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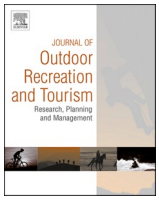

Research Article

Tourists' perception of open safari vehicles (OSV) in Kruger National Park. Is it a problem or not?

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ABSTRACT

During the last ten years, visitor numbers have increased, leading to the crowding of open safari vehicles (OSVs) in the southern part of the Kruger National Park. This has resulted in complaints from visitors to KNP regarding the number and behaviour of some of these OSV operators. Therefore, this research aimed to determine visitors' perceptions regarding OSVs in the southern part of the KNP. A qualitative approach was followed with results showing that half participants differed in their perceived OSVs. Some solutions to the problem are banning two-way radio contact between OSVs, applying stricter rules and regulations for OSVs, and allocating park sections to be limited to OSVs only.

Management implication:

First, it is suggested by the participants that SANParks must educate OSV drivers/operators regarding the rules and regulations and more signage governing their use of the park is necessary.
Second, better enforcement of behaviour – there is a need for better enforcement of the rules and regulations related to OSVs.
Third, no radio or mobile phone communications between the OSVs – it is clear from the results that radio communications between the OSVs contribute to congestion. This may be the best plausible solution addressing congestion, but not OSV guides overall behaviour.
Fourth, use technology to manage OSV crowding by implementing an application that uses GPS tracking to indicate the location of all OSVs. A control room must monitor this application, and as soon as there are too many OSVs at a sighting, let's say more than 5, a notice must be sent to the OSV operators to move on. Noticeably, all OSV must be registered on the application, each with a unique number, enabling park management to identify wrongdoers and those that behave appropriately.
Fith a reporting system/platform, and it is suggested that a reporting platform must be developed allowing all visitors and OSVs to report bad behaviour or to help monitor and track issues related to OSV use within the park.

1. Introduction

The Kruger National Park (hereafter referred to as KNP) is the largest national park in South Africa, with approximately 2.1 million hectares under conservation. This is more than 50% of SANParks' four million hectares of land (South African National Parks, management body) (South African National Parks Annual Report, 2022). In addition, the KNP is amongst the largest conservation areas in the world. KNP is larger than particular countries such as Israel and the Netherlands. The park is home to a diverse range of living organisms, including 1982 species of plants, 517 species of birds, 147 mammal species (including the Big Five, rhinoceros, leopard, elephant, buffalo, and lion) and 114 reptile species. It offers 27 rest camps (nodes) and 24 privately owned/operated concession lodges catering to various visitors. It also provides a range of conservation- and wilderness-based experiences through its abundance of wildlife sighting opportunities while participating in multiple activities such as self-drive safaris and four-wheel drive vehicle eco-trails, to name but a few (Brett, 2018; Ferreira & Harmse, 2014; Saayman et al.,

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2010).

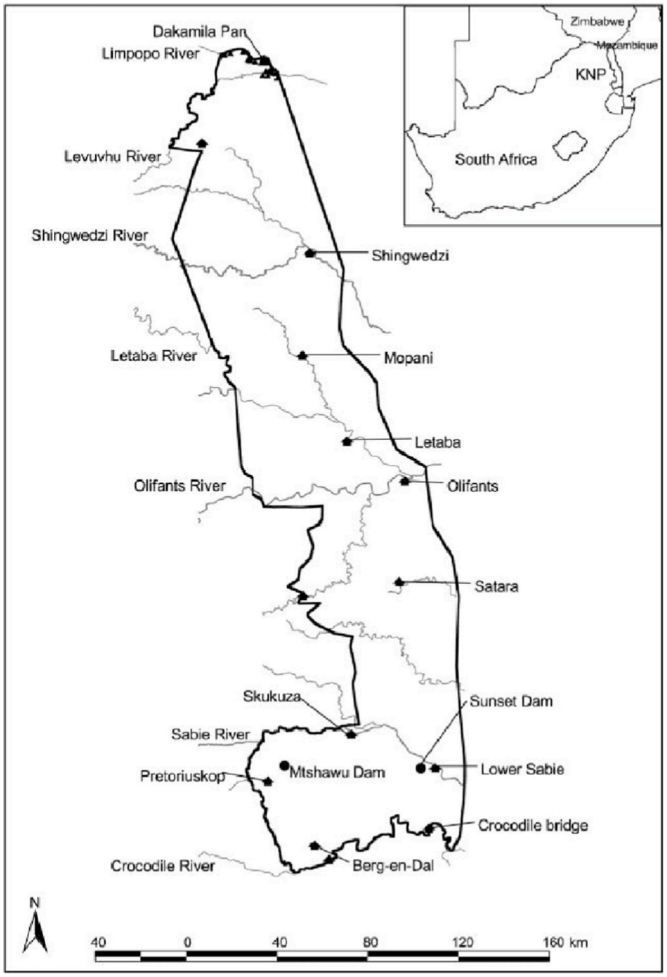
During the last ten years (See Appendix 1), visitor numbers have increased, and congestion of tourist traffic over weekends, certain public holidays and school holidays has intensified in the southern part of KNP (Maps 1 and 2) with associated impacts on the wildlife-viewing experience (Brett, 2018; Gutiérrez et al., 2017). The fact that the southern region is near Johannesburg and Pretoria (South Africa) adds to the fact that more visitors visit this area than sections further north in the park (Brett, 2018). The southern region accounts for 21.9% of the total surface area of the KNP but does receive nearly 73.9% of all tourists and hosts 49.8% of the tourist beds provided by the park (Brett, 2022).

