



SOCIAL MEDIA AS A CONTRIBUTOR TO CONFLICTS IN PROTECTED AREAS: EXPERIENCES, PROBLEMS AND POTENTIAL SOLUTIONS

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ABSTRACT

Within two decades, social media has profoundly changed modern society. The various effects of this rapid development are increasingly the subject of interdisciplinary research. For protected areas, the focus has so far been on the possibilities of social media as a means of visitor communication and monitoring. This is an exploratory study identifying case studies of protected areas where visitors' use of social media has contributed to negative environmental effects. Furthermore, potential measures to address these challenges are provided. Data collection was conducted with a selective review of academic and non-academic literature using a global research framework and EU-wide qualitative email interviews with staff from 44 national parks. The research results were structured using the DPSIR framework of the European Environment Agency. Social media trend-driven mass tourism and dissemination of nature-damaging behaviour via social media appear to be the most pressing issues. To implement conservation measures successfully and ensure long-term conservation goals, protected area management must consider the potential negative effects of social media. As digitisation progresses, the urgency of corresponding studies and measures increases. The enhancement of digital skills and digital visitor guidance by nature conservation actors may help to counteract future negative environmental effects.

Keywords: national park, mass tourism, nature-damaging behaviour, DPSIR model, Leave No Trace

INTRODUCTION

Since 2005, social media have become an elementary part of modern life with a growing influence on information flows and opinion making (Fuchs, 2021). 'Social media' is a collective term for a wide range of internet-based applications, whose conceptual framework is yet to be conclusively defined. The term generally refers to individuals and groups creating profiles for websites or apps that are designed and maintained by the respective social media service (Obar & Wildman, 2015). By connecting these profiles, social media facilitates the development of online social networks (ibid.). Thereby, social media services allow their users to make information of all kinds available to others (Taddicken & Schmidt, 2017). This user-generated content (UGC) is the key feature of social media (Obar & Wildman, 2015) and is characterised by being persistent, replicable and searchable (Taddicken & Schmidt, 2017).

In recent years, interest in the role of social media in nature conservation has increased. Researchers have discussed social media as a means to communicate nature conservation concerns to the public (Miller & Heiland, 2021; Šmelhausová et al., 2022), and for gathering data (such as georeferenced UGC) about visitors' locations and activities in protected areas (Ghermandi, 2022; Teles da Mota & Pickering, 2020; Wilkins et al., 2021).

However, headlines regarding the adverse impacts of social media on the protected environment contrast their benefits for nature conservation practice. Newspaper headlines from *The New York Times* (Holson, 2018) or *The Guardian* (Simmonds et al., 2018) have drawn the public's attention to the alarming increase in visitor numbers to US-protected areas. Social media platform Instagram is cited as the main cause of nature-destroying crowds (ibid.). Geotagged photos allow social media

users to easily find (protected) locations (Holson, 2018). On-site, outdoor apps with maps and user-generated route suggestions empower visitors to move independently of existing infrastructure and traditional visitor guidance (Job et al., 2016). This challenges the prediction of development trends in protected areas and consequently their management (Øian et al., 2018).

With increasing user numbers worldwide (Dixon, 2023), the influence of social media is growing. Therefore, nature conservation actors will have to address the potential environmental effects social media exerts on protected areas. This paper explores visitors' use of social media and resulting conflicts in protected areas, providing a first systematic overview of potential cause-effect relationships. Conflict experiences from various protected areas are compiled and analysed to identify problems and solutions.

METHODS

An exploratory research approach was adopted to identify case studies of protected areas exemplifying the conflict potential of visitors' use of social media. Given the lack of scientific literature on this topic, a selective review of both academic and non-academic literature was initially conducted and supplemented by qualitative email interviews.

