

# Outdoor recreation: from analysing motivations to furthering ecologically responsible behaviour

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## Abstract

Outdoor-recreation activities can have negative effects on nature. The Swiss authorities and sport associations have, therefore, been trying to encourage people to behave more responsibly towards nature during outdoor recreation. To provide scientific support for this, the study aimed at: 1) clarifying people's motivations for outdoor recreation and in particular how important experiencing nature is for them; 2) analysing the predictors of ecologically responsible recreation behaviour according to Ajzen's theory of planned behaviour, and 3) evaluating concrete intervention measures to further such behaviour. To this end qualitative interviews, a representative survey as well as intervention experiments were conducted in Switzerland. The results of the nationwide survey showed that "experiencing nature" is one of the most important motivational factors, whereas experiencing thrill is not as important as it is often assumed. Regression models revealed the importance of Ajzen's general predictors of ecological behaviour as well as the significance of specific factors such as landscape preferences. Combining prompts and information, and providing suitable infrastructure are recommended to encourage people to be more ecologically responsible in their outdoor recreation.

Keywords: nature, landscape, behaviour, outdoor activities, leisure, social science, survey, intervention experiments, evaluation

## 1 Introduction

### 1.1 Description of the problem and the starting point

The recreational use of nature and landscape has increased in recent decades and is expected to increase further in the future. This development can cause ecological problems: outdoor recreation activities like off-piste skiing, picnicking, mountain biking, paragliding, dog walking, etc. can have negative impacts on the natural environment. They result in, for example, littering, damage to the soil and vegetation through trampling and, in particular, disturbance of wildlife habitats, according to various environmental organisations (e.g. Mountain Wilderness), authorities (e.g. the Swiss Landscape Concept; BUWAL 1998 and conservation biologists (e.g. INGOLD 1999, 2005). The current literature lists a broad range of very specific, but difficult to verify, potential impacts on nature and landscape (e.g. BAUR 2003).

In our study we have concentrated on two main fields of potential negative impacts: the influence on wildlife and on the soil and vegetation.

According to INGOLD (1999) the disturbance of wild animals has the most far-reaching impacts and can cause the loss of important parts of their habitat and have a negative effect on their state of health. They may lead to a decrease in fertility and eventually extinction.

The second area of negative impact is the effect of outdoor activities, such as picnicking, barbecue and downhill biking on the vegetation and soil in forests or areas close to forests. BAUR (2003), INGOLD (2005) and TESTER (1990) provide very concrete examples of damage to forests caused by recreation activities, destruction of plants, bushes and young trees in the areas near the activity, damage to tree bark and the loss of undisturbed areas (BAUR 1999). Picnicking near rivers or streams can also disturb breeding and young birds (INGOLD 2005).

According to the Swiss Landscape Concept (BUWAL 1998), action must be taken to encourage people to behave responsibly towards nature and landscape. But attempts in this direction do not seem to have been very successful so far, probably due to insufficient knowledge about psychological factors like motivation and attitudes and their influence on people's willingness to behave ecologically responsibly. It has been, in particular, unclear whether individuals' relationships with nature influence their recreation behaviour. It is often assumed that it will, particularly when intervention measures such as prompts, chartas, and information are applied (DWYER *et al.* 1993; STREMLow 1998). But it has been unclear whether those who engage in outdoor recreation are conscious and sensible about the effect of their behaviour or if there is a lack of knowledge about nature and landscape.

In addition, the success of attempts to influence recreational behaviour has not yet been specifically evaluated. Thus, the overall objective of our study was to contribute to filling these gaps and thus support the authorities in ensuring that outdoor recreational activities do the least possible damage to nature and landscape.

## 1.2 State of research

Although there is extensive scientific literature on recreation research (e.g. GARTNER and LIME 2000; WESSELY and SCHNEEBERGER 1999), people's motivations for outdoor recreation have only been investigated by a few authors (JACKSON and BURTON 1999; ISO-AHOLA 1999; 2000; RHEINBERG 1993). For example, RHEINBERG (1993) identified 15 main clusters that could relate to important motives for outdoor recreation. These include self-evaluation, acceptance, solitude, identification, adventure/sensation seeking and flow, as well as, the sensual experience of nature.

BEARD and RAGHEB (1983) classified people's reasons for participating in recreational activities into four major categories: intellectual, i.e. involving learning and creativity; stimulus avoidance, i.e. relaxing and avoiding stressful situations; social, i.e. involving the friendship and esteem of others and competence/mastery, which includes achievement, mastery, challenge and competition, and is often physical in nature.

BEIER (2000) investigated 244 people regarding their motivation for their outdoor activities. The most important motives were experiencing nature (with women tending to experience being outdoors more strongly than men), social aspects and improvement of fitness, health and/or performance (more important for the men than the women). The results indicate that there is no stereotype of a "typical outdoor recreationist", but many different types associated with different sports. This diversity poses a challenge for recreation research just as the diverse and broad spectrum of ecological problems does in ecology. One of the first steps in our study was to analyze and systemize this diversity. We could then identify the right indicators to predict behaviour.

