretically, *actual* conflict can occur when the presence of one user group interferes with these goals of another (Carothers *et al.*, 2001). Latent conflict has been recognised as one of first phases of conflict, where an *unstable peace* can exist, with differences between user groups not major enough to cause issues (Brahm, 2003).

Another early article (Bury et al., 1983), while itself referencing Jacob and Schreyer (1980) in defining conflict, determines three activity characteristics that directly affect the degree of conflict between activities: 1) their spatial or temporal propinquity, 2) the degree to which the activity

dictates the user 'conquering' the environment in which it takes place and 3) the extent of recreationalist's dependence on technology.

Research confirms considerable numbers of hikers, for example, mentioning negative encounters with mountain bikers (Ramthun, 1995 and Heer *et al.*, 2003). These encounters *may* be actual, where the presence of mountain bikers can interfere with the goals of hikers (Carothers *et al.*, 2001), for example physical disturbance on the trail (Mann and Absher, 2008).

In contrast to actual conflict or user group interference, conflict may be more *perceptual*, or structural in nature, resulting, to a large extent, from people's contrasting lifestyles, attitudes and values (Watson *et al.*, 1991), or differences in norms (Vaske *et al.*, 1995). Perceived differences between user groups, in terms of their dress or equipment for example, can lead to unjustified mental constructs about other group members; such conflict, independent of actual contact between groups, is termed social values conflict (Carothers *et al.*, 2001). When participants in Mann and Absher's (2008: 375) study were interviewed in depth, it was suggested that the conflict was caused by a differentiation of values between elderly hikers and young mountain bikers, "caused by a gap in their leisure and recreational world".

Conflicts are often one-way (Jackson and Wong, 1982); it is suggested that such an asymmetric- relationship can exist between mountain bikers and other user groups, with bikers less likely to report issues than other land or trail users (Ramthun, 1995). Such relationships can result from both real and perceived conflict. Real conflict has been reported when bikers pass hikers with high speed (Dalen, 2011; Jellum, 2007). Hikers perceived conflict have been found to be more likely than mountain bikers to perceive differences between the users (Watson *et al.*, 1991). Yet resonance has been found between walkers' and bikers' motivations for being in the outdoors (Brown *et al.*, 2008).

These perceptions can result in the portrayal of others as stereotypes: for examples hikers' perceptions of mountain bikers as young hoons (Horn *et al.*, 1994) or not caring about the environment (Symmonds *et al.*, 2000). Pigeonholing other users as members of either an in-group - individuals involved in the same activity (Carothers *et al.*, 2001) - or out-group - others participating in different activities (Carothers *et al.*, 2001) - can lead to perceived conflict, even if no actual conflict occurs (Ramthun, 1995). Furthermore, in-group discussion of perceived problems can often lead to distortion of encounters and conflict, as problems are exaggerated beyond what was actually encountered (The Countryside Agency, 2001).

Alternatively, conflict can result from the perception of new user groups imposing themselves on traditional land use or trail users (Horn *et al.*, 1994); this can be exacerbated by perceived differences in technology used on the trail, for example. While some anecdotal evidence supports this (*ibid.*), more recent research found that 72% of walkers agreed that as they get used to bikes conflicts will reduce, giving some support to the proposition that the perception of walkers may change as they become more used to encounters with mountain bikers (Cessford, 2003). Such changes in attitudes to the other could occur if the relation is dominated by practical and physical qualities. Changes in attitudes would be more difficult if it is based on moral attitudes how to practices outdoor activity as described by Flemsæter, Setten & Brown (2014). Based on Creswell (2010) these authors describe how moral attitudes hold by officers at the Norwegian Directorate for

Nature Management define what kind of skills, mobility, technology and nature relation deserve as the real outdoor, and where MTB do not fit.

3. Conflict between Mountain Bikers and Other Recreationists

A range of research has examined the conflict between mountain bikers and other users of the great outdoors; naturally, given the great numbers of recreationists who enjoy hiking, it is biker's conflict with this user group, whether real or merely perceived, that occupies most of the literature. The debate over potential social conflict is generally contingent upon the issue of mountain bikers' access to trails, or areas of land; trails that in many cases have traditionally been the preserve of hikers in particular (Brown *et al.*, 2008). The spread of mountain bikers onto tracks that were previously the preserve of walkers, or land that has been traditionally used for other outdoor pursuits, is a worldwide phenomenon (Cessford, 2003). Although mountain bikers in the UK have been regular trail users for over 20 years, for example, Brown *et al.* (2008: 9) acknowledge that even today "between walkers and bikers there exists both harmony and tension in taking countryside access".

Consequently, the social situation has changed on many popular trail systems (Ramthun, 1995). The use of mountain bikes on such traditional trails has long been contested. In some countries, such as the USA, bicycles have been traditionally classed or treated as motorised vehicles in many recreational areas. This has led to questions over their use in wild areas, as the bike's mechanical advantage is perceived as conferring the means to travel further into areas once the preserve of hikers (Butler, 2003).

To enable conflict-free mountain biking, many countries have developed purpose-built centres. The 7Stanes mountain biking centres, for example, in the border region of Scotland, have been largely responsible for Scotland being tagged as the mountain biking global superstar for two years in a row by the International Mountain Bicycling Association (IMBA, 2006). At centres such as these, where trails are generally constructed for mountain biking only, to the exclusion of other users, conflict issues are avoided at source. Brown (2014) argue that such centres maintain the attitude of bikers as outgroup when isolating them from other outdoor users, and centre hinders the different contestant to adapt to each other when using the same trails.

In empirical studies on outdoor recreational conflict, involving mountain biking as one of the activities, a range of different methods have been used to establish issues such as whether conflict exists, how it manifests itself, and attitudes towards other, distinct user groups. Survey and questionnaire is the most commonly used research techniques.

Cessford (2003) surveyed 370 walkers on New Zealand's Queen Charlotte Track. Although the sampling method isn't stated it is inferred that all walkers who were encountered were surveyed. Around 30% of the respondents felt that bikers travel too quickly when passing other users or cornering, although 74% admitted that most of the issues were derived from a few irresponsible bikers. This perception of a safety hazard was one of three impact issues discussed by Cessford (2003), the others being a perceived environmental impact and a feeling that biking is inappropriate

in certain settings. Cessford (2003: 315) found that “opinions about biking were consistently more negative among those walkers over 40”, especially the negative perceptions from those hikers who hadn’t actually encountered mountain bikers.

Carothers et al. (2001) also utilised surveys, given out to all trail users at the survey site on randomly selected days within a set period. In total, 210 hikers, 163 mountain bikers, and 400 dual-sport participants took part in the research. The authors found that interpersonal conflict was more prevalent than social values conflict, noting that “given the similarities in hikers and mountain bikers noted by previous research such findings are not surprising” (Carothers et al., 2001: 58). Mountain bikers were less likely than hikers to have experienced this conflict; over 60% of hikers reported conflict with bikers for the following parameters: riding out of control, riding too fast, not giving the right of way and no warning on approach (Ibid.).

Also in the USA, Jellum (2007) surveyed 3,657 hikers (87.4%), 502 mountain bikers (12.0%), and 25 stock users (0.6%), using data collection at self-registration stations. This was followed up by an on-site questionnaire of all trail ‘exiters’ on randomly selected odd and even days; 73 bikers and 160 hikers were surveyed. Significance was identified for mountain bikers’ excessive speed and issues regarding lack of trail etiquette (from 14% and 13%, of hikers respectively) but no identified problems with hiker behaviour, suggesting one-sided conflict (Jellum, 2007).

In an Australian peri-urban park, Rossi et al. (2012) surveyed 288 visitors, including 121 bushwalkers and 95 mountain bikers; all visitors entering or leaving the park were asked to participate. Sixty percent of respondents were unaffected by the presence or behaviour of other park users. Of the remainder, 84% reported being positively affected, welcoming interaction with others, with motorized users’ interaction being more negatively identified (Rossi et al., 2012). Another American study (Bradsher, 2003) surveyed 421 trail users, broken down as: hiking (39.4%), MTB (21.2%), walking (20.2%), running (10.6%), Horseback riding (1.6%), other (7%). All relevant trail users were asked to participate, using a systematic sampling schedule. The author reports that most trail users reported that other recreationalists in the identified groups had no effect on their enjoyment. The number of comments about mountain bikers made by respondents was roughly equally positive and negative. Commensurate with the aims of the research, examining the relationship between conflict and past experience, those who had experience of an activity felt less conflict when these trail users were encountered, and were more likely to enjoy that encounter (Ibid.).

A different approach was taken by Ramthun (1995), who used secondary analysis of quantitative surveys in the USA, examining responses from 231 mountain bikers, 121 hikers and 38 ‘other’. Asymmetric conflict between hikers and bikers was identified, as 32.2% of hikers attributed conflict to bikers but only 5.6% in the other direction. The author concludes that such goal interference was closely related to pigeonholing other users as members of an outgroup. Those hikers with more experience, however, were found to be less sensitive to others’ behaviour (Ramthun, 1995).