Selective review of academic and non-academic literature

The review scope of scientific and non-scientific literature was broadly defined to include case studies from protected areas of all categories and geographic locations and social media services. The literature search was conducted using Google Scholar and Google search engines with English and German keywords. In the first research phase, a search entry contained a conservation-related term ('protected area', 'national park' or 'nature conservation'), a social media term ('social media', 'Instagram' or 'YouTube') and the term 'problem' or 'conflict'. A search result was considered as a case study if a described conflict occurred in a protected area with explicit links to visitors using social media. The latter applied if either a specific social media service or social media in general were suggested as a contributing cause. In the second phase, a more targeted search of information about the case studies identified in the first phase aimed at a deeper understanding of the individual situation. In the third phase, references to other potential case studies in the identified search results were reviewed for relevant information. When identifying a new case study, the second phase was carried out again. This approach did not allow for a complete review of relevant literature but provided an initial overview of relevant case studies.

Box 1. Interview questions

Does the use of social media have an impact on the number and behaviour of visitors in your national park? If this is the case:

- 1 What are the positive and negative impacts in your national park?
- 2 Have measures already been taken or are they planned in your national park to counteract negative impacts? Which measures are involved?
- 3 If (2) applies: Can conclusions already be made about the effect or success of these measures?

Qualitative email interviews

EU-wide, semi-structured, qualitative email interviews were conducted to gather experiences from national park staff on local conflicts related to social media. The research scope was limited to national parks classified as IUCN management category II in EU member states with an additional geographical boundary of continental Europe. Based on the World Database on Protected Areas (WDPA), relevant national parks were identified. With the defined scope and restrictions due to missing and incomplete WDPA data, 229 national parks were compiled. An internet search was used to collect the email addresses of the respective national park employees. Email interview requests were ultimately sent to the administrations of 177 national parks.

The interview request followed the 'Guidelines for Conducting Effective E-Mail Interviews' by Meho (2006) and directly integrated the interview questions (see Box 1). The recipients were asked to describe their experiences of possible effects of social media in their respective national parks and to be open to potential follow-up questions. To protect the anonymity of the interviewee, complete interview responses are not disclosed.

The interview data were evaluated using thematic analysis (Braun & Clarke, 2012), combining a deductive and inductive approach. The pre-structuring of the data complies with the DPSIR framework developed by the European Environment Agency (EEA) (1999) addressing the components: Driving forces, Pressures, States, Impacts and Responses. The elements were derived from the literature search results. In the following analysis of the interview data, the email interviews were divided into thematic response sections (direct quotes) and further assigned to thematically matching elements.