Explaining and predicting environmental behaviour has become a key issue in environmental-psychological research in recent decades (e.g. KAISER *et al.* 1999; FREY *et al.* 1990).

One influencing factor is people's knowledge. It is commonly assumed that what people know directly influences how environmentally friendly their behaviour is (STERN 1992), but other theories and findings indicate that knowledge only indirectly influences behaviour (HINES *et al.* 1986; KAISER and FUHRER 2003). ARCURY (1990) and GELLER (1995) suggest that knowledge influences behaviour via attitudes. Other authors suggest that knowledge acts via perceived behavioural control of behaviour (e.g. DE YOUNG 2000). In their very profound study of knowledge, FRICK *et al.* (2004) found that action-related knowledge and effectiveness knowledge have a direct effect on behaviour, but system knowledge has only a mediated effect via the other two knowledge types.

An important starting point for understanding environmental behaviour was the theory of planned behaviour (AJZEN and MADDEN 1986). According to AJZEN (1991), this model can be used to explain all kinds of intentional social behaviour. Moreover "it is the most extensively studied social cognition theory, and is relevant to both intention and behaviour change" (HARDEMAN *et al.* 2002). It has been applied in various fields of environmental psychology, from the "environmental attitude as a powerful predictor of ecological behaviour" (KAISER *et al.* 1999) to "approaches for the reduction of car-use in a small town" (HUNECKE *et al.* 1999). And there have also been initial attempts to apply it in the context of recreation activities. AJZEN and DRIVER (1992) demonstrated how the model can be applied to predict recreation behaviour. We therefore used it as a theoretical basis for our empirical model to predict ecologically responsible recreation behaviour on the basis of attitudes, motivations, and other factors.

One of the central parts of the theory of planned behaviour is attitudes towards intervention measures, especially any changes in attitudes and behaviour, and their empirical verification.

When focusing on changing attitudes and behaviour, environmental-psychological intervention research mostly involves exploring human behaviour in natural settings with every day scenes and environments (MOSLER-BERGER and MOSLER 2005; HARDEMAN *et al.* 2002; BAMBERG and SCHMIDT 2003). DWYER *et al.* (1993) describe three different interventional ways, to cause a change in behaviour: 1) through communicative strategies, 2) using stimuli, or rather antecedent or demanding strategies, and 3) specifying consequences, e.g. feedback, rewards or penalties. MOSLER and GUTSCHER (1998) describe some potential behaviour-oriented interventions including prompts/signs/notes, rewards/gratification, competition and role model behaviour.

Analysing the literature led us to the following conclusions:

- Outdoor recreation does pose an ecological problem which is diverse and rather diffuse.
- Little research has been done on analysing the motivational (especially the intentional) background of recreational behaviour.
- The "theory of planned behaviour" has already been empirically corroborated in numerous studies, including one on recreation (AJZEN and DRIVER 1992), but not yet in the field of unorganised outdoor recreation.
- Traditional psychological research investigating changes in attitudes and behaviour has been conducted mostly in laboratory settings. This makes it difficult to generalise from the results. External validity can be improved by investigating "real-life"-phenomena. Therefore environmental psychological research methods mostly involve quasi-experiments under field-reality conditions.
- No attempts have been made to combine theories, surveys and intervention experiments when evaluating concrete strategies to promote responsible behaviour during outdoor recreation.

### 1.3 Aims

To provide scientific support for authorities, environmental organisations, and others who want to further ecologically responsible recreation behaviour, we set the following three main aims<sup>1</sup>:

- 1) To analyse the motivational structure of outdoor-recreation activities and to investigate to what extent experiencing nature and landscape could be such a motive.
- 2) To identify the predictors of ecologically responsible recreation behaviour.
- 3) To evaluate experimentally concrete intervention strategies and measures promoting responsible behaviour towards nature.

## 2 Methods

### 2.1 Procedures and instruments

This study involved five methodical steps:

- 1) In the pre-study, expert interviews were conducted in order to identify those outdoor-recreation activities that are most relevant because they are the most frequent, they have considerable impact on nature, or they are unorganised and thus difficult to guide. 31 such activities were identified (and considered in the deductive part).

Not all 31 activities could be included in the subsequent inductive and later experimental part due to the limitations of our time-consuming, but thorough methodical approach. Thus, two highly typical and frequent activities occurring in different seasons with some main characteristics (trend/traditional) were sought for. Based on expert interviews and literature analyses, free-riding (skiing/snowboarding off-piste) and picnicking (compare e.g. BAUR 1999 and 2003) were selected. This selection was supported by the results of the nation-wide survey, which indicated that picnicking was especially frequent.

- 2) In the inductive part, problem-centred interviews (WITZEL 1985) were conducted with individuals practising the selected outdoor activities. The analysis of this qualitative data revealed deep insights into the different motivations for these activities and into possible predictors of responsible behaviour towards nature and landscape. The results of this part served as a basis for the design of the following parts.