Watson et al.’s (1991) study in the USA surveyed 211 users of the Rattlesnake National Recreation Area; about 50% of respondents were mountain bikers and 50% other trail users. After screening at the trailheads to exclude those staying under two hours, each person encountered was

asked if they would be happy to participate in a mailback questionnaire. The authors reported that only one mountain biker suggested dislike for meeting hikers but 32 percent of the hikers who didn't enter the 'wilderness' designated part of the NRA said they disliked meeting bikers (Watson et al., 1991). It was also found that "the wilderness bicyclists indicated strong beliefs that the two groups were similar, while the hikers, particularly the wilderness hikers, were least likely to agree that the two groups were similar" (Watson et al., 1991: 65).

Tumes (2007) is alone in only using only in-depth interviews in her study, interviewing six Australian bushwalkers in the relevant phase two of her research, accessed through local club members and via snowball sampling. Only one interviewee had had an actual negative conflict experience with a mountain biker, on a walking-only track. All had, at some point, been scared by a rider's sudden appearance, but when pushed the participants admitted they "did not seem to mind coming into contact with mountain bike riders and in fact had no problems with them" (Tumes, 2007: 50).

A number of studies, however, have used qualitative techniques as part of a mixed-method study design. Horn et al. (1994), for example, used participant observation, in-depth interviews and questionnaires. Mann and Absher (2008), meanwhile, employed questionnaires, in-depth interviews and an expert workshop. For Horn et al.'s (1994) surveys in New Zealand, mountain bikers were contacted through the Canterbury bike club and trampers contacted through local tramping clubs; 253 tramper and 173 biker surveys were returned. For the interviews, participants were chosen purposively from contacts made, survey respondents and through snowballing; 27 bikers and trampers (no breakdown discerned) were interviewed (Horn et al., 1994). The authors found that 65 per cent of tramper-only respondents (those who only tramped) disliked or strongly disliked mountain bikers; the environmental damage, danger and intrusion were the three most common reasons. The data and findings again show an asymmetric relationship in this respect. Nearly a third of the bikers felt that it was their perceived image that was the biggest source of conflict (Ibid.).

The German study of Mann and Absher (2008) derives its findings from 805 questionnaires, 16 interviews and one expert workshop. Of the survey respondents 50% were hikers and 7% mountain bikers; four other user groups made up the rest. Theoretical sampling was used, and contacts made through appropriate clubs and organisations were surveyed via post and email. Sixteen follow-up interviews were undertaken, 'internally' with organisations' representatives and 'externally' with predetermined experts (Mann and Absher, 2008). Disturbance by cyclists/mountain bikers was mainly registered by hikers and horse-riders (34% and 35% respectively); in one of the interviews with a hiking club, it was ascertained that value conflict rather than actual disturbance was the greater cause of this conflict. The hikers' 'place attachment' and 'experience levels' had a greater influence on their perceptions of conflict, whereas "mountain bikers, with more distinct 'expectations', were more sensitive toward conflict" (Mann and Absher, 2008: 376).

The Countryside Agency (2001), in the UK, was alone in using video recordings of user group interactions, as well as surveys and focus groups, undertaken by an academic partner. Sixty-four percent of respondents were cyclists and 32% walkers, a participant chosen immediately after video recording an actual user encounter on five chosen routes and one later. No hostility, intrusion,

competition or disagreeableness – the chosen parameters for conflict – was reported, the issues of note being related to factors such as the unpredictable movement of other users.

While safety concerns have been reported by walkers, actual reports of accidents are few: an unpublished survey of walkers notes only 15 encounters cited by walkers as potentially hazardous, out of nearly 1500 interviewed, and only one actual accident reported, between two bikers (Petit and Pontes, 1987; cited in Grost, 1989). In several years of accident statistics in the German Alps, almost none of the thousands of incidents reported involve bikers and walkers (Woehrstein 1998; cited in Cessford, 2003). Although mountain bikers may be criticised for illegally using walking tracks, in the context of the USA at least, there is little evidence to support this (Connelly et al., 2004).

In a Norwegian study from Oslo more than 40 percentages of the users (about 400.000) of Oslo recreation area (Nordmarka and Østmarka) had less satisfaction of outdoor life due to high speed bikers. A random sampling of 300 inhabitants was interviewed by phone (Dalen, 2011). The results from this study were followed up in a Bachelor thesis in the same area based on close to 300 random selected respondents in a survey. The main finding was that conflict between bikers and hikers was most intensive on gravel roads at crossing points during weekends (Sameien & Authen, 2014).

It is not easy to sum up these studies due to different methods and theoretical perspectives, in addition to different physical environment and legal context in where the outdoor activity is carried out. E.g. the studies do not tell us about the width of the trails, the quality of the trails (the extent of stones and roots which is common in Scandinavia), the ground besides the trail which influence the ability to step aside etc. Such condition would influence the conditions for passing and therefore the ability for conflict. However, we have found a group of studies reporting conflict between hikers and bikers as substantial. In several studies about 30-40 percentage of hikers have felt dissatisfaction with bikers due to high speed. But, several other studies report minor conflict between hikers and bikers, and that some few bikers could damage the reputation of bikers. The studies show less conflict between the two groups when:

- Hikers get used to bikers on the trail
- The respondents are mixed users (both hiker and biker)
- Hikers are young, less than 40 years

Such factors may illustrate that some conflicts are perceived if bikers are experienced as “others” in relation to “we”. However, it is evident that trail improvement would reduce the frequency of conflict, e.g. with increasing width and quality of the trail, improvement for free sight etc.

4. Other recreational conflicts

The conflict between various recreationalists on trails or areas of land has been the subject of a wide range of academic literature dating back to the 1960s, much of it originating from the USA. These studies have included conflict between canoeists and motor-boaters (Lucas, 1964; Ivy *et al.*, 1992),

horse riders and backpackers (Snyder, 1966); hikers and stock users (Watson *et al.*, 1994); and cross-country skiers and snowmobilers (Knopp and Tyger, 1973; Jackson and Wong, 1982).

More recently, Vittersø *et al.* (2010) examined the affective conflict between cross-country skiers and snowmobilers in Troms County, Norway. Among their findings is the negative thoughts that skiers have about the noise of snowmobiles in particular, which many found to be intrusive, and rather contrary to one of the principal motivations for many recreationalists, including mountain bikers: tranquillity and escape (Cessford, 1995; Taylor, 2009) or being in nature (Skår *et al.*, 2008). Of some relevance to MTB, the beliefs that snowmobiles have negative environmental impacts, including the disturbance of wildlife, were less well supported (Vittersø *et al.*, 2010).

Of resonance to the situation in Norway, Reis and Higham (2009) explored sport hunting and recreational hiking conflict on Stewart Island, New Zealand. The island offers a number of challenging tramping (hiking) tracks and the opportunity to hunt Whitetail deer, introduced specifically for hunting in the early twentieth century. Many of the hunting *blocks*, managed annually by a ballot system, are criss-crossed by walking tracks and land users had reported tension and conflict (Reis and Higham, 2009).

The research of Reis and Higham (2009) involved 220 questionnaires, 13 in-depth interviews with recreationalists (seven hunters and six hikers) and participant observation. The surveys were randomly distributed using prescribed means to hunters, deerstalkers and visitors; interviewees were chosen with prior permission through the questionnaire respondents. Most pertinently for the Norwegian context, over 61% of hunters unsurprisingly considered the disturbance of wildlife from hikers to be an important issue; what is perhaps more unexpected is that 71% of hikers felt this way. Overall, Reis and Higham (2009: 103) concluded that as few negative experiences were reported, in either direction:

The potential for conflict, and actual manifestations of conflict, are overstated. Despite differences, hunters and hikers seem to share the space and their experiences in a manner that is generally harmonious.

It is suggested that polarized opinions could therefore arise from inevitable individual characteristics. Collectively, hikers generally accepted hunting and “reports of conflict were the exception rather than the rule” (Reis and Higham, 2009: 104).

The earlier work of Wray *et al.* (2005), in a nearby setting, employed a two-stage focus group, surveys and both ‘on-site’ and participant observation. The total number of surveys completed was 17 of hunters, 44 from visitors not spending the night, and 284 from overnight visitors, the vast majority (not specified) of the visitors being walkers. To ensure statistical significance, every visitor that passed through the area was surveyed. Stakeholders were invited onto focus groups who fitted one of three predetermined criteria. (Wray *et al.*, 2005). Although visitor conflict was often subtle, sometimes it appeared to have substantial impact; the principal differences, for example, were between short-stay/guided visitors’ and circuit walkers’ motivations and expectations. The asymmetric nature of the relationship saw the more ‘serious’ circuit walkers being annoyed by the behavior of some short-stay visitors (but not vice-versa), exemplified by those who flew into the area to go wildlife spotting.

These studies found that there are three core elements to potential conflict in this instance. In terms of *group characteristics*, the hunters tended to be male, in larger parties than the hikers, have much more luxurious food, which tends to be brought in by motorised transport, and have much greater consumption of alcohol. When spaces are shared this “can make hikers feel a bit uneasy when arriving at a hut at the end of a long day” (Reis and Higham, 2009: 100). This *possession* can be attributed, in part, to the authors’ belief that the hunters, predominantly Kiwis, are often repeat visitors, and have a greater sense of place attachment (Reis and Higham, 2009).