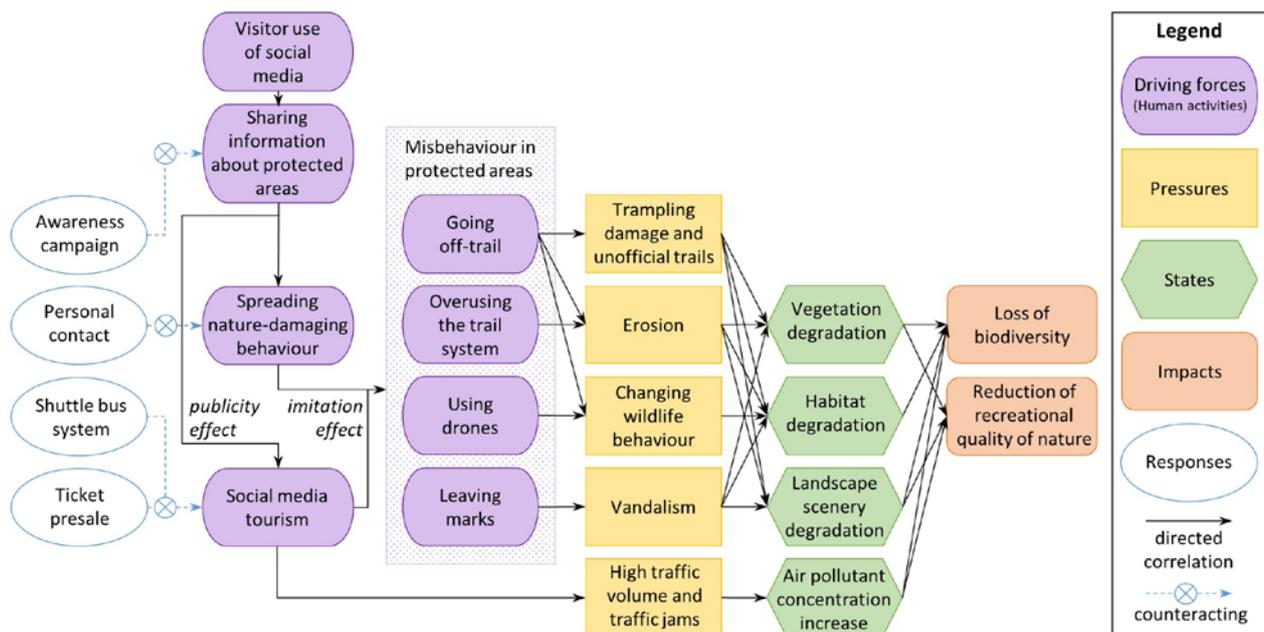


Figure 1. DPSIR model illustrating potential relationships between visitors' use of social media and environmental effects in protected areas, including counter-measures

RESULTS

Conflict perception of interviewed national park staff

Out of 177 email interview requests, 44 were answered (response rate of 25 per cent). For a complete list of national parks providing interview responses, see Table 1 (supplementary online material). In 15 national parks, the interviewees reported conflicts that they (partly) attributed to social media. They refer to content seen on social media showing misbehaviour or observed behaviour on-site (e.g. crowding) believed to be related to social media activities. A further 16 respondents assume such conflicts, presumably because descriptions of conflicts are not directly linked to social media or are accompanied by uncertainties or a lack of specific data. The other 13 interviewees are unaware of social media-related conflicts in their respective national parks or report that no conclusive studies have been conducted on the subject so far.

Case studies and the DPSIR model

The results comprise a total of 57 case studies. The review of academic and non-academic literature identified 26 case studies, with a strong emphasis on non-scientific sources (see discussion). A complete overview of these case studies is listed in Table 2 (supplementary online material). Another 31 case studies originated from the email interviews describing conflicts (presumably) related to visitors using social media. Based on the case studies, a DPSIR model was developed to explain correlations between visitors' use of social media and

negative environmental impacts in protected areas, including potential responses. Figure 1 gives a visual overview of the potential causal relationships. Each text field represents an element of the DPSIR model. The colour codes indicate the affiliation to the components of the DPSIR framework. The elements are connected by directed relationships shown by black arrows, illustrating the potential cause-effect relationships.

In the following, I present central aspects of the DPSIR model focusing on the driving forces directly related to social media: spreading nature-damaging behaviour and social media tourism (Figure 1, column 2). In addition, I address specific misbehaviour in protected areas (column 3) and name the associated pressures, states and impacts (columns 4–6). When illustrating interrelationships using selected case studies, elements of the DPSIR model are indicated by quotation marks in parentheses. Finally, I outline potential responses (column 1) that are intended to counteract (blue dashed arrows) the initial driving forces and are therefore placed before the driving forces in Figure 1.

Spreading nature-damaging behaviour via social media

Social media as a source of information and inspiration for visiting protected areas can become problematic when they provide access to content that is non-compliant with protected area regulations and rules (according to 19 interviewees). Since any social media user can create (almost) uncontrolled and uncensored content, social media can contribute to a vigorous sharing of individual and non-compliant behaviour in



Demonstrating potential nature-damaging behaviour – a visitor to Joshua Tree National Park posing on a protected Joshua tree
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protected areas. By spreading such content, other social media users are inspired to imitate the misbehaviour (imitation effect). Three interviewees emphasised the lack of critical reflection on information in social media probably adding significantly to the problem.