2014 Ferreira and Harmse (2014) published an article concerning tourism development issues in KNP. Already then, the alarm bells sound that day-visitor numbers have increased, and congestion of tourist traffic has intensified in the southern part of KNP. Four years later, in 2018, an article was published by Brett (2018) where crowding issues again were highlighted, precisely that of OSVs (Open Safari vehicles), which were identified as a problem. Brett (2018) research indicated behavioural issues such as not adhering to rules and regulations and crowding of OSVs at sightings, to name a few. He further listed several management ideas, for example, better management of OSVs, separate branding for the four regions and the establishment of peripheral accommodation development, to name but a few (Brett (2018). Four years down the line, this problem still seems to exist, as Slabbert (2022) (manager, tourism research visitor services unit South African National Parks) and Moore (2022) (general manager: visitor services South African National Parks) indicated that KNP has received complains about the behaviour of OSVs in the Southern part of KNP.

From the literature studied, crowding in protected areas is not limited to KNP alone but is a more widespread and long-standing problem. The work of Arnberger and Haider (2007) investigated the influence of place attachment and experience on the perception of depreciative visitor behaviour, recreation impacts and crowding in an urban national park. The results showed that visitors with higher place attachment and previous experience in the park were more sensitive to crowding. Kalisch and Klaphake (2007) researched visitors' expectations and satisfaction in Hallig Hooge National Park, Germany. Their work found that the most sensitive visitor group comprised the non-guided day visitors, whereas guided visitors were much more tolerant of crowding. Furthermore, the study found that perceptions of crowding have had only a slight impact on visitor satisfaction. The Ruhunu (Yala) National Park (NP) in Sri Lanka, the most visited park in the country (Sri Lanka), experienced a decline in visitor satisfaction and resulted in a reduction in visitor numbers due to heavy traffic congestion, identified as one of the primary reasons leading to tourist dissatisfaction while also adversely affecting the conservation of wildlife (Aththanayaka et al., 2019). The only other studies found on OSV behaviour, except for those studies conducted in South Africa (KNP), were those of Kabii and Wandaka (2018) (Masai Mara National Reserve Kenya) and Mogende and Moswete (2018) (Botswana). Kabii and Wandaka (2018) also identified communication between OSVs as a cause for crowding at sightings.

Therefore, due to the long-standing crowding and behavioural problem of OSVs in KNP and seemingly other well-known protected areas, the proposed research aims to contribute to the existing literature on OSV operators' management in protected areas, building upon the works of Brett (2018) and Kabii and Wandaka (2018). This research will expand and enrich the literature on OSV behaviour and the sustainable management of protected areas. Considering the critical role that OSVs play in facilitating game viewing and wildlife safaris for ecotourists and wildlife enthusiasts, it becomes crucial for protected area management to ensure that these vehicles operate sustainably. Ultimately, this research aims to provide valuable insights, recommendations, and guidelines that protected area management authorities can implement. These measures will minimise the negative impacts of OSV operations on wildlife, the overall visitor experience, and the environment, thus

Map 1. (a) Southern Kruger National Part (Safari.com, 2023).