Related to this possession is the second element: hut *behaviour*, by both groups (Reis and Higham, 2009). There is a long tradition of back-country hut use in New Zealand, with an established, if not necessarily formal, hut etiquette; ignoring these social norms has been reported as being a source of conflict on the island (Wray *et al.*, 2005). This is less relevant in Norway where hunters have their own huts, and many do not stay overnight. Reis and Higham (2009) considered that the international nature of many hikers on the island may render them less familiar with established etiquette; a difference in attitude between independent hikers and those in guided groups may also be a factor (Wray *et al.*, 2005).

The third point of potential conflict is the attitude towards the use of *firearms and the killing of wildlife*; as Wray *et al.* (2005) reports, although there was little conflict between hunters and trampers, some of the latter disliking the nearby presence of firearms, while hunters were sometimes annoyed that visitors walked off the trail in hunting zones. Again, it was considered that it was perhaps more likely that, as hunting is part of the way of life in New Zealand, international visitors would feel more perturbed by the presence of firearms or the idea of killing animals (Reis and Higham, 2009). There was also a safety aspect to consider, with hunters on Stewart Island being “irritated on a few occasions by finding visitors walking off the trail in hunting zones” (Wray *et al.*, 2005: 48).

Some of these findings correlated with those of Vaske *et al.* (1995), who explored goal interference and social values conflicts between hunters of mountain goat and bighorn sheep and other recreational users, such as wildlife watchers, on Mt Evans in Colorado. The researchers tried to survey all ‘visitors’ to the area on randomly-selected days, with a follow-up survey; 402 such surveys were completed. ‘Regional residents’, conversely, were randomly selected from local phone directories, resulting in 200 surveys. The survey was mailed to an (unspecified) sample of people who had applied for a sheep or goat permit previously (Vaske *et al.*, 1995). It was found that actual conflict was minimal between hunters and non-hunters as Colorado state regulations ban hunting near to roads, where most of the non-hunters recreated. On the other hand, users, hunters in particular, held perceptions about inappropriate actions such as feeding or disturbing wildlife (*Ibid.*). Therefore “much of the problem stems from differences in social values held by the non-hunting public”, especially the more frequent visitors to whom Mt Evans appeared to hold greater significance as a recreational environment (Vaske *et al.*, 1995: 10).

The potential impact of llama packing on other trail users in the western USA is the focus of Blahna *et al.*’s (1995) paper. Undertaking 454 backcountry surveys and 337 longer mailback surveys, during the chosen sampling periods the authors approached each visitor group, at the end of its trip, asking them to fill out a one-page questionnaire; they were asked to give names and addresses if

they were willing to complete a longer mailback questionnaire. In all, of the mailback surveys 62% were completed by walkers, 33.5% horseback riders and 4.5% hikers with packstock (2.7% with llamas). Blahna et al. (1995) report that issues concerning the llamas were very low. Hikers felt that horseback riders were more problematic, while horseback riders' concern were over potential safety issues and the appropriateness of llamas on backcountry trails.

An interesting study from Scotland identifies the views of sporting estate landowners on threats and opportunities to their estates (MacMillan *et al.*, 2010). The principal threats were legal protection for birds of prey, poaching and public access; on estates several recreation activities were discouraged. Mountain biking was the most unpopular activity followed by canoeing and cross-country skiing. The biking and skiing were unpopular largely because participants cover large areas of ground and hence have the potential to disturb stalking activities. Income from stalking was viewed as the largest opportunity for the estates.

The findings were generated from a survey distributed to 172 randomly-selected sports estates with around a 50% response rate; the 85 responses covered 17% of all privately-owned land in Scotland (MacMillan *et al.*, 2010). The survey data were supplemented by 10 interviews of the estates owners; the most common approach to managing access identified was the use of signposts asking people to avoid the area where the stalking was taking place. Some recreationalists were felt to ignore signs, and it was felt that the imposition of a blanket ban on access would be the ideal solution, if not for the strictures of the 2003 Land Reform Act. The sporting estate owners' motivations for ownership was strongly linked to a lifestyle choice and not to maximizing benefits. Unfettered commercialization innovation and change were therefore unsought because they could undermine a comfortable and desired status quo (*Ibid.*).

It is difficult to relate these studies to the Norwegian context due to differences in legal framework, hunting and weapon culture. The density of hunters and recreationists in the field would also influence the ability for conflict. The studies detect perceived conflict to a large degree due to difference in culture and values. However, it is interesting to record the segregating model in Colorado where hunting is band near roads (or other infrastructure) where most of the recreationists stay.

5. Mountain Biking's Potential Impacts on Soil and Vegetation

As Quinn and Chernoff (2010: 15) state in their review of mountain biking's ecological effects "there has been considerable research done on the effects of mountain biking..., in part because of the commonly held perception among other recreationists that mountain biking contributes disproportionately [to these issues]". A number of academic studies have been carried out to examine the hypothesis that mountain biking causes disproportionate trail damage (Cessford, 2003). Much of this research has focused on quantifying erosion and compaction effects, created by shear and normal forces respectively (Quinn and Chernoff, 2010).

Nearly all the studies have been undertaken in either North America or Australia. These areas generally have rather different climatic characteristics to Scandinavia and Northern Europe. The results therefore need to be interpreted with some caution.

Wilson and Seney (1994) undertook one of the earliest pieces of research, in Bozeman, Montana, which has annual precipitation of 65-90cm, with 60% falling as snow. In terms of method, they conducted two sets of 50 passes over a test-trail by hikers, bikers, horse riders and motorbikes, with trail roughness and soil resistance measured and rainfall simulations applied and measured (Wilson and Seney, 1994). They found no significant difference between the effects of biking and hiking with horses causing the greatest amount of trail erosion of the, while motorbikes on wetted trails created significant impact. The authors suggest that precipitation will cause erosion even without recreational use, which may significantly outweigh the effects of use, and that factors such as trail design and construction and effective maintenance may be more important in the control of erosion (Ibid.).

In Canada, Thurston and Reader (2001) researched the effects of mountain biking and hiking in Boyne Valley Provincial Park, Ontario, which has well-drained, fine sandy loam soils. Methodologically, five different intensities of passes (from 0 to 500) were applied, and measurements of plant stem density, species richness, and soil exposure were made before and after, and again one year later. They report that "at a similar intensity of activity, the short-term impacts of mountain biking and hiking may not differ greatly in the undisturbed area of a deciduous forest habitat" (Thurston and Reader, 2001: 397). While both activities can have considerable immediate impacts, it is suggested that there would be rapid recovery if the activities were discontinued (Thurston and Reader, 2001).

Bjorkman (1996) was able to evaluate two new mountain biking trails in Wisconsin before and after development. Changes to the vegetation and soil primarily were reported as occurring in the first year after construction; soil on the trail became increasingly compacted while trailside vegetation levels were constant or increased in those areas which had been impacted by the construction process (cited in Marion and Wimpey, 2007).

In Western Australia, Goeft and Alder (2001) examined soil compaction and erosion, trail width and vegetation cover for one year, five or six times in summer and twice in winter, on both recreational and racing trails; transects representing uphill, downhill and flat sections were used. The authors report less-severe impacts than other studies, which was attributed to factors such as fewer users and different climatic and soil characteristics. In terms of the erosional impacts of mountain bike riding, downhill slopes and corners are deemed to be the most vulnerable trail segments (Goeft and Alder, 2001).

In the eastern USA, impacts to a multi-use trail network in Kentucky and Tennessee were studied by Marion and Olive (2006), these areas being characterized by generally thin and sandy soils. They measured factors such as maximum incision, to indicate soil erosion, and the cross-sectional area of soil loss, as well as observing, and photographing, pronounced changes in vegetation height, cover, composition and disturbance to organic litter. Type of use was found to be a better determinant of trail degradation than amount of use, and horse and ATV trails suffered greater degradation than biking, or hiking, trails. Mountain bike trails were found to be the

narrowest trails, and to have the least severe erosion and least amount of soil loss (Marion and Olive, 2006).

Further west, in Arizona, New Mexico and Colorado - relatively dry, warm environments - White et al. (2006: 37) found that impacts to mountain biking tracks were comparable to hiking or multiple-use trails, "and significantly less than impacts to equestrian or off-highway vehicle trails". The study focusses on measuring maximum incision and trail width, along with the identification of obvious disturbance such as changes in ground vegetation height, cover and composition. While the impacts attributable to mountain bikers were 'modest', the findings suggest a direct relationship between slope and maximum incision, especially at small to medium slope angles, and, although not measured, the authors flag erosion on medium to severe slope angles as a potential management issue.

As a graduate research project, Crealock (2002) investigated c-stratum vegetation adjacent to hiking, multi-use and biking trails in California, reporting that native plant cover decreased in areas closer to trail, while, conversely, invasive species were more likely to be found in the areas immediately next to trails. Both of these findings are relevant for of all trail's types examined (cited in Quinn and Chernoff, 2010).