- 3) Model development: Based on the theory of planned behaviour (AJZEN and MADDEN 1986), other literature and the results of the inductive part, a theoretical model was developed. This consisted of the (assumed) most relevant predictors of ecologically responsible recreation behaviour (Fig. 1), i.e. of the original "Ajzen-factors": attitude towards the behaviour, subjective norm, and perceived behaviour control, which explain intention and finally behaviour. We extended this model by including factors from the inductive research part and from theories of motivation (RHEINBERG 1993), attitude towards nature and landscape, perception of problems (HUNECKE *et al.* 1999), acceptance of behaviour-measures,

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<sup>1</sup> Please note: this publication is intended as an overview of the three main results of our study (survey, model and interventions) so that the reader can understand the inter-relationships between these parts. Unfortunately this means that we have had to focus on only the main steps and results. For further details, see ZEIDENITZ (2005).

knowledge and external factors (e.g. lack of such resources as time or money, and unexpected events). The central factor “ecologically responsible behaviour” was measured as four actual forms of behaviour: “no damage to vegetation”, “no disturbance of wild animals”, “no littering” and “using public transport”.

4) In the deductive part a representative nation-wide postal survey with a highly standardised questionnaire was conducted in Switzerland ( $n = 1340$  completed questionnaires) to test the established model and to gain representative quantitative data regarding the motivations and the importance of experiencing nature and landscape as such a motive. The questionnaire consisted of questions about whether and how often respondents participated in the 31 activities as well as about their motives. Most of the questionnaire consisted of likert-items, which expressed the above-mentioned model factors in the form of textual statements. One to three items were used to operationalise each factor. A five-point scale was used for respondents to indicate their answers: “fully agree, rather agree, partially agree, rather disagree, completely disagree”.

5) In the experimental part the actual effect of the intervention measures on how ecologically responsible people behaved during outdoor recreation was experimentally tested in order to scientifically evaluate behaviour-changing strategies. For this purpose one experiment was conducted for each of the two selected outdoor leisure activities, free-riding and picnicking.

In the first experiment we investigated the effect of measures that aimed at persuading people not to cut barbecue sticks when picnicking by a river (a traditional summer activity) near Zurich. This was considered by experts to be ecologically highly problematic.

Drawing on MOSLER and GUTSCHER (1998) as well as the results of the inductive and deductive research steps, we used a) prompts with limited information, and b) prompts with infrastructure (in the form of industrially produced wooden sticks, which were a concrete behaviour alternative) at the entrances of the chosen area as interventions (“treatments”). For comparison (control group), we applied c) “nothing”. The different treatments (two interventions and the “no-intervention”) were conducted during different weeks in the same area.

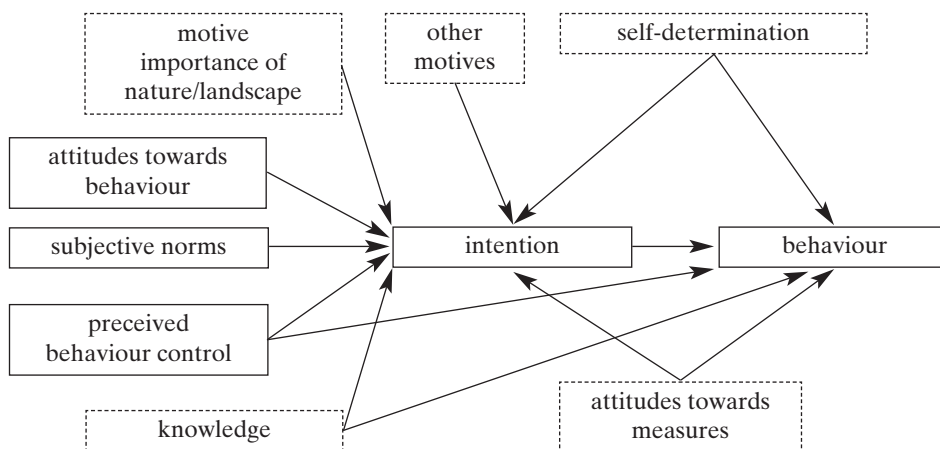


Fig. 1. The theoretical model with the original “Ajzen-factors” (boxes with continuous lines) and the inductively gained factors (boxes with broken lines) as predictors of ecologically responsible recreation behaviour.

The intention “not to cut sticks” (and other ecological intentions) was measured by means of a standardised questionnaire handed out to all visitors who passed the intervention point (if any). It was not possible to observe actual behaviour as a measurement of the behaviour effect for privacy reasons. Instead, we observed a behaviour indicator, i.e. the use of the sticks provided (only possible during the infrastructure-intervention days).

In the second experiment we tested the effect of strategies (interventions) that aimed at persuading people not to pass through forests (which was again defined by experts as ecologically problematic) when free-riding in ski resorts in the Alps (a trendy activity). To test the effect of the interventions we applied an experimental pre-post design on ski buses from Zurich to a skiing area.

We again used a) prompts with limited information, and b) prompts with extensive detailed information for the interventions (“treatments”) and c) “nothing” for the control group. The effects of the two interventions and “no-intervention” were investigated on several ski buses that depart from Zurich to ski resorts every Saturday and Sunday morning and return to Zurich in the evening. This situation provided an ideal setting for a pre-post measurement of the intention and (stated) actual ecologically responsible behaviour as well as for the comparison of different “treatments”.