Such an imitation effect is demonstrated, for example, in Joshua Tree National Park (California, US) through selfies with Joshua trees (*Yucca brevifolia*) on Instagram (Clarke, 2017a). The photos show people sitting, standing and lying on the trunks of Joshua trees, striking yoga poses and stretching hammocks between them ('Driving force'). Joshua trees are mainly native to the Mojave Desert and are highly threatened by climate change (Sweet et al., 2019). Their root system is shallow, and adding weight puts extra stress on the Joshua trees, making them vulnerable to breakage or collapse (Joshua Tree National Park, 2016). Posting such photos gives people the impression that such behaviour is acceptable.

In Acadia National Park (Maine, US), the removal of nearly 3,500 rock stacks in 2016 and 2017 demonstrates another example of social media-driven hype, according to the public affairs specialist (Haigney, 2018). Rock stacking is a form of self-expression, and sharing on social media serves as a way to show the world that one has been 'here', inspiring new rock stackers to imitate ('Driving force') (ibid.). Also, one interviewee suggested the visual appeal of rock stacks against natural sceneries may explain the popularity on social media. However, moving geological material and leaving such individual marks is not desired in national parks ('Driving force'). Zion National Park (2018) (Utah, US) refers to rock stacking as an act of vandalism ('Pressure'), affecting

protected landscape scenery negatively ('State') and, therefore, visitors' experience of solitude and wilderness ('Impact'). Moving a considerable number of stones can result in wildlife habitat degradation ('State'), and eventually impact biodiversity conservation ('Impact') (ibid.). The case study illustrates how (pre-existing) human behaviour, rather harmless in isolation, can be popularised through social media reaching a level of environmental degradation (Haigney, 2018).

Social media tourism

Sharing information about protected areas on social media creates a certain publicity effect, potentially leading to an increase in popularity and consequently to rising visitor numbers in protected areas (according to 20 interviewees). Once visitor numbers overburden existing infrastructure and staff capacities are no longer able to cope, a phenomenon occurs that the media refers to as 'Instagram tourism', 'selfie tourism', 'mass tourism' and 'overtourism'. In the following, this phenomenon will be summarised under the term 'social media tourism'.

Social media tourism potentially alters visitors' motivation and, therefore, the type of visitor behaviour in protected areas. According to one interviewee, social media attracts visitors who seem to have little affinity for nature and are more event and adventure-oriented. They presumably know little about nature itself and the environmental effect of certain behaviours. Moreover, they obtain their information from sources that usually do not provide information about the need for environmental protection and conservation-oriented behaviour.



Unofficial trails – remnants after visitors posed for photos in Walker Canyon's sea of wildflowers during the Superbloom 2019
© Angelica Reyn / Pexels

The phenomenon of social media tourism was observed during the spring bloom of wildflowers in desert regions in southern California in 2019 (BBC, 2019; Reyes-Velarde, 2019). ‘Superbloom’ years can lead to an influx of thousands, even hundreds of thousands, of visitors within a few weeks (Winkler & Brooks, 2020). Social media plays a contributing role in publicising these events (ibid.), for example, when Instagram influencers with numerous followers post selfies in the sea of flowers (‘Driving force’) (Pollack, 2019). Near Walker Canyon Ecological Reserve, the city administration of Lake Elsinore reported approximately 50,000 visitors on one weekend in March 2019, leading to traffic jams on Interstate 15 with cars backing up to 32 km at times (‘Pressure’) (BBC, 2019; Reyes-Velarde, 2019). To take photos of the sea of blossoms, visitors often go off-trail (‘Driving force’), creating unofficial trails (‘Pressure’) that leave lifeless patches (State of California, 2023) and damage vegetation and landscape (‘States’), eventually reducing biodiversity and the recreational quality of nature (‘Impacts’).