Taking a different research approach, Pickering et al. (2010b: 63) examine the environmental impacts of informally-constructed 'technical trail features' on trails in a forest on Australia's Gold Coast. They conclude that impacts associated with their construction include "damage to existing vegetation including the shrub and understory, cutting of trees or harvesting of fallen timber to construct features, exposure of bare ground, [and the] movement of soil". Also exploring technical trail features, in Western Australia, Davies and Newsome (2009) sought to test a way of assessing mountain biking impacts in an area where mountain bikers have created informal trails and these features.

A recently Norwegian study reached trail damage, as trail width and deep, by mapping the effect of traffic, dry and wet conditions and the slope degree of trails. The study found trail damage when the trails were wet (increasing width) and with increasing slope (deeper trails) due to braking effects. These overall conclusions was the same in the forest as in the mountains, but the damage is also depended of soil type and the degree of roots. In some dry areas soil erosion could erase from traffic due to unfixed soils. The study does not compare biking and hiking (Hagen, Evju, Olsen, Andersen & Viestad, 2016).

In a literature review of 59 English language peer-reviewed academic journals Ballantyne and Pickering (2015) identify lack of research of nature-based activities, as biking and hiking, effects on informal trails environment in Europe. No articles were found from Norway or Sweden. There is also a knowledge gap about long term and larger-scale effects; effects on ecosystems, while most studies focused on traffic effects on the trail (e.g. width) and the edge of the trails during a little period. Most studies are also carried out in conservation areas in US and Australia as also this literature review has detected

The lack of research in environments representative to western Norway make it difficult to conclude from the literature according to trail and vegetation damage caused by hiking and biking. The Norwegian study mentioned has obvious results: increase in traffic, wet conditions and increase

in the slope would normally increase trail width (vegetation loss) and trail deep. In dry and flat environment, we could not expect more damage from biking than hiking.

6. The Impact of Mountain Biking on Wildlife

It is undoubtedly true that “many trail users and managers cite environmental impact as the reason for their disapproval of mountain biking” (Hoger and Chavez, 1998: 43). While it is generally acknowledged that some change will occur with all uses (Thurston and Reader, 2001), “environmental degradation caused by mountain biking is generally equivalent or less than that caused by hiking, and both are substantially less impacting than horse or motorized activities” (Marion and Wimpey, 2007: 14).

A considerable number of academic studies has been carried out to examine this hypothesis, with inconclusive results; in comparative terms, for example, Wilson and Seney (1994) and Chiu and Kriwoken (2003) find no significant difference between the effects of hiking and mountain biking. Grost (1989: 52) reports that erosion from activities such as mountain biking or hiking would be “insignificant when compared to the inherent erosion caused by the existence of the trail itself”. These recreational activities however, including mountain biking, can directly impact upon habitat (Marzano and Dandy, 2012), through the compaction and erosion of soil and the damage to vegetation.

In addition to these changes in habitat, recreational use of any type can impact wildlife, in two further ways: disturbance causing stress and direct impact or collision (Liddle, 1997). Marzano and Dandy (2012), in their review of the literature on recreationalists’ disturbance of flora and fauna, also identified the introduction of invasive pests and species as a potential issue, via boots, hooves or tyres for example. How wildlife is affected by recreationalists depends on a number of factors, including: detection distance, species sensitivity to disturbance, the seasonal timing of impacts; and the zone or area of impact (Quinn and Chernoff, 2010).

While studies have examined the interactions between bikers and bears (Schmor, 1999 and Herrero and Herrero, 2000), generally concluding that the relative speed and silence of mountain biking makes them more likely to disturb bears than other recreationalists, other work has more direct relevance to the Norwegian context, assessing impact on species such as deer, elk, sheep and chamois, with very different conflict implications to those associated with bears.

Taylor and Knight (2003: 957), for example, examined the responses of animals, including mule deer, to bikers and hikers in a state park in Utah, finding “little difference in wildlife response to hikers vs. mountain bikers”. Other authors have reported that hiking or walking with dogs is the most commonly reported disturbance, especially in terms of birds in open environments (see Marzano and Dandy, 2012 for a review).

While wildlife may not differentiate between user groups, and, primarily, their *flight* is merely a reaction to human presence on a trail, as animals tend to react to the *human form*, the higher speed of bikers and the lack of discussion between them when riding suggests more

unpredictable responses to their presence (Taylor and Knight, 2003). The primary concern in terms of this flight is the effect of animals fleeing from cover, disturbing their feeding patterns, energy balance and increasing the vulnerability of young (Marzano and Dandy, 2012).

Furthermore, as bikers can cover much greater distances in a set period they can potentially create greater disturbance *per unit time* (Marion and Wimpey, 2007). It was suggested that animals disturbed in the cover of trees were less likely to react than those in the open; interestingly, the perceptions of trail users interviewed in the study felt that they were able to get much closer to wildlife than the response experiments found (*Ibid.*).

Conversely, a study of response of bighorn sheep to backcountry users in Canyonlands National Park, also in Utah, concludes that hikers caused a far greater number of animals to flee than bikers: in 61% of interactions with hikers, as opposed to 6% with mountain bikers; the sheep also moved longer distances when fleeing from hikers (Papouchis *et al.*, 2001). In contrast to the study area in this research of course, Canyonlands is a much more open environment with little tree cover. It was suggested that this differential of behaviour occurred as hikers were more likely to be in unpredictable locations, away from trails, while mountain bikers were noticed from twice the distance of hikers (*Ibid.*). A further study, on the golden-cheeked warbler, suggests minimal cumulative disturbance impacts from mountain biking as an activity, even if the trails may cause a reduction in nesting habitat quality (Davis *et al.*, 2010).

Naylor *et al.* (2009), examining the response behaviour of elk, found that *both* mountain biking and hiking increased the elks' time spent *in transit*, compared to their normal behavioural routine of feeding and resting, albeit at lower levels of impact than all-terrain vehicle use. Similarly, Gander and Ingold (1997) found comparative reactions in alpine chamois in Switzerland to joggers, hikers and mountain-bikers, with similar influence on the use of habitat. Again, it is worth noting that the study was undertaken in a different environment to the project¹ study area: in pastures at 1,500-2,000 metres altitude. The authors suggest that while restrictions on mountain bikers in such habitats would be unnecessary, all three activities could prevent the chamois from using such habitats in summer (Gander and Ingold, 1997).

While the *scapegoating* of mountain bikers may account for some of the perceived difference in trail impact between users (Hoger and Chavez, 1998), and recreationalists generally are apt to hold other user groups responsible for such impacts (Symmonds *et al.*, 2003; Heer *et al.*, 2003; Marzano and Dandy, 2012), it is clear that recreational land and trail use *does* impact upon wildlife habitats, even if the results and findings about the comparative effects are relatively inconclusive. What the literature does suggest, however, is that even "wildlife impacts are greatly minimized when visitors stay on trails; wildlife has a well-documented capacity to habituate to non-threatening recreational uses that occur in consistent places" (Marion and Wimpey, 2007).

We could sum up these studies that disturbance from recreations are depended on several factors as distance to the animal, time of day and year, and kind of terrain. It is probable that high speed and little noise from biking could make disturbance due to bikers suddenly on the animal. Biking and hiking on track would make fewer disturbances to wildlife than traffic in the field due to the animal possibility to foresee the recreationist motion.

¹ Management system for multiple use of the outdoors

7. Management Approaches for Conflict Resolution

Interaction types and management tools

The issues that mountain biking presents to trail and land managers fall into a number of categories: trail design and management; safety issues, typified by conflict with other users; and issues relating to access (Chavez *et al.*, 1993). A further problem for managers is taking into account different goals for recreational experiences; *goal interference* can occur when bikers who want an exciting ride use the same trails or land as other outdoor user groups, and this can be one of the hardest issues to overcome (Chiu and Kriwoken, 2003). A range of recreation management models have been created (for example, Stankey *et al.*, 1984 and Clark and Stankey, 1990), although these have tended to be concerned with defining recreational settings or assessing ecological carrying capacity for example. As a basis for development of relevant tools for recreation management Marcouiller, Scott and Prey (Unknown) outline four interaction types: complementary, supplementary, competitive and antagonistic. The two first represent beneficial and neutral integration up to some threshold level, while the two last represent conflicting interaction. As mention these types is not static but are after our understanding influenced by scale both according to terrain, trail quality, technology, activity practice and the frequency of interaction (the scale of contestant). The authors outlined management tools related to these interaction types as encourage, monitor, regulate and separate respectively.

In our setting it is important to discuss the continuum between competitive and supplementary/complementary: How could a competitive situation be transformed into a supplementary situation, and how could we avoid a situation of no conflict to end in a conflict situation?

Change and conflict

Christopher R. Mitchell (2006) has developed a conceptual framework to discuss the above type of questions based on the relationship between change and conflict. He distinguishes between conflict *formation (creation)*; conflict *escalation*; conflict *mitigation*; and conflict *transformation*. An understanding of the dynamics of conflict formation has implications for methods of conflict transformation. We have to ask: what sorts of change *create* conflict, what changes *escalate* conflicts, what changes *diminish* conflict intensity, and what sorts of changes *transform* conflicts? Different actors could take different roles in order to avoid or stimulate change. We may have restorers who “*wish to return to the status quo or some golden age*”, or accelerators or supporters who want greater or faster change and resisters “*seeking to block changes threatening their resources, status or political influence*”. Seeking the source of conflict formation you have to look for “*prior change that disturb a social hierarchy as a driving force*” (Mitchell, 2006, pp. 5-6).