The pre-post procedure involved several steps: during the outward journey a first questionnaire was distributed to the people in the bus to find out how they reported their past behaviour in terms of the average time they usually spent off-piste, in particular in forests. Then the treatments took place, which means that flyers with prompts and more or less information were handed out. The control group received nothing. During the day at the ski resort the participants performed their activities, i.e. skiing and snowboarding on- and off-piste. During the return journey a second questionnaire was distributed asking respondents how they had spent the day, again in terms of time off-piste, in particular in forests.

## 2.2 Samples

The inductive step consisted of only nine interviews, including two “experts” for each of the activities. They were selected by the theoretical-sampling strategy (HUNZIKER 1995, 2000; STRAUSS 1991), which allows exploration of problems with small sample sizes.

For the nationwide mail survey, a stratified random sample of 5217 subjects was drawn from the national telephone directory for the German- and French-speaking parts of the Swiss population (provided by the Swiss Federal Agency of Statistics, BFS). 1340 subjects returned completed questionnaires, which represents a response rate of 25.7 %. With 48.6 % female and an age distribution from 16 to 93, comparable to the real one in Switzerland, the resulting sample can be considered as representative of the German- and French-speaking parts of Switzerland.

In the experimental part 41 free-riders, between the age of 12 and 47 and 94 picnickers aged 15 to 60 were included in the experiments.

## 2.3 Analysis

We used thematic content analysis (LAMNEK 1989) to analyse the data obtained in both the pre-study and the inductive phase. Descriptive and multi-variate statistics were applied for data analyses during the deductive and experimental steps.

### 3 Results

In the following we will concentrate on the results of the deductive step, i.e. the representative nation-wide postal survey, in particular the motives and the behaviour model, and the experimental step, i.e. the two intervention experiments.

#### 3.1 Frequency of participation in outdoor-recreation activities

The results of the nation wide survey revealed that the majority of the population (55.2 %) picnic sometimes. Thus, as we assumed based on the pre-phase, it represents a very typical outdoor-recreation activity with a high impact on nature as so many people picnic. It therefore made sense to select it as one of the two activities that should be analysed more deeply analysed during the inductive and experimental parts of the project. In contrast, only a few people (10.0 %) are skiing and snowboarding off-piste, which confirms its typicality too. We also asked for the frequency and the perceived individual importance of the activities and recognised that those who are skiing or snowboarding off-piste do it rather often and consider it as important. Thus, the quantitative impact on nature might be quite large, which again legitimises its selection for deeper analyses.

#### 3.2 Motivation for outdoor-recreation activities

The results of the nationwide survey showed that “experiencing scenic beauty and nature”, “recreation/relaxation” and “wellness/fitness” are the most important motives, whereas “adventure/thrill” and “saving costs” are not as important as it is often assumed.

The motives of the two selected activity groups tended to be rather different (Fig. 2): the group of free-riders are significantly more motivated by “adventure and thrill” than the picnickers are. But nevertheless, experiencing nature and landscape is one of the most important motives for both of the investigated activity groups. The question, however, remains, whether the motive of experiencing landscape and nature could also influence people to behave in an ecologically responsible way, as we discuss in the next section.

#### 3.3 Model evaluation: predictors of ecologically responsible recreation behaviour

The central focus of this study was on potential predictors of ecologically responsible recreation behaviour and its motivation. To this end we calculated several multiple regression models to test the theoretical behaviour model. We used three separate models for the groups: all participants ( $n = 1340$ ), only free-riders ( $n = 116$ ), and only picnickers ( $n = 740$ ).

In a first step we checked which factors explain people’s intention to behave responsibly towards nature in general. Intention as a dependent variable was here coded as “general responsible behaviour towards nature”.

The stepwise regression regarding the influences of the factors towards the intention of all recreationists ( $N = 1340$ ) explained 39 % of the variance ( $p < .001$ ). The most influential factor was “attitude towards the behaviour” (the individual’s attitude). Other highly significant factors were “importance of diversity and beauty of the landscape” (the nature/landscape motive) and the “subjective norm” (the attitudes of the individual’s social group, their friends and relatives). The factors “knowledge”, “perceived behaviour control” (the