However, the occurrence of mass tourism always relates to the visitor capacities of a given location (Moczek et al., 2020; Øian et al., 2018). This particularly applies to wilderness areas and core zones of national parks. In Grand Teton National Park (Wyoming, US), postings by social media influencers from Delta Lake led to increased visitor numbers from one or two per day to around 145 hikers daily (‘Driving forces’) (Holson, 2018). Less known paths became heavily frequented (‘Driving force’) leading to partial erosion (‘Pressure’) (ibid.). Similarly, at Conundrum Hot Springs in the Maroon Bells-Snowmass Wilderness (Colorado, US), preserving wilderness has

become increasingly difficult due to growing visitor interest and nature-damaging behaviour, driven partly by social media content (Worby, 2017). The management of wilderness areas presents a paradox, as wilderness refers to an area (almost) without human intervention. Balancing the protection and experience of wilderness may be the greatest management challenge in modern times (ibid.).

Misbehaviour in protected areas and its environmental effects

Spreading nature-damaging behaviour via social media and social media tourism potentially contribute to misbehaviour in protected areas. In some circumstances, this misbehaviour applies pressure on the environment, potentially leading to changes in the environmental state and ultimately leading to adverse impacts. This study identifies at least (but is not necessarily limited to) four types of misbehaviour on-site in the context of visitors’ use of social media: “Going off-trail”, “Overusing the trail system”, “Using drones” and “Leaving marks” (Figure 1).

In the Berchtesgaden National Park (Germany), a hidden natural pool lies in the Königsbach waterfall. The popularity of the off-trail pool has increased massively after influencers with large followings started posting selfies and drone videos from the pool (‘Driving forces’) (Barth, 2020; Nationalpark Berchtesgaden, 2020). Geotagged pictures and directions disseminated on social media (‘Driving force’) encouraged new visitors to ignore warning signs and go off-trail (‘Driving force’) (NDR, 2021). In the visitor survey by Moczek et al. (2020), 62 per cent stated that they had learned about the Königsbach waterfall through social media. As a

result, a network of trampling damage and unofficial trails of at least three kilometres covering an area of about 10 hectares formed around the natural pool ('Pressure') (Nationalparkverwaltung Berchtesgaden, 2021), leading to massively degraded vegetation ('State'). Going off-trail also severely contributed to soil erosion ('Pressure') (ibid.) and the human presence disturbed wildlife ('Pressure'), likely resulting in habitat degradation of protected bird species ('State') (Moczek et al., 2020). Furthermore, the presence of drones (for creating social media content ('Driving force')) may be perceived as predatory by wildlife (Rebolo-Ifrán et al., 2019), potentially affecting wildlife behaviour ('Pressure') and contributing to habitat degradation ('State'). The addressed disruptive factors may contribute to biodiversity loss and reduced recreational quality of the national park ('Impacts').

Counter-measures

Environmental education is one approach addressing nature-damaging behaviour. An example of norms for environmentally responsible behaviour is 'The Seven Principles of Leave No Trace' (2021) (see Box 2). Such principles are characterised by being formulated concisely to be memorable and with a high recognition value. Protected area management can adopt such principles for their environmental communication.

However, environmental education should also include raising awareness about environmentally friendly behaviour on social media. Therefore, Schreiner (2018) proposes digital behaviour principles for human-nature interactions, which were also adopted by Leave No Trace (2020) as social media guidance, reading as follows:

- "Use Conscientious Tagging" (Schreiner, 2018);
- "Be Mindful of What You're Showing" (ibid.); or
- "Encourage and Inspire Leave No Trace in Social Media Posts" (Leave No Trace, 2020).

Such digital behaviour principles can be communicated through awareness campaigns. Such campaigns may have a catchy name or slogan to promote them on and off social media, like the campaign and simultaneous geotag "Tag Responsibly, Keep Jackson Hole Wild" (Holson, 2018). Similarly, the Nationalpark Berchtesgaden (2021) published a series of animated videos on its Instagram account, including one titled "Think before you post", addressing geo-referenced UGC on social media and its environmental effects.