Scarcity is often a source of conflict formation, where scarcity tends to be a result of diminishing or new resources, more resource users, new forms of resource use, and so on. Conflict escalation or intensification may be stimulated by mobilisation for goal incompatibility, conflict enlargement and entrapment, as well as conflicting parties' polarisation and dissociation. To diminish conflict intensity, the direction of the process has to be changed by stimulating the opposite movement: demobilisation and de-escalation through bringing the parties together for re-communication and de-isolation. However, there are obstacles to such changes, obstacles to disengagement and de-commitment in the conflict. Such barriers may include existential issues such as income opportunities (policy determinants), individual feelings (psychological determinants), social mechanism such as "face-saving" (social norms) and institutions based on a conflict situation (political determinants).

Management styles to directly address issues associated with mountain biking has been identified as falling into three strategies: *direct*, *indirect* and *bridge building* (Chavez, 1996).

Direct Management

Those management approaches that involve some form of regulation or aim to control use or dominate users are termed *hard* or *direct* approaches (Mason, 2005). They include techniques such as trail improvements, separate trails or other forms of visitor control, such as closing trails if necessary or dispersing riders over a greater number of trails if they become too crowded (Chavez, 1997).

Some areas in the USA have even imposed fines for riding on hiking trails (Hoger and Chavez, 1998), although such direct approaches can be counterproductive and both alienate the biking population and lead to *guerrilla trails* (Centre for Recreation and Tourism Research, 2013) or illegal riding (Taylor, 2009). They may also be inappropriate in more remote areas, such as the New Zealand backcountry (Mason, 2005).

It is recognised that "where possible, mountain-bike-specific trails should be established to avoid conflicts with other trail users" (Goefit and Alder, 2001: 208). Where this is not possible multiple-use trails should be carefully designed and marked to consider all user-group needs (Moore and Barthlow, 1997). Through careful design and management they can provide good quality and safe recreational experiences for a *range* of users.

Reiter and Blahna's (2002) survey of user perceptions on the Slickrock Trail in the USA concludes that as the vast majority of respondents feel that the trails *aren't* too crowded use restrictions are not necessary. Interviewees were found to be willing to pay modest fees to fund proper trail management and believe that resource protection is considerably more important than the provision of services (*Ibid.*).

Indirect Management

Most land managers use indirect management methods, possibly because direct methods are more contentious or can be more expensive (Chavez, 1996). These methods also tend to be favoured by recreational users over heavy-handed, direct methods (Chiu and Kriwoken, 2003). In terms of mitigating the potential for conflict, for example, bikers feel that "responsible riding and attitudes

would [work], as would information on alternative places to ride” (Leberman and Mason, 2000: 36). Watson *et al.* (1991: 69) also feel that “a light-handed technique, such as education, offers potential to at least partially manage the conflict [with hikers]”.

Other *soft* approaches, such as posters, signs and brochures (Chavez, 1997), can be used to “transform visitors’ thinking and behaviour” (Mason, 2005: 192), while codes of conduct represent an effective means of *self-regulation*. As a practical example, Developing Mountain Biking in Scotland, an initiative which aims to aid co-ordination and sustainably increase the benefits which mountain biking brings to Scotland, has produced the *Highland E-guide* (Developing Mountain Biking in Scotland, 2014), a guide to mountain biking in the Scottish Highlands, which includes sections on responsible riding, landowner engagement and sustainability. It also developed *Do the Ride Thing* (Developing Mountain Biking in Scotland, no date), a guide to responsible riding, with advice on conduct in wild areas and attitudes towards other land and trail users. The earlier, and internationally recognised, International Mountain Bicycling Association code of conduct for mountain bikers, the *Rules of the Trail*, addresses similar issues (International Mountain Bicycling Association, no date).

Bridge Building and Negotiation

Bridge building is acknowledged as a more progressive management tool, which reflects possible budget restrictions and a more collaborative and integrated approach (Chavez, 1996). Some areas in the USA have been successful in organizing meetings between land or trail managers and user groups, such as local mountain bike clubs, in order to try to address conflict issues (Chavez, 1993) through a mutual process of *analysis, confrontation* and *resolution* (Schneider, 1997).

An example of two advocacy groups with disparate agendas setting aside mutual differences, the Sierra Club and the IMBA “committed to an action plan of local assistance and conflict resolution, joint conservation projects and revision of the Sierra Club policy” towards bikers (Sprung, 1997: 16). Communication with the biking community is important to incentivise riders to comply with any specific restrictions (Mosedale, 2003).

In Scotland, Developing Mountain Biking in Scotland organises its regional development into specific cluster groups. Bringing together a range of interests, including public bodies, landowners, local businesses and mountain bikers, and with an overarching aim of developing sustainable mountain biking facilities, these clusters serve as a platform to openly discuss issues and collaborate on resolving issues and implementing goals (Developing Mountain Biking in Scotland, 2011).

It is acknowledged, however, that sometimes managers are left with no alternative but to take direct action. While the management style at the Rattlesnake National Recreation Area in the USA was centred on education *and* collaborative programs it was recognised that more direct techniques of “regulations and enforcement may be required... [for the] small percentage of visitors who do not respond to the educational effort” (Watson *et al.*, 1991: 69).

Barbara Grey (1989) have developed a model describing the collaborative process in three phases: problem setting, direction setting and implementation with the following sub-elements 1: common definition of problem, commitment to collaborate, identification an legitimacy of stakeholders, convener characteristics and identification of resources, 2: establishing ground rules,

agenda setting, organizing subgroups, joint information search, exploring options and reaching agreement and closing the deal, 3: dealing with constituencies, building external support, structuring and monitoring the agreement and ensuring compliance. In a case study in the same book Gray (1989) analyse how a conflict was turned into collaboration based on the model. From this analyse we identify several interesting elements in relation to our context, such as the use of power (exchange logic) to get the stakeholders at the dialogue table and the participants focus on initial positions masking their ability to see shared interest. The long and stepwise process making common effort consisted of the participants joint information search, the impartial convener giving time to all participants to present their view, the comprehensive time spend in the more informal subgroups and the final identification of a superior common aim (Gray, 1989a).

Increasing Participation and Influencing Change

Although principally concerned with participation to influence local economic development policies, the work of Brendehaug (2013) has a generic relevance for many situations where there are competing interests and where conflicts may need to be resolved, utilising a national park policy example in Breheimen, Norway.

The author illustrates two antagonistic concepts of power relations. The *power over* scenario assumes the dominance of one partner and uses participation not so much as a means of making one's voice heard as a way to legitimise pre-ordained decisions (Brendehaug, 2013). The concept of *power with*, on the other hand, suggests a creative pluralistic approach, whereby the parties *put their cards on the table* and detail the issues that need to be evaluated, from both aspects: the harmonisation of words and actions is the goal (*Ibid.*).

These arguments have resonance for conflict-handling between private parties. Although Norwegians enjoy liberal statutory access rights under *allemannsretten*, the *right* to recreate on private lands still suggests the potential dominance of the land owner in exercising decisions and negating such a pluralistic approach. The resolution of recreational conflict still requires: common understanding of issues; intention towards participation on both sides; and potential problems of conflict to be *brought into the open*, dissected and solutions developed in collaboration (Brendehaug, 2013).

"Understanding... sources of conflict (interpersonal conflict versus conflicts in social values) is important for natural resource managers because the solution to conflict depends on the cause of the problem" (Vaske *et al.*, 1995: 2). Therefore, when conflict has been identified, there is a need for **better understanding** of the species affected, as well as "the social and cultural context of both the conflict and the options for managing it" (Young *et al.*, 2005: 1656). Resolution to conflict of this type suggests that emphasis should be placed on indirect and bridgebuilding approaches (Cessford, 2003), rather than heavy-handed direct means, although the latter may need to be considered.

In a study on tourism entrepreneurs' relationship to land owners (stakeholders) in Finland four different strategies was detected (Matilainen, & Lähdesmäki, 2014): the proactive, adaptive, negligence and community strategy. These strategies were related to Clarkson's (1995) typology: proactive, accommodative, defensive and reactive, where the negligence strategy was described as a combination of the defensive and reactive. Matilainen and Lähdesmäki's (2014) contribution was the

discovery of the community strategy, which was differentiated from the other strategies by using social pressure, in combination with social identity and social relations, to secure access to the land. The entrepreneurs did not take into account the forest owner's power to consider their access to the land, while the entrepreneur was fully integrated in the community with good relationships with both the forest owner and other inhabitants. This association could be described as a generally mutual relationship and dependency. The entrepreneur did not pay for access to work or the land through specific compensation, but took part in necessary work on the farm as a community inhabitant. A proactive strategy, in comparison, does not have this social-culture mechanism, but focuses more on a business-to-business relationship with mutual interests, for example formalised in written agreements and a willingness to pay for use of the forest (Matilainen, & Lähdesmäki, 2014).