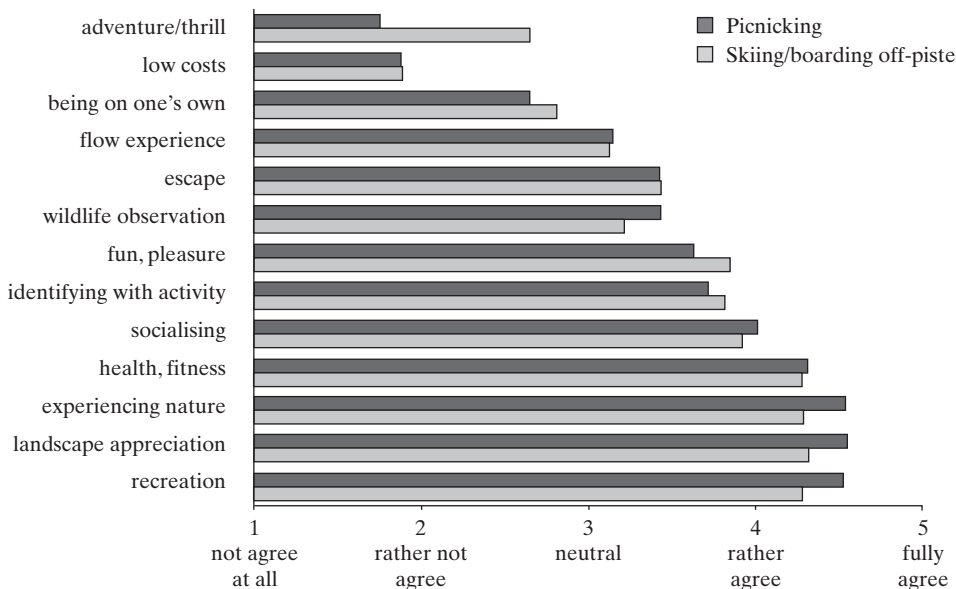


Fig. 2. Motives for conducting outdoor recreation activities in general, and for free-riding and picnicking in particular (degree of agreement with the textual items expressing the indicated motives).

perceived possibility to actually behave in the intended way) and “self-determination” (regarding the behaviour) were not as highly significant. Although not very highly significant, the factor “attitude towards the intervention measure information” indicates that the more positive a person’s attitude towards information is, the higher is their willingness to behave responsibly towards nature (Table 1).

The results of the regression models with only the specific activity groups were only slightly different. In all groups the factor “attitude towards the behaviour” had the strongest and most significant influence, i.e. the person’s behaviour depends on how relevant the behaviour is for the individual her- or himself.

In a second step we investigated the influences of all model factors on the (stated) actual ecologically responsible behaviour (Table 2). Here, the model explained 37% of the variance of the actual behaviour (all participants of the study). The most influential factor was “intention”, as we expected from the literature. The factors “perceived behaviour control” and “self-determination” were also influential and highly significant. This means that there are two main influences on behaviour: the persons’ willingness to behave in the intended way and their perception of the possibilities of actually behaving like that. The last factor “attitude towards the intervention measure protection areas” was not as important, but still significant.

The factors in the model for the group of free-riders explain a great deal of the variance (adj.  $R^2 = .52$ ,  $p < .001$ ). “Intention” ( $\beta = .37$ ,  $p < .001$ ) is again the most significant factor here, followed by the factor “attitude towards the intervention measure seasonal restricted access to areas” ( $\beta = .26$ ,  $p < .001$ ) and “perceived behaviour control” ( $\beta = .23$ ,  $p < .001$ ). Other significant factors are “attitude towards the intervention measure information” ( $\beta = .21$ ,  $p < .01$ ) and “self-determination” ( $\beta = .20$ ,  $p < .01$ ). For this group of people having control and self-determination is very important. The results for the second group of people,



the picnickers, are slightly different. Although this model explains much less variance (adj.  $R^2 = .38$ ,  $p < .001$ ), the factors “intention” ( $\beta = .39$ ,  $p < .001$ ), “perceived behaviour control” ( $\beta = .20$ ,  $p < .001$ ) and “self-determination” ( $\beta = .12$ ,  $p < .001$ ) are still highly significant. The more these people feel they can control their behaviour, i.e., can actually behave in the intended way, the more they will behave responsibly towards nature. A last significant factor was “attitude towards the intervention measure seasonal restricted access to areas” ( $\beta = .06$ ,  $p < .05$ ).

Table 1. Predictors of the intention to behave principally ecologically responsibly during outdoor-recreation activities. The model includes all factors (“Ajzen-factors”, as well as inductively gained factors) and all respondents of the national survey (all types of recreation activities). Only the significant factors of the step-wise regression model are shown (for the non-significant factors, see the method section, in particular the model description and Fig. 1).

Stepwise-Regression;  $n = 1340$ ; adj.  $R^2 = .39^{***}$ ; \*:  $p < .05$ ; \*\*:  $p < .01$ ; \*\*\*:  $p < .001$

Predictors	B	S.E.B	$\beta$
<b>Attitude</b> of the individual towards the ecologically responsible recreation behaviour	.394	.035	.38***
Importance of <b>landscape</b> diversity and beauty in outdoor recreation	.060	.015	.13***
<b>Subjective norms</b> (perceived importance of the individual’s relevant social group’s attitudes towards such behaviour)	.072	.021	.11***
<b>Knowledge</b> about ecologically responsible outdoor-recreation behaviour	.037	.013	.09**
<b>Perceived behaviour control</b> (perceived possibilities to actually behave in the intended ecologically responsible way)	.067	.024	.09**
Importance of <b>self-determination</b> in the context of outdoor recreation	.079	.031	.08*
<b>Attitudes towards intervention measure</b> “information”	.036	.015	.07*

Table 2. The predictors of the (reported) actual ecologically responsible behaviour. The model includes all factors (“Ajzen-factors” as well as inductively gained factors) and all respondents of the national survey (all types of recreation activities). Only the significant factors of the step-wise regression model are shown (for the non-significant factors, see the method section, in particular the model description and Fig. 1).