Map 2. (b) Kruger National Park (Freitag-Ronaldson, 2023).

promoting the long-term sustainability of protected areas and enhancing the satisfaction of ecotourists and wildlife tourists.

2. Literature review

2.1. Area under investigation

The first land allocated for protection in South Africa was proclaimed on March 26, 1898, namely the Sabi Game Reserve, the largest game reserve established in South Africa. In 1902, the reserve was re-established by the British caretaker government. The South African Parliament finally proclaimed the enlarged game reserve, Kruger National Park, in 1926, and it became the country's first national park. The first accommodation for overnight visitors was constructed in 1928.

After over 90 years, the KNP has become the most visited national park in South Africa and Africa. Tourist numbers (visitors) have increased from 27 in the early days of its existence (Brett, 2018) to 1.833 million in the 2019–2020 season (pre-COVID) (Slabbert, 2022). Today, the parks boast a total of 4179 beds and 1896 visitors in campsites. Besides accommodation operated by SANParks, an additional 1047 beds are also available in 24 privately owned concession lodges.

2.2. Crowding

The actual number of people, vehicles and activities in an area is a starting point for studies in crowding management. A considerable body of work has documented how rising numbers of visitors bring problems in site management, notably in areas such as ecological impacts and visitor experiences (Kalisch & Klaphake, 2007; Zelenka & Kacetl, 2013; Kim & Yoon, 2019; Yu & Egger, 2021; These impacts are particularly significant in protected areas such as national parks and proper management strategies, for example, visitor education, infrastructure improvements, visitor capacity limits, and monitoring programmes, can assist mitigate these problems.

Issues surrounding crowding include habitat destruction and loss, wildlife disturbance, soil erosion and disturbance, noise and environmental pollution, resource management challenges, social conflict among visitors, visitors' satisfaction, and visitor experience, to name but a few (Higginbottom et al., 2003; Li et al., 2017; Manning, 2002). Issues surrounding commercial tour operators or OSVs are speeding in protected areas, lousy behaviour of operators, driving off the allocated roads, not adhering to rules and regulations, congestion at sightings and radio contact between drivers (Ballantyne et al., 2017; Brett, 2018).

Growing numbers of visitors to protected areas such as KNP impact the management's decision, as park management has to balance two main objectives: protecting the quality of the protected area (KNP) resources and maintaining reasonable access to recreational areas. Identified variables influencing the experience's quality of visitors to protected areas are the number of perceived encounters, location, and type of activity (Kalisch & Klaphake, 2007). Understanding crowding in protected areas such as KNP is even more critical than at so-called regular tourism destinations, as the after-effects may be irreversible for protected areas. Much site management in protected areas includes planning and organising transportation (Leask, 2016). Well-designed transportation systems (road networks, parking areas, entrance and exit areas, private vehicles, OSVs) in protected areas can improve visitors' experiences through crowding (congestion) reductions (Pettebone et al., 2011). Manning et al. (2014) concurred with Pettebone et al. (2011) and stated that transportation systems are important role players; apart from their environmental impacts, they significantly impact the quality of the tourist experience if not well managed.

2.3. Management frameworks/models

The existing literature on crowding management reveals several visitors and crowding management approaches. The critical management approaches are carrying capacity and limits to acceptable change (LAC). In the early 1960s, outdoor recreation managers adopted "carrying capacity" as a management tool to determine the maximum number of people a protected (recreational area) area could carry without destroying its essential qualities (Wager 1964 as in Ferreira & Harmse, 1999). The WTO (WTO, 1982) define carrying capacity as "the maximum number of people that may visit a tourist destination at the same time, without causing destruction of the physical, economic and socio-cultural environment and an unacceptable decrease in the quality of the visitors' experience". Although the carrying capacity approach is mainly used, it lacks uniqueness when closely scrutinised. This has led to the more detailed "limits to acceptable change (LAC)" approach, where there are empirical measures of concepts such as visitor experience or satisfaction and better-defined parameters of environmental impacts. LAC refers to the fact that visitors to conservation areas lead to changes in biophysical conditions and that these changes can be unacceptable at some stage. Therefore, conservation managers must maintain impacts at an acceptable level, which refers to LAC (Stankey et al., 1985; Newsome et al., 2013). The LAC recognizes that tourism and visitor numbers have inevitable impacts but must be limited.