8. Primary Research Findings on Mountain Biking Conflict

The following findings were drawn from more wide-ranging doctoral research, on mountain bikers' motivations and settings decision, undertaken in New Zealand and the UK (Taylor, 2009). As part of the research, interviewees – all experienced mountain bikers – were questioned, using open-ended, semi-structured techniques, on their feelings regarding conflict on the trail.

Meeting Other Bikers on the Trail

When the interviewees were asked about their thoughts on meeting other bikers on the trail, few negative comments were received; as other bikers form part of the *in-group* this is to be expected (Cessford, 2003). Those concerns raised over the potentially negative aspects were mostly related to perceptions of over-crowding at trail centres. Richard [pseudonyms used in this sub-section] considered: "I'd rather be on a trail where there's no-one at all... I'm not a big fan of riding where there are others". His thoughts suggest that some people do dislike meeting others on the trail, whether the other parties are bikers or not, a further reflection of the individual nature of motivations for being in the outdoors.

Meeting Hikers

Whether conflict is a real issue on the trail or merely a perceived issue based upon people's attitudes and expectations, the "introduction of large numbers of mountain bikers has changed the social situation on many popular trail systems" (Ramthun, 1995: 159). Even in countries such as Scotland or Norway, which have a very liberal attitude towards land access for bikers, the legal onus on responsible use still suggests an ongoing moral negotiation by mountain bikers to assert and secure their claims to rural space, to overcome the disruption of traditional, hegemonic and powerful user-groups (Brown *et al.*, 2008).

Those interviewees who are also hikers, or trampers, or have been previously, are able to empathise with them: "I'm aware that in no way am I an addition to the walkers' experience. Even if we get on okay and we're both polite it can't be adding anything to their experience" (George). In

the past, this conflict could have resulted from the perception of a new user group imposing itself on traditional trail users (Horn *et al.*, 1994). One of the respondents, Dorothy, alluded to it: “we both have equal rights to enjoy the environment but on the historic side of things they obviously feel that they have more ownership than we do”.

Most interviewees have only positive things to report. Simon’s experience, and viewpoint, was the most positive of the interviewees: “trampers in New Zealand are great... I’ve not met anyone here who’s been aggressive. Everyone’s a trail user, we’re all in the same boat”. Relative ambivalence towards hikers appears typical: “that’s fine. I’ve never had any problems with them” (Robert). Perhaps unsurprisingly, everyone stated that they are polite to them and considerate of their needs. Beatrice, however, felt that the side can be let down by a minority of inconsiderate riders:

I ride the tracks in Nelson assuming there will be walkers, where it is a walking track. But there are about 5% of bikers who let the 95% down by riding in an uncontrolled manner when they know somebody could be walking towards them. That’s irritating as it gives bikers a bad name.

These findings regarding interviewees’ attitudes towards hikers or trampers generally support the suggestion that mountain biking is becoming more widely recognised and accepted (Brown *et al.*, 2008). Consequently, the relationship between users on shared trails may be more positive (Cessford, 2003) than earlier studies suggest (Horn *et al.*, 1994). Where mountain biking is still a relatively recent outdoor pursuit, as it is suggested to be in the study area, attitudes between user groups may well be considerably less well-developed.

Meeting Motorised Users

Interviewees’ opinions on meeting motorised users on the trail divided them into two camps: a few who are tolerant of them, and the majority who hate the intrusion. While it is, however, generally acknowledged that they have a perfect right to use certain tracks, there are believed to be problems with the number of dirt bikers in some areas, in terms of smell, safety and noise. Many participants’ feelings are commensurate with research in Wisconsin which reports an absence of motorised vehicles as one of the most important setting characteristics for mountain bikers (Sumathi and Berard, 1997). As Elizabeth states: “there’s something about motorised transport that just doesn’t balance with this enjoyment of the great outdoors”. Her feelings are perhaps a reflection of the importance of accessing natural settings to fully enjoy the opportunities offered by mountain biking.

9. Implications for Conflict Resolution in the Sogndal Area

Comprehension of the Issues

“Understanding... sources of conflict (interpersonal conflict versus conflicts in social values) is important for natural resource managers because the solution to conflict depends on the cause of the problem” (Vaske *et al.*, 1995: 2). Therefore, when conflict has been identified, there is a need for **better understanding** of the species affected, as well as “the social and cultural context of both the conflict and the options for managing it” (Young *et al.*, 2005: 1656). Resolution to conflict of this type suggests that emphasis should be placed on indirect and bridgebuilding approaches (Cessford, 2003), rather than heavy-handed direct means, although the latter may need to be considered.

When the potential conflict between mountain bikers and hunters, both individuals’ recreation and organised *business* activities, in the Sogndal area has been defined, the academic literature reviewed suggests a number of considerations for a mutually-acceptable solution for the identified issue.

More Direct Approaches

- Overarching strategies for the co-existence of hunting and non-hunting activity, at least from a management perspective, have been suggested as zoning and education (Wray *et al.*, 2005). Where there has been actual interpersonal conflict reported, **zoning** users into different locations can be an effective solution; it is less effective where the issue is differences in the *social values* of the two groups (Vaske *et al.*, 1995). Where both groups wish to be on the same areas of land, however, this will obviously not solve the issue.
- Where there are “existing trails, consider discouraging or **restricting access** during sensitive times/seasons (e.g., mating or birthing seasons) to protect wildlife from undue stress” (Marion and Wimpey, 2007: 13): in this case the birthing season is June. Such restrictions could naturally also apply to the peak hunting season of October. As these periods coincide with periods before and after the snows respectively, however, when mountain biking activity is probable, this is also unlikely to be an acceptable compromise for mountain bikers in the area.
- A compromise might be for the landowner to provide **alternative riding trails** in less sensitive areas, heavily contingent upon the availability of suitable terrain and the compliance of riders, and with potentially significant resource implications. Collaborating with neighbouring landowners might facilitate these actions (Mosedale, 2003).
- Another approach is to improve trails’ capacity to better maintain different users at the same time.

Better Decision-making

- The further investigation of **good practice** in areas where there is established mountain biking and hunting activity (in Canada, the USA and New Zealand for example) may help to create workable solutions.
- Other suggestions, which don’t necessarily seek to find a solution but which aim to enable more informed decisions to be made include:
 - **Monitoring trends** in mountain biking activity, such as numbers, frequent, trail use, reports of interpersonal conflict; and

- Undertaking **scientific studies** that will support management responses to the issue (Mosedale, 2003).
- The **motivations, desired experiences, settings preferences** and other needs of the user groups in question need to be fully understood, to manage the conflict and anticipate future issues.

Participative Approaches

- Once the individual elements of the problem have been *brought into the open* and dissected (Brendehaug, 2013), there needs to be **holistic consideration** of the conflict, with a complete integration of social and natural elements. The neglect of certain elements of the issue can lead to an incomplete understanding of the problem and frustrated attempts to resolve it (Young *et al.*, 2005).
- The most **light-handed approach** that will achieve the desired objectives should be utilised (Hendee, *et al.*, 1990).
- Any approach to manage conflict needs the **early involvement** of all key stakeholders (Young *et al.*, 2005).
- The success of any initiative to resolve the issue will be contingent upon the **support of the local biking community** (Mosedale, 2003), with collaborative solutions developed. Failure to involve them may merely result in continued inappropriate trail use.
- There has to be the **intention to participate** on both sides (Brendehaug, 2013).
- The situation needs to include the appropriate mechanisms for **feedback and review** (Young *et al.*, 2005).

Educating Use Groups

- The **education** of mountain bikers and hunters alike has been proposed in a number of conflict scenarios (for example Chavez, 1997; Mason, 2005; Wray *et al.*, 2005; Reis and Higham, 2009), through posters, information boards, leaflets, press releases and workshops for example. Information on expected and appropriate behaviour could be coupled to interpretative material that discusses the social, cultural and environmental heritage of hunting (Reis and Higham, 2009). In the context of the conflict between hunters and hikers in New Zealand, as Reis and Higham (2009: 104) espoused:

“A focus on education through interpretation could represent a move away from management based on generalized constructions of goal interference. This would signal a shift toward a... recognition of values that are shared, to a large degree, by both hunters and hikers, and to an understanding of, and respect for, values held in common by hunters and hikers”.