Stepwise-Regression;  $n = 1340$ ; adj.  $R^2 = .37^{***}$ ; \*:  $p < .05$ ; \*\*:  $p < .01$ ; \*\*\*:  $p < .001$

Predictors	B	S.E.B	$\beta$
<b>Intention</b> of the individual to behave principally in an ecologically way during outdoor-recreation activities	.40	.033	.38***
<b>Perceived behaviour control</b> (perceived possibilities to actually behave in the intended ecologically responsible way)	.19	.02	.25***
Importance of <b>self-determination</b> in the context of outdoor recreation	.035	.01	.08***
<b>Attitudes towards intervention measure</b> “conservation areas”	.029	.01	.05*

### 3.4 The effects of intervention measures

#### 3.4.1 Derivation of the selected measures from the results of the deductive phase

Which concrete intervention measures are actually effective? As the experimental part of the project represented mainly a pilot study, only very few intervention measures could be tested. In selecting those to be tested, the following results of the deductive phase were primarily considered:

The results of the evaluation of the behaviour model suggest that behaviour is mostly influenced by the intention and the perceived level of control of behaviour. Intention, in turn, is influenced by attitudes towards the behaviour, by subjective norms, by knowledge, by the importance of landscape diversity and beauty, i.e., the nature/landscape-experience motive, and by attitudes towards specific measures.

In addition, the questionnaire results revealed that the measures “establishing conservation areas”, “infrastructure” and “information” were supported by all participants. The “seasonal restricted access to areas”, the “appeals” and the “tickets” were not rejected, but were not much appreciated. The measure most likely to be rejected was the use of “prohibition signs”.

We also investigated people’s self-reports of actual behaviour regarding the measures. Interestingly, the measure of “prohibition signs” was observed quite frequently, although it was not appreciated at all. The same applied to “appeals” and “infrastructure”, but the reverse to the measure “information”. They were appreciated much more than the “signs”, but considered (or read) much less often.

These last results show it is necessary to test the effects of information, appeal, and infrastructure. Measuring the effects of “prohibition signs” was not feasible for organisational reasons. The results of the model evaluation show that knowledge can be a predictor of behaviour, and attitudes to nature and landscape are also influential. Thus, information about the impact of (non-)ecologically responsible behaviour on nature can be expected to be an effective intervention measure. The model evaluation further revealed that perceived behaviour control is decisive for intention as well as for behaviour. Providing appropriate infrastructure seems to be one of the most powerful tools to encourage people to perceive possibilities to actually behave in an ecologically responsible way. Thus, appeals, information, infrastructure and combinations of these intervention forms were selected. Attitudes towards the behaviour might be implicitly affected by appeals and information too, whereas subjective norms could not be covered in this pilot experiment.

### **3.4.2 Results of the picnic experiment**

The results of the standardised questionnaire handed out during the first experiment (picnicking) revealed that basically all respondents reacted favourably to the offer of infrastructure as well as to the offer of information. In addition, the questionnaire-based measurement of the intention to behave ecologically responsible during picnic activities showed that the intervention type “appeal and information” did have some influence on the intention to behave ecologically and not to cut sticks (the intention values were higher than with the control group). “Providing infrastructure” (industrially produced barbecue sticks) did not, however, have this effect, i.e., the intention values of this group were not higher than those of the control group (Table 3). As these results are from a pilot experiment with a small sample we have not included here the results of the significance tests (although we did conduct some non-parametric tests which revealed the significance of the differences, see ZEIDENITZ 2005). Therefore, these results must be considered only preliminary, showing just interesting tendencies.

Regarding actual ecologically responsible behaviour the observation of the behaviour indicator “use of the provided barbecue sticks” revealed that offering infrastructure does have an effect on ecological behaviour. Almost all provided sticks were used for the intended purpose. We assume that the intervention prevented people from cutting fresh sticks and was thus successful. As we could not directly observe people’s actual behaviour for privacy reasons, we do not know whether those who intended to behave ecologically responsible found other ways of avoiding stick-cutting without being provided with prepared sticks.

Table 3. The effect of infrastructure and appeals with information on the intention to behave ecologically responsible during picnicking. Values are the means of responses to a textual item expressing the individual's intention not to cut barbecue sticks (scale: 5 = fully agree, 4 = rather agree, 3 = partially agree, 2 = rather disagree, 1 = disagree completely).

Intervention type	Infrastructure	Appeal with information	Control group
Mean level of intention	3.8	4.4	3.8

### 3.4.3 Results of the free-rider experiment

The results of the second experiment (free-riding) indicated that the intervention type “appeal with little information” does have an influence on the (reported) actual ecologically responsible behaviour: as Table 4 shows, the average number of hours spent skiing through forests off-piste was reduced by the intervention. In contrast, appeals with much more detailed information had hardly any effect on the hours spent free-riding through forests. The same non-effect could be observed for the control group. But again, the sample was small so we have not included here the results of the significance tests (although, we conducted non-parametric tests which revealed the significance of the differences, see ZEIDENITZ [2005]). Therefore, these results must also be considered only preliminary.