To make visitors aware of their social media posts showing nature-damaging behaviour, protected area management can comment on such content (public) or directly message the creators (private) (as indicated by 13

Box 2. The Seven Principles of Leave No Trace

- 1 Plan Ahead & Prepare
 - 2 Travel & Camp on Durable Surfaces
 - 3 Dispose of Waste Properly
 - 4 Leave What You Find
 - 5 Minimize Campfire Impacts
 - 6 Respect Wildlife
 - 7 Be Considerate of Other Visitors
- (Leave No Trace, 2021)

interviewees). The users may be asked to delete the post or to modify it in a way that points out the misbehaviour. Additional staff capacity may be needed to monitor social media activity around the protected area (digital rangers), using protected area-related hashtags, geotags and search terms.

Increasing numbers and misbehaviour of visitors may challenge the management capacities of protected areas. Restricting access can be considered as a last resort when other measures have failed. One way of reducing crowds in protected areas to a nature-compatible number of visitors is to pre-sell a limited number of entrance tickets, similar to the reservation system of Spring Creek Canyon Wilderness Study Area (Utah, US) with a limit of 150 tickets per day (Kanarra Falls, 2023). However, this measure requires strict entrance control and, consequently, additional staff. Another option might be the implementation of a shuttle bus system. For instance, a limited bus service with an online booking system and a daily car ban of several hours during the main visitor season was introduced for the Lago di Braies in the Fanes-Sennes-Prags Nature Park (Italy) (Radiotelevisione Italiana, 2020).

DISCUSSION AND CONCLUSION

The research results heavily rely on non-academic literature, mostly reports about conflict situations in protected areas from regional to international newspapers as well as outdoor and travel magazines. Here, interviewees from protected area and municipal administrations mention (among others) social media as a critical conflict driver. In the interviews with national park staff, 22 of 44 respondents explicitly mentioned uncertainties in the conflict assessment due to a lack of empirical data making it difficult to answer the interview questions. The lack of academic literature and objective data on this topic urges caution in evaluating the study results. This exploratory work represents a first approach to disclose the complex cause-effect relationships

of social media and their contribution to negative environmental effects in protected areas.

This study emphasises the need for further research regarding the conflict potential of social media for protected areas. Comprehensive visitor surveys would allow for more precise statements about the influence of social media on visitor behaviour, as demonstrated in the visitor observations and surveys conducted by Moczek et al. (2020) for Berchtesgaden National Park. Studies show how geo-referenced UGC on social media can provide information on the location and activities of visitors in protected areas (Teles da Mota & Pickering, 2020). Future studies could specifically focus on undesirable behaviour and rule violations as shown, for example, by Norman and Pickering (2017) in detecting off-trail use in Mount Barney National Park (Australia). Furthermore, correlations could be analysed between observed increasing visitor crowding or misbehaviour at a particular site in the protected area and increased social media activity related to that site.

Besides social media, other factors have strongly contributed to and still contribute to the presented conflicts. Concerning the development of mass tourism, US national parks have been struggling with high visitor flows for years (Duncan, 2016) with a major increase in visitation (Statista, 2022). Also, a significant rise in visitor numbers to European national parks was observed during the pandemic (McGinlay et al., 2020). Which factors further favour mass tourism and its adverse effects in protected areas cannot be conclusively determined by this study. However, the dominance of the US case studies in the literature search results suggests that an already existing high visitor pressure is a determining factor. In future studies, relationships between mass tourism associated with social media coverage in protected areas and their popularity, uniqueness and accessibility could be analysed.

Regarding nature-damaging behaviour, the lack of environmental awareness and education of visitors have to be considered (Solomon, 2022). Social media seems to contribute to this general problem by attracting people with low environmental awareness to a protected area for the first time, usually without providing the necessary background knowledge. Several case studies indirectly link visitors' use of social media to increased misbehaviour like leaving rubbish, leaving dogs unleashed, wild camping and lighting prohibited campfires (Burkitt, 2017; Nationalpark Berchtesgaden, 2020; Worby, 2017). Such misbehaviour is shared on social media (Clarke, 2017a, 2017b; Solomon, 2022) and may contribute to further misbehaviour, although

possible links need to be explored further. However, potential new visitor groups to protected areas also bring opportunities for reaching more people through environmental education measures.