Over the last 20 years, different management frameworks have been used to manage protected areas and the impacts of visitors in these areas. These are Environmental Impact Assessment (EIA), Recreation Opportunity Spectrum (ROS), Limits of Acceptable Change (LAC), Visitor Impact Management, Tourism Optimisation Management Model, and Experience-based Management model. The six critical elements in common of these models or frameworks are a) clearly stated and agreed-on management objectives which include a statement about protection

or desired status of the wildlife and habitat; b) appropriate choice and implementation of management actions designed to meet these objectives; c) a suitable monitoring program; d) a mechanism for effective feedback from evaluation of monitoring into management actions; e) an adequate process for stakeholder participation in the management process and f) a documented management framework that brings the above elements together and guides management (Higginbottom et al., 2003).

Currently, South African National Parks use a Strategic Adaptive Management (SAM) framework similar to that of LAC. SAM is designed to be strategic (facilitate action with foresight and purpose), adaptive (facilitate learning whilst we are doing) and participatory (promote engagement and co-learning with stakeholders) (Grant et al., 2008). SAM begins with determining the desired future state of a particular social-ecological system, which aims to build a common purpose among all relevant stakeholders and develop a collective roadmap for moving from current reality to a more desirable social-ecological system. This desired state or vision and mission, together with the vital attributes of the system to be managed, informs the setting of objectives in the park. The park's goals start with high-level objectives that are deconstructed into a series of lower-level objectives and, ultimately, management options for achieving those objectives. Alternative management options are considered by considering resources available, constraints, potential threats and risks associated with a particular management option while anticipating likely results. The most appropriate option is selected, followed by a planning stage and implementation. A critical component of SAM is monitoring and evaluating the consequences of management decisions. Constant scrutiny of emerging results and evaluation against objectives are essential to adjust strategy and methodology as new understanding and knowledge appear. Of critical importance is the participation and engagement of all relevant stakeholders (Kruger National Park Management Plan, 2018).

A vital theory that also impacts the management of protected areas is the perceived normative theory, which focuses on how visitors react to the presence of other visitors (Donnelly et al., 2000). The normative theory has been used in numerous studies to understand the relationship between encounter norms and perceived crowding. For example, the number of OSVs that are seen as normal at wildlife sightings by visitors and which are seen as not (Donnelly et al., 2000; Manning, 1999; Shelby et al., 1996; Vaske et al., 1986). The relationship between actual use levels and perceived crowding (number of OSVs and private vehicles at sightings) is mediated by the number of reported encounters (number of times one encounters OSVs and other vehicles), and visitors are said to have standards or norms for the acceptability of the number of these encounters. In this approach, when visitors to KNP reported more encounters than their norms, they perceived crowding to be more, whereas those who reported fewer encounters than their norms perceived crowing as less. Vaske and Donnelly (2002) also reported that these relationships can be described as having a mid-point of acceptability – this is where the number of OSVs encountered equals the number of OSVs expected. Differently stated, Tarrant et al. (1997) emphasised that crowding occurs when other visitors' behaviour interferes with an individual's goals or norms.

2.4. The current situation concerning OSV in KNP

Over the last few years, the number of tourist vehicles in the KNP has increased (Slabbert, 2023). Not only has the number of vehicles increased, but also the size of the vehicles, meaning that today, vehicles ride higher on their wheels and carry more passengers per vehicle. Adding to the problem, as Nhlapo in Ferreira and Harmse (2014) indicated, traffic congestion on the internal road system of the southern part of the KNP is aggravated by the 219 private OSVs permitted to enter the park daily. It was further indicated by Ferreira and Harmse (2014) that almost 85% of the OSVs enter and exit the park through the gates in the south (Malelane, Crocodile Bridge, Phabeni and Kruger Gate), with an additional 550 and 750 tourist vehicles also entering the park through the same gates. An official study initiated by SANParks concerning crowding in Kruger National Park in 2018, titled "Kruger National Park traffic management study: stakeholder perceptions of, and solutions to, traffic congestion problems in the south region" (Ballentyne et al., 2017), showed remarkable visitor agreement on the places and issues needing traffic management attention, crowding management and improvement. Areas, where crowding and congestion were perceived as a problem were park entrance gates, animal sightings, picnic sites and camps. Areas that contributed to crowding and traffic congestion were visitor education, vehicle speeding, driver behaviour (especially at animal sightings), an inefficient booking system, increased service, and military and OSV vehicle numbers. Other peer-reviewed works on crowding and OSV in KNP are that of Ferreira and Harmse (2014) and Brett (2018), which highlighted the considerable opposition to the Open Safari Vehicles (OSVs). Resistance arises from the tendency of drivers to monopolise sightings of predators, the fact that they are in radio contact and can quickly access sightings, and the perception that they disregard other visitors.