Table 4. The effect of simple and more detailed information (both combined with an appeal) on the reported behaviour, i.e. on the time spent off-piste (free-riding time).

Intervention Type	Pre-measurement of reported behaviour (mean hours free-riding)	Post-measurement of reported behaviour (mean hours free-riding)
Appeal, simple information	1.8	1.2
Appeal, detailed information	1.7	1.6
Control group	1.3	1.3

## 4 Discussion

### 4.1 Adequacy and limitations of the methods applied

A central feature and special strength of this study was the way it combined different methods and theoretical perspectives to come to grips with the complexity of the study's issue. For example, we used qualitative interviews with outdoor experts and people engaged in outdoor recreation to identify the main issues in the inductive phase at the beginning. This step was very helpful for other parts of the study, for example, in formulating the questionnaire for the nationwide survey and designing the field experiments. In addition, integrating of the experts' and practitioners' views as well as the views of selected typical recreationists right from the beginning in a transdisciplinary approach proved to be valuable.

However, the multi-method approach and transdisciplinarity also led to methodical challenges. The length of the questionnaire (8 pages), for instance, was not unproblematic due to the potential risk of tiring respondents or of annoying or provoking them. This might explain why the return rate of 25.7 % was not very high, although this rate is not unusual for nation wide postal surveys in Switzerland (experience shows the response rate mostly lies around 25–30 %). Of course, a low response rate does mean there could be a self-selection bias in the sample (more people participating who are interested in the issue of the survey, less of the “indifferent average”). However, as the evaluation of the socio-statistical

indicators (age, gender) revealed, there was no serious distortion of the sample. In addition, regarding the behaviour model, we were mostly interested in the answers of those people actually carrying out outdoor recreation. Thus, the self-selection bias emphasising those interested was not necessarily a disadvantage.

The necessary restructuring or extension of the model was based mainly on the inductive results of the pre-study. We also drew on the literature regarding motivation (RHEINBERG 1993, 2000), knowledge (FRICK *et al.* 2004) and attitude towards landscape (STREMLOW 1998; DWYER *et al.* 1993). It was therefore a good transformation of theory and practice for the aims of this study.

Although the variance-explanation rates of the regression models were highly significant, the adj.  $R^2$ s of 37 to 51 % are rather low. Apparently there are other influential factors not covered by the model, which suggests further research is needed.

An advantage of field experiments (over laboratory experiments) is their external validity and the generalizability of the findings due to their closeness to reality. At least for the picnic experiments, it was also an advantage that the subjects in the study were not aware of being studied, which eliminated problems like reactance or the social desirability bias. On the other hand, experiments in a complex natural setting pose a challenge because other influences may occur simultaneously and cannot be fully controlled or measured. Another serious problem concerns ethics. In our case, there was the question of whether a researcher may involve individuals in an experiment without their knowledge or permission during their “very precious” leisure-time. This issue made us decide that direct behaviour observation was mostly inappropriate. Thus the intervention results are based mainly on self-reports, behaviour-indicator observation and some “moderate” participant observation. This must be kept in mind when interpreting the results: self-reported behaviour tends to be affected by a social desirability bias, which is particularly a limitation for the free-riding experiment. However, this bias should have affected both interventions, but only one intervention showed the desired effect. This reveals that the bias might not have played such an important role.

The sample sizes of the two experiments were rather small, but both revealed clear tendencies. They must, however, be regarded as preliminary results of pilot experiments, which show that further research is necessary and worthwhile.

## **4.2 Interpretation of the results with respect to theories and previous research**

The results of the nationwide survey showed that most of the people spend their leisure time in an “everyday” and “traditional” way, i.e., they engage in recreation activities which can be described as: unorganised, often practised daily, and outside in nature and landscape. Activities practised less than once per month tend to be more the trend activities, e.g., canyoning, bouldering/climbing or heli-skiing. The two activities we chose to study, picnicking and free-riding, were practised at least once per month by half of the respondents. Because of their frequency and because people personally perceived them as important, they were appropriate activities to focus on here. Finally, the selection of picnicking and free-riding as typical outdoor-recreation activities was legitimised by the deductive phase (as already noted in the Result section). This also means that the results concerning these two activities can be generalised to a certain degree: what is true for picnicking might also apply to other traditional activities, and the findings regarding free-riding are also relevant for other trend sports.

Our results show that people greatly value experiencing nature and beautiful landscapes while active outdoors. It is as a central motive for all outdoor-recreation activities, as is

“relaxation and wellness”. RHEINBERG’s (1993) finding that the “sensual experience of nature” is an important motive could therefore be confirmed. In contrast to claims in the recent literature (WESSELY and SCHNEEBERGER 1999; RHEINBERG 1993; BEIER 2000), the motive “experiencing adventure and thrill” did not seem very important. However, “experiencing adventure and thrill” is much more important for the trend activities like “free-riding” than for the traditional recreation activities like picnicking. Thus, our results do not completely contradict these claims regarding trend activities. Both groups report being interested in observing wild animals and experiencing landscapes, with those preferring traditional activities emphasizing this more. This conforms to recent findings (BEIER 2000; WESSELY and SCHNEEBERGER 1999) and shows that motives tend to depend on the activity.