References

- Adelman, B.J.E., Heberlein, T.A. and Bonnicksen, T.M. (1982) Social psychological explanations for the persistence of a conflict between paddling canoeists and motorcraft users in the Boundary Waters Canoe Area, *Leisure Sciences*, 5(1), 45 – 61.
- Ballantyne, M., & Pickering, C. M. (2015). The impacts of trail infrastructure on vegetation and soils: Current literature and future directions. *Journal of Environmental Management*, 164, 53-64. doi: 10.1016/j.jenvman.2015.08.032
- Brendehaug, E. (2013) How local participation in national planning creates new development opportunities, *Systemic Practice and Action Research*, 26, 75 – 88.
- Blahna, D.J., Smith, K.S. and Anderson, J.A. (1995) Backcountry llama packing: Visitor perceptions of acceptability and conflict, *Leisure Sciences*, 17(3), 185-204.
- Bradsher, D.J. (2003) *The relationship between past experience and multiple-use trail conflict*. Unpublished Masters Thesis, North Carolina State University.
- Brahm, E. (2003) Latent conflict stage. In G. Burgess and H. Burgess (Eds.) *Beyond Intractability*. Conflict Information Consortium, University of Colorado, Boulder.
- Brown, K. M. (2014). Spaces of play, spaces of responsibility: Creating dichotomous geographies of outdoor citizenship. *Geoforum*, 55(0), 22-32. doi: <http://dx.doi.org/10.1016/j.geoforum.2014.05.002>
- Brown, K.M., Marshall, K. and Dilley, R. (2008). Claiming rights to rural space through off-road cycling. Paper presented at the Annual Meeting of the Association of American Geographers, Boston, Massachusetts, April 15-19 2008.
- Bury, R. L., Holland, S. M. and McEwen, D. N. (1983) Analyzing recreational conflict. *Journal of Soil and Water Conservation*, 38, 401–403.
- Butler, T. (2003) A wilderness view. *Wild Earth*, 13(1).
- Carothers, P., Vaske, J.J. and Donnelly, M. (2001) Social values versus interpersonal conflict among hikers and mountain bikers. *Leisure Sciences*, 23(1), 47 – 61.
- Centre for Recreation and Tourism Research (2013) *Review of mountain biking developments and potential opportunities in the Scottish Enterprise area*. Centre for Recreation and Tourism Research, University of the Highlands and Islands, Scotland.
- Cessford, G.R. (1995) *Off-road mountain biking: A profile of participants and their recreation setting and experience preferences*. Science and Research Series No. 93. Science and Research Division. Department of Conservation, Wellington, New Zealand.
- Cessford, G.R. (2003) *Perception and reality of conflict: Walkers and mountain bikes on the Queen Charlotte Track in New Zealand*. Science and Research Unit. Department of Conservation, Wellington, New Zealand.

- Chavez, D.J. (1996) Mountain biking: direct, indirect, and bridge building management styles. *Journal of Park and Recreation Administration*, 14(4), 21 – 35.
- Chavez, D.J. (1997) Mountain bike management: Resource protection and social conflicts. *Trends*, 34(3), 36 – 40.
- Chavez, D.J., Winter, P.L. and Baas, J.M. (1993) Recreational mountain biking: a management perspective. *Journal of Parks and Recreation Administration*, 11(3), 29 – 36.
- Chiu, L. and Kriwoken, L. (2003) Managing recreational mountain biking in Wellington Park, Tasmania, Australia. *Annals of Leisure Research*, 6(4), 339 – 361.
- Clark, R.N. & Stankey, G.H. (1990) The recreation opportunity spectrum: A framework for planning, management and research. In R. Graham & R. Lawrence (Eds.) *Towards Serving Visitors and Managing our Resources*. Proceedings of a North American Workshop on Visitor Management: Perspectives of Several Canadian and United States Park, Protected Area and Natural Resource Management Agencies. Tourism Research and Education Centre, University of Waterloo, 127 – 158.
- Connelly, N.A., Dawson, C.P. and Brown, T.L. (2004) *Comparative analysis of visitor attitudes and preferences in three Adirondack management areas*. Proceedings of the 2004 Northeastern Recreation Research Symposium, GTR-NE-326, 231 – 239.
- Countryside Agency (2001) *How people interact on off-road routes*. Research Note CRN 32, March 2001.
- Dalen, L. (2011). *Undersøkelse om bruk av Oslomarka*. Oslo: Synnovate.
- Davies, C. and Newsome, D. (2009) *Mountain bike activity in natural areas: Impacts, assessment and implications for management – a case study from John Forrest National Park, Western Australia*. CRC for Sustainable Tourism Pty, Australia.
- Davis, C.A., Leslie Jr, D.M., Walter, W.D. and Graber, A.E. (2010) Mountain biking trail use affects reproductive success of nesting Golden-Cheeked Warblers. *The Wilson Journal of Ornithology* 122(3):465 – 474
- Developing Mountain Biking in Scotland (2011) *Tayside & Fife development cluster: Regional development plan, 2011-2015*. Developing Mountain Biking in Scotland.
- Developing Mountain Biking in Scotland (2014) *Highland e-guide: Mountain biking in Scotland*. Available from: <http://www.highlandeguide.co.uk/> (Accessed 1st January 2015).
- Developing Mountain Biking in Scotland (no date) *Do the ride thing: A guide to responsible mountain biking in Scotland*. Available from: [http://www.dmbins.com/files/Do the Ride Thing.pdf](http://www.dmbins.com/files/Do_the_Ride_Thing.pdf) (Accessed 1st January 2015).
- Flemsæter, F., Setten, G., & Brown, K. M. (2014). Morality, mobility and citizenship: Legitimising mobile subjectivities in a contested outdoors. *Geoforum*(0). doi: <http://dx.doi.org/10.1016/j.geoforum.2014.06.017>
- Gander, H. and Ingold, P. (1996) Reactions of male Alpine Chamois *Rupicapra r.rupicapra* to hikers, joggers and mountainbikers. *Biological Conservation*, 79, 107 – 109.

Goedt, U. and Alder, J. (2001) Sustainable mountain biking: A case study from the southwest of Western Australia. *Journal of Sustainable Tourism*, 9(3), 193 – 211.

Gray, B. (1989). *Collaborating : finding common ground for multiparty problems*. San Francisco, Calif: Jossey-Bass.

Grey, B. (1989a). Turning Conflict into Collaboration: A Case Study. In B. Grey (Ed.), *Collaborating. Finding common ground for multiparty problems*. San Francisco, Calif: Jossey-Bass management series.

Grost, R.T. (1989) Managing the mountain bike. *American Forests*, 95(3 - 4), 50 – 57.

Hagen, D., Evju, M., Olsen, S. L., Andersen, O., & Vistad, O. I. (2016). Effekt av sykling og riding på vegetasjon langs stier NINA-rapport. Traondheim: NINA.

Heer, C., Rusterholz, H-P. and Baur, B. (2003) Forest perception and knowledge of hikers and mountain bikers in two different areas in northwestern Switzerland. *Environmental Management*, 31(6), 709 – 723.

Hendee, J.C., Stankey, G.H. and Lucas, R.C. (1990) *Wilderness Management*. Golden, Colorado: North American Press.

Herrero, J. and Herrero, S. (2000) *Management options for the Moraine Lake highline trail: Grizzly bears and cyclists*. Parks Canada.

Hoger, J.L. and Chavez, D.J. (1998) Conflict and management tactics on the trail. *Parks and Recreation*, 33, 41 – 56.

Horn, C., Devlin, P. and Simmons, D. (1994) *Conflict in recreation: The case of mountain-bikers and trampers*. Department of Conservation, Wellington, New Zealand.

International Mountain Bicycling Association (2006) *2006 IMBA report card*. Available from: http://www.imba.com/news/news_releases/12_06/12_21_report_card.html (Accessed 21 June 2007).

International Mountain Bicycling Association (no date b) *International IMBA rules of the trail*. Available from: http://www.imba.com/international/rules_intern.html (Accessed 21 August 2007).

Ivy, M. I., Stewart, W. P., and Lue, C. (1992) Exploring the role of tolerance in recreational conflict. *Journal of Leisure Research*, 24, 348 – 360.

Jackson, E. L. & Wong, R. (1982) Perceived conflict between urban cross-country skiers and snowmobiles in Alberta. *Journal of Leisure Research*, 14, 47 – 62.

Jacob, C. R. and Schreyer, R. (1980) Conflict in outdoor recreation: A theoretical perspective. *Journal of Leisure Research*, 12, 368 – 380.

Jellum, C.M. (2007) *Managing Mountain Bike Recreation and User Conflicts: A Case Study on Mt. Baker-Snoqualmie National Forest, Washington State*. Unpublished Master of Science thesis, Central Washington University.