Complaints have been received regarding the unacceptable driving behaviour of the private guides (OSVs), for example, blocking sightings from other vehicles. They are further considered inconsiderate of other visitors (Nhlapo, as in Ferreira & Harmse, 2014). Some examples are drawn from social media and news feeds. On March 26, 2017, News24 reported that: "Open Safari Vehicles (OSV) completely obstructing a KNP road has sparked outrage on social media, hitting a nerve with loyal Kruger visitors who say operators should be better regulated". In the news feed, the OSVs reportedly obstructed the view of a leopard nesting den, and visitors to the park felt that they could not see the sight, let alone drive past it (News24, 2017). Another post on the social media platform, Klipspringer, indicated that "SANParks has noted with concern the abuse of technology (cell phones) mostly by some independent OSV guides to communicate sightings to each other and speed to those sightings. This causes congestion and could lead to unnecessary confrontations with other tourists (Klipspringer, 2019). In News24, on September 2, 2016, it was posted that "Despite rangers and guides being under fire over the past couple of days for not abiding by the official rules of the Kruger National Park, members of the public should be wary of pointing a finger … Earlier this week, the controversy was sparked after a ranger posted a message to the Guides & Rangers Facebook page, asking members of the public not to report rangers and guides with 'little kak (shit) complaints'". Members of the public responded in outrage with some stating that "Not all but 99% of the tour operators (OSVs) are selfish, rude and don't actually care about anything but the big game and making a tip … ". Another identified problem is that most, if not all, OSV operators use two-way radio communication to communicate important sightings, which further contributes to the problem of crowding at sightings.

This problem seems not to be unique just to the Kruger National Park, as Kabii and Wandaka (2018) affirm that safari guides in the Masai Mara (Kenya) will go to great lengths to ensure that their customers enjoy the highest level of satisfaction with watching wildlife. Experienced safari guides are valuable assets to tour firms in providing tourists with satisfying experiences, resulting in successful safari operations. This tourist pressure causes safari guides to tune in to any available two-way radio channel that might guide them to sought-after wildlife, such as the Big 5. This, in turn, leads to crowding around the sighted animals. Sitati et al., (2003) indicate that once safari guides have communicated to other guides about the presence of any sought-after wildlife, an astonishing 6.8% of the OSV drivers observed all park rules, with the remaining 90% breaking most of these regulations. Kabii and Wakada (2018) suggest implementing restrictions on using radios or other communication devices to reduce the crowding of OSVs at sightings. Thus, the situation is common to the KNP but is also found in other wildlife destinations such as Kenya and Botswana (Mogende & Moswete, 2018).

The OSV operators within the park also attempt to improve the perceived problems caused by OSVs in the park. OSV operators launched a self-regulation project in 2015 in partnership with the South African Tourism Service Association (SATSA) and SANParks to strengthen SANParks' responsible tourism program. The main aim of the self-regulation project was to add a monitoring element to ensure the best behaviour of its members. Two hundred and seventy-five open safari vehicles were registered during the project's first year of existence. This project is taken very seriously, and the KNP Protection Services issues fines to those who misbehave in the park (Izwi, 2016).

A stringent process must be followed for registration and due diligence jointly developed by the industry. SANParks screened each applicant, covering the business, vehicles (including safety inspections), and guides. The monitoring project is a huge success, with noticeably improved behaviour amongst OSV guides. To further strengthen the program, it is required for all OSV guides to attend the KNP Orientation Training program, which provides guides with up-to-date information on park policy and issues such as antipoaching efforts and elephant population management, to name but a few (Izwi, 2016).