As digitisation progresses and the number of users of social media services grows, the influence of social media on protected areas and their management is likely to increase. The results of this study can be understood as a recommendation to further strengthen digital skills in protected area management and to improve digital visitor guidance.

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SUPPLEMENTARY ONLINE MATERIAL

Table 1. Overview of national parks (IUCN Management Category II) with email interview responses.

Table 2. Overview of case studies from the selective review of academic and non-academic literature

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RESUMEN

En dos décadas, las redes sociales han cambiado profundamente la sociedad moderna. Los diversos efectos de este rápido desarrollo son cada vez más objeto de investigación interdisciplinar. En el caso de las áreas protegidas, la atención se ha centrado hasta ahora en las posibilidades de las redes sociales como medio de comunicación y seguimiento de los visitantes. Se trata de un estudio exploratorio en el que se identifican estudios de casos de áreas protegidas en las que el uso de los medios sociales por parte de los visitantes ha contribuido a provocar efectos medioambientales negativos. Además, se ofrecen posibles medidas para hacer frente a estos problemas. La recopilación de datos se llevó a cabo con una revisión selectiva de la literatura académica y no académica utilizando un marco de investigación global y entrevistas cualitativas por correo electrónico en toda la UE con personal de 44 parques nacionales. Los resultados de la investigación se estructuraron utilizando el marco DPSIR de la Agencia Europea de Medio Ambiente. El turismo de masas impulsado por las tendencias de las redes sociales y la difusión de comportamientos perjudiciales para la naturaleza a través de las redes sociales parecen ser los problemas más acuciantes. Para aplicar con éxito las medidas de conservación y garantizar los objetivos de conservación a largo plazo, la gestión de las áreas protegidas debe tener en cuenta los posibles efectos negativos de los medios sociales. A medida que avanza la digitalización, aumenta la urgencia de los estudios y medidas correspondientes. La mejora de las competencias digitales y de la orientación digital de los visitantes por parte de los agentes de la conservación de la naturaleza puede contribuir a contrarrestar futuros efectos ambientales negativos.

RÉSUMÉ

En l'espace de deux décennies, les médias sociaux ont profondément modifié la société moderne. Les différents effets de ce développement rapide font de plus en plus l'objet de recherches interdisciplinaires. Pour les zones protégées, l'accent a été mis jusqu'à présent sur les possibilités des médias sociaux en tant que moyen de communication et de suivi des visiteurs. Il s'agit d'une étude exploratoire qui identifie des études de cas de zones protégées où l'utilisation des médias sociaux par les visiteurs a contribué à des effets négatifs sur l'environnement. En outre, des mesures potentielles pour relever ces défis sont proposées. La collecte des données a été réalisée à l'aide d'un examen sélectif de la littérature académique et non académique en utilisant un cadre de recherche global et des entretiens qualitatifs par courriel à l'échelle de l'UE avec le personnel de 44 parcs nationaux. Les résultats de la recherche ont été structurés à l'aide du cadre DPSIR de l'Agence européenne pour l'environnement. Le tourisme de masse induit par les médias sociaux et la diffusion de comportements nuisibles à la nature par le biais des médias sociaux semblent être les problèmes les plus urgents. Pour mettre en œuvre avec succès les mesures de conservation et garantir les objectifs de conservation à long terme, la gestion des zones protégées doit prendre en compte les effets négatifs potentiels des médias sociaux. À mesure que la numérisation progresse, l'urgence des études et des mesures correspondantes augmente. Le renforcement des compétences numériques et l'orientation numérique des visiteurs par les acteurs de la conservation de la nature peuvent contribuer à contrecarrer les futurs effets négatifs sur l'environnement.