- Knopp, T. B. and Tyger, J. D. (1973) Study of conflict in recreational land use: Snowmobiling vs. ski-touring. *Journal of Leisure Research*, 5, 6 – 17.
- Leberman, S. and Mason, P. (2000) Mountain biking in the Manawatu region: Participants, perceptions, and management decisions. *New Zealand Geographer*, 56(1), 30 – 38.
- Liddle, M. (1997) *Recreation Ecology: The Ecological Impact of Outdoor Recreation and Ecotourism*. Chapman & Hall.
- Lime, D.W. (1975) *Sources of congestion and visitor dissatisfaction in the Boundary Waters Canoe Area*. Proceedings, Quetico-Superior Foundation 1975 Institute on the Boundary Waters Canoe Area, 68-82.
- Lucas, R. C. (1964) *The recreation capacity of the Quetico-Superior area* (Research Paper LS-15). St. Paul, MN: Lake States Experiment Station.
- MacMillan, D. C., Leitch, K., Wightman, A., & Higgins, P. (2010). The Management and Role of Highland Sporting Estates in the Early Twenty-First Century: The Owner's View of a Unique but Contested Form of Land Use. *Scottish Geographical Journal*, 126(1), 24-40. doi: 10.1080/14702540903499124
- Mann, C. and Absher, J.D. (2008) Recreation conflict potential and management implications in the northern/central Black Forest Nature Park. *Journal of Environmental Planning and Management*, 51(3), 363 – 380.
- Marcouiller, D., Scott, I., & Prey, J. (Unknown). Addressing recreation conflict: Providing a conceptual basis for management. University of Wisconsin.
- Marion, J.L. and Olive, N. (2006) *Assessing and understanding trail degradation: Results from Big South Fork National River and Recreation Area*. USGS Patuxent Wildlife Research Center/National Park Service Research Report.
- Marion, J. and Wimpey, J. (2007) *Environmental impacts of mountain biking: Science review and best practices*. International Mountain Bicycling Association.
- Marzano, M. and Dandy, N. (2012) Recreationist behaviour in forests and the disturbance of wildlife. *Biodiversity Conservation*, 21, 2967 – 2986.
- Mason, P. (2005) Visitor management in protected areas: From 'hard' to 'soft' approaches. *Current Issues in Tourism*, 8(2 and 3), 181 – 194.
- Matilainen, A., & Lähdesmäki, M. (2014) Nature-based tourism in private forests: Stakeholder management balancing the interests of entrepreneurs and forest owners? *Journal of Rural Studies*, 35(0), 70-79.
- Mitchell, C. R. (Producer). (2006). Conflict, Social Change and Conflict Resolution. An Enquiry. Handbook Dialogue Series nr.5 [Leading article]
- Moore, R.L and Barthlow, K. (1997) Principles for minimizing trail conflicts: Applications to mountain biking. *Trends*, 34(3), 11 – 14.

- Mosedale, J. (2003) *Mountain Biking in the Canadian Rocky Mountains: A Situational Analysis*. Case Study on Mountain Tourism and the Conservation of Biological and Cultural Diversity, Mountain Forum E-consultation for the UNEP/ Bishkek Global Mountain Summit.
- Moyle, B. And Croy, G. (2007) Crowding and visitor satisfaction during the off-season: Port Campbell National Park. *Annals of Leisure Research*, 10(3/4), 518 – 531.
- Naylor, L.M., Wisdom, M.J. and Anthony, R.G. (2009) Behavioural responses of North American elk to recreational activity. *Journal of Wildlife Management*, 73(3), 328 – 338.
- Newsome, D. and Davies, C. (2009) A case study in estimating the area of informal trail development and associated impacts caused by mountain bike activity in John Forrest National Park, Western Australia. *Journal of Ecotourism*, 8(3), 237 – 253.
- Papouchis, C.M, Singer, F.J. and Sloan, W. (2001) Responses of Desert Bighorn sheep to increased human recreation. *Journal of Wildlife Management*, 65(3), 573 – 582.
- Pickering, C.M. and Hill, W. (2007) Impacts of recreation and tourism on plant biodiversity and vegetation in protected areas in Australia. *Journal of Environmental Management*, 85, 791 – 800.
- Pickering, C.M., Hill, W., Newsome, D. And Leung, Y.F. (2010a) Comparing hiking, mountain biking, and horse riding impacts on vegetation and soils in Australia and the United States of America. *Journal of Environmental Management*, 91(3), 551 – 562.
- Pickering, C.M., Castley, J.G., Hill, W. and Newsome, D. (2010b) Environmental, safety and management issues of unauthorised trail technical features for mountain bicycling. *Landscape and Urban Planning*, 97, 58 – 67.
- Quinn, M. and Chernoff, G. (2010) *Mountain biking: A review of the ecological effects*. A Literature Review for Parks Canada – National Office (Visitor Experience Branch).
- Ramthun, R. (1995) Factors in user group conflict between hikers and mountain bikers. *Leisure Sciences*, 17, 159 – 169.
- Reis, A.C. and Higham, J.E.S. (2009) Recreation conflict and sport hunting: Moving beyond goal interference towards social sustainability, *Journal of Sport & Tourism*, 14(2-3), 83 – 107.
- Reiter, D.K. and Blahna, D.J. (2002) Slickrock Trail mountain bike survey: Implications for resource managers and area communities. *Utah Recreation and Tourism Matters*. Institute for Outdoor Recreation and Tourism, Utah State University. No. NR/RF/012, April 2002.
- Rossi, S., Pickering, C.M. and Byrne, J. (2012) *Differences among hikers, runners and mountain bikers in a peri-urban park*. MMV6, Stockholm.
- Schmor, M.R. (1999) *An exploration into bear deterrents, as related to mountain biking, and the design of an ultrasonic bear warning device*. Masters Degree Project, Faculty of Environmental Design, University of Calgary.
- Schneider, I. (1997) Conflict resolution: Opportunities and challenges in recreation management. *Trends*, 34, 26 – 28.

Skår, M., Odden, A. and Vistad, O.I. (2008) Motivation for mountain biking in Norway: Change and stability in late-modern outdoor recreation. *Norsk Geografisk Tidsskrift - Norwegian Journal of Geography*, 62(1), 36 – 45.

Snyder, A. P. (1966) Wilderness management - a growing challenge. *Journal of Forestry*, 441 – 446.

Sprung, G. (1997) Mountain biking can foster progressive management. *Trends*, 34(3), 15 – 17.

Sumathi, N.R. and Berard, D.A. (1997) *Mountain Biking in the Chequamego Area of Northern Wisconsin and Implications for Regional Development*. University of Wisconsin. Available from: <http://www.cambatrails.org/research-econ-impact.html> (Accessed 4th February 2009).

Symmonds, M.C., Hammitt, W.E. and Quisenberry, V.L. (2000) Managing recreational trail environments for mountain bike user preferences. *Environmental Management*, 25(5), 549 – 564.

Stankey, G.H., McCool, S.F. and Stokes, G.L. (1984) Limits of acceptable change: A new framework for Managing the Bob Marshall Wilderness. *Western Wildlands*, 10(3), 33 – 37.

Taylor, A.R. and Knight, R.L. (2003) Wildlife responses to recreation and associated visitor perceptions. *Ecological Applications*, 13(4), 951 – 963.

Taylor, S. (2010). *'Extending the dream machine: Understanding dedicated participation in mountain biking*. PhD Thesis, University of Otago, Dunedin.

Thurston, E. and Reader, R. J. (2001) Impacts of experimentally applied mountain biking and hiking on vegetation and soil of a deciduous forest. *Environmental Management*, 27(3), 397 – 409.

Tumes, K. (2007) Out of my way: Using qualitative methods to understand recreation conflict between bushwalkers and mountain bike riders. *Anthropological Notebooks*, 13(1), 45 – 55.

Vaske, J. J., Donnelly, M. P., Wittmann, K. and Laidlaw, S. (1995) Interpersonal versus social values conflict. *Leisure Sciences*, 17, 205 – 222.

Vittersø, J., Chipeniuk, R., Skår, M. and Vistad, O.I. (2004) Recreational conflict is affective: The case of cross-country skiers and snowmobiles. *Leisure Sciences*, 26(3), 227 – 243.

Watson, A.E., Williams, D.R. and Daigle, J.J. (1991) Sources of conflict between hikers and mountain bike riders in the Rattlesnake NRA. *Journal of Park and Recreation Administration*, 9(3), 59 – 71.

Watson, A.E., Niccolucci, M.J. and Williams, D.R. (1994) The nature of conflict between hikers and recreational stock users in the John Muir Wilderness. *Journal of Leisure Research*, 26(4), 372 – 385.

White, D.D., Waskey, M.T., Brodehl, G.P. and Foti, P.E. (2006) A comparative study of impacts to mountain bike trails in five common ecological regions of the southwestern U.S. *Journal of Park and Recreation Administration*, 24(2), 21-41.

Wilson, J.P. and Seney, J.P. (1994) Erosional impacts of hikers, horses, motorcycles and off-road bicycles on mountain trails in Montana. *Mountain Research and Development*, 47(1), 77 – 88.

Wray, K., Harbrow, M., & Kazmierow, B. (2005) Planning for visitor management at Mason Bay (Rakiura National Park, Stewart Island). *DOC Research & Development Series 222*, Wellington: Science & Technical Publishing, Department of Conservation.

Young, J., Watt, A., Nowicki, P., Alard, D., Clitherow, J., Henle, K., Johnson, R., Laczko, E., McCracken, D., Matouch, S., Niemela, J. and Richards, C. (2005) Towards sustainable land use: Identifying and managing the conflicts between human activities and biodiversity conservation in Europe. *Biodiversity & Conservation*, 14(7), 1641 – 1661.

Sameien, T., & Authen, A. J. (2014). *Oslomarka – tur-mekka eller slagmark? En deskriptiv studie av årsaker til brukerkonflikt mellom stisyklister og turgåere*. Bachelor, Sogn og Fjordane University College, Sogndal.

Gray, B. (1989). *Collaborating : finding common ground for multiparty problems*. San Francisco, Calif: Jossey-Bass.