The results of evaluating the behaviour model in regression analyses suggest that behaviour is mainly influenced by the intention and the perceived behaviour control and only slightly by self-determination. Intention, in turn, is mainly influenced by people’s attitudes towards the behaviour, by the importance of landscape diversity and beauty, by subjective norms, and also slightly by knowledge, perceived behavioural control, self-determination and by people’s attitudes towards specific measures. This indicates once more the high predictive power of AJZEN and MADDEN’s (1986) theory of planned behaviour. In addition, it also supports our assumption that other factors also play an important role. In particular, those people who consider the beauty and diversity of a landscape as important for outdoor recreation are more willing to behave ecologically responsibly during outdoor activities. Thus, the motive “experiencing nature and landscape” proved to be a relevant predictor of ecologically responsible recreation behaviour.

These results helped us design the intervention measures of the experimental phase (see section 3.4.1). In addition, the effect of the subjective norms should be regarded as an important clue for the development of future intervention measures. And particular attention must be paid to the fact that it somewhat contradicts self-determination: on the one hand, we are influenced by the (assumed) expectations of people important to us and create our own norms (= subjective norm), and on the other hand, we wish to be independent and to express our own individuality. This tendency has already been observed, especially in trendy recreation activities (Ingold 2004, personal communication).

The picnic experiment showed that appeals with very little information may encourage people to intend to behave ecologically responsibly during outdoor recreation, although their effect on actual behaviour is unknown. Providing appropriate infrastructure (barbecue sticks) resulted in smaller intentional effects, but influenced actual behaviour more clearly (using the provided sticks instead of cutting new ones). Thus, infrastructure alone might be sufficient to change people’s behaviour. However, as MOSLER and GUTSCHER (1998) already stated, this effect will disappear if people’s intentions are not also changed correspondingly. Providing infrastructure alone does not necessarily change people’s intentions, whereas appeals with little information do seem to change them. Thus, a combination of both measures might be the best choice. This supports the findings of WESSELY and SCHNEEBERGER (1999) who favour combined interventions and the findings of a later more detailed study on behaviour interventions. In a survey of foresters, FREULER and HUNZIKER (2005) interviewed 377 Swiss-German foresters about successful measures to encourage people to behave more ecologically responsibly during outdoor recreation. The majority of the foresters found the combination of several intervention types, e.g. providing information and infrastructure, most effective.

Results regarding the trend activity free-riding indicate a slight difference between providing “simple” and “detailed” information. “Simple” information seems to be more effective in preventing people from skiing off-piste, whereas too much information does not seem to elicit the desired behaviour. This preliminary result corresponds with the empirically

based “elaboration-likelihood theory” of PETTY and CACIOPPO (1986), who claim that, in certain cases, (extensive) information can be unproductive or even counter-productive because people then try to find rational arguments against the informational intervention and, thus, even strengthen their original attitude. In our case, providing extensive information seemed to have such a rather unproductive effect. PETTY and CACIOPPO (1986) suggest first using other persuasive strategies, such as “model persons” or social norms. Further development of intervention strategies should go in this direction. Appeals seem to represent a first step.

## 5 Conclusions

As stated in the introduction, our aim is to provide scientific support for the authorities, environmental organisations, and others who want to further ecologically responsible recreational behaviour.

Regarding the first aim of our study, the analysis of the motivational structure of outdoor recreationists, one such motive is clearly experiencing nature and landscape, as has often been assumed, but also questioned. This result supports and encourages public agencies and NGOs who develop measures to promote ecologically responsible behaviour to further build on this motive for people to directly experience nature and landscape.

Regarding the second aim of the study, we identified predictors for ecologically responsible behaviour on the basis of Ajzen’s “theory of planned behaviour”. As the regression models indicated, people’s attitudes towards landscape, and especially their appreciation of its diversity, was one of the important predictors of the intention to behave ecologically responsible during outdoor recreation. Factors such as subjective norms (or peer pressure), intention and knowledge clearly play a role, but so too does perceived behaviour control. The need to be in control of one’s behaviour reflects the important role of self-determination.

When developing measures and strategies to encourage people to behave ecologically responsibly, their interest in experiencing nature and landscape and their need to self-determine their own recreational activities should be kept in mind. In other words, we can assume that outdoor-recreation people are interested in many aspects of nature and landscape and in protecting them, but rather object to being controlled or over-directed in their behaviour, especially during their precious leisure time.

On this assumption we developed intervention experiments for testing measures to promote ecologically responsible behaviour in order to achieve the third aim of our study. As seen in the intervention experiments, a small amount of simple information seems to be more effective than a large amount of detailed information. Infrastructure seems to have a positive effect on (ecological) behaviour, but only as long as it is actually provided and appropriate. The most suitable approach appears, thus, to be a combination of e.g. three steps: 1) appeals, encouraging people to behave in the desired way, 2) brief information explaining the necessity of the desired behaviour, and 3) infrastructure enabling people to actually engage in the desired behaviour.

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