A survey conducted by SATSA in 2016 among OSV operators regarding the said program indicates that, overall, the project was a great success, with 83% of OSV operators rating the project as being more efficient than the previous permitting process. Further, 91% of the OSV operators believe that the monitoring process is improving the industry's image and 78% rated morale around the project as positive (Izwi, 2016).

It is important to note that not all KNP visitors perceive OSVs as a problem. Many visitors enjoy the experience of riding in OSVs and appreciate the unobstructed views of wildlife that these vehicles provide. Some visitors feel that OSVs are essential to the park's tourism offerings (Brett, 2018) and that, on the contrary, OSVs also make a valuable contribution to the KNP. In 2016, Izwi, the voice of RICK online magazine, published data on the contribution of OSVs to the local economy of the KNP. It stated that OSVs contribute close to R26 million to SANParks and, therefore, to conservation. It was further noted that OSV operators (guides) contribute to the SANParks' responsible tourism strategy by decreasing vehicle numbers and reducing carbon emissions. The OSV guides further assist conservation efforts by reporting suspicious/illegal activities and distressed animals (Izwi, 2016).

3. Method

This research aims to determine visitor perceptions regarding OSVs in the Southern section of Kruger National Park. The study followed an inductive approach. The inductive approach does not involve the formulation of hypotheses. It begins with research questions (what visitors perceive regarding OSV behaviour) and an aim that must be achieved during the research process (Maree, 2019). The research followed a causal design (explanatory) (Maree & Van der Westhuizen, 2007).

A qualitative approach was followed, namely non-probability sampling. In a non-probability sample, individuals are selected based on non-random criteria and only some individuals have a chance of being included. Convenience sampling was used as a form of non-probability sampling. The convenience sample consists of the individuals who are most accessible to the researcher (Maree & Pietersen, 2007).

The research was conducted during the school holidays in December 2022 and the peak period of the Christmas season. The sample population was overnight and day visitors to the park older than 18. The research was mainly conducted in the Berg en Dal and Skukuza rest camps, two of the largest rest camps in the southern section. Two picnic areas were included: the day visitors' site at Skukuza and Afsaal, a picnic area with a restaurant. Twenty-three (23) interviews were conducted at the Berg en Dal rest camp (10), the Afsaal picnic area (4), and the Skukuza rest camp (9). The research population included day and overnight visitors to the park's southern section. While a saturation point was reached at interviewee 16, the researchers continued interviewing seven more participants. This was because we booked for a week at the park, and the researchers felt it would not harm to continue as we were there for another two days. No new responses to the questions emerged. The saturation point is when new data ceases to provide additional insights or perspectives regarding the research topic or question (Maree & Pietersen, 2007).

The questions asked during the interview were derived from previous work done on crowding in national parks namely that of Ballentyne et al., (2017), Brett (2018; 2022) and Ferreira and Harmse (2014). The interview guide's first section covered the participants' demographic information (average number of visits, days spent in the park, etc.), and the second section focused on visitors' perceptions of OSVs in the park. Here, participants were asked to explain their experiences of OSVs, how this experience made them feel inside, how it affected their overall experience in the park, and their actions and behaviour when there were too many OSVs at sightings. Last, they were asked if they had any management suggestions for park management on OSVs.

A digital recording device was used to record all the interviews. After that, the recorded interviews were carefully transcribed. The data were analysed using Creswell and Creswell's (2018) six-step approach: (i) organising and preparing data. All the questions were typed out as they had been asked during the interviews, and the questions and interviewees' responses were transcribed, and (ii) reading through all the data. The researchers read through every interviewee's answer to each question and (iii) assigned codes to the main themes that emerged from these responses. The researchers identified specific themes arising from the particular questions, and (iv) applied the coding process to create a description of the setting or the people and ascribed themes for analysis. Once the researchers had identified the main themes, which were analysed to determine their significance, (v), summaries were advanced and the items were then represented in the qualitative narrative (results); and finally, (vi) meaning drawn from the data through data interpretation allowed the researchers to decide on recommendations.

3.1. Ethical considerations

The Faculty of Economic Management Sciences at the North-West University ethics community approved the study with the following ethics number NWU 01872-22-A4. The study was also approved by the scientific committee of SANParks, with the following project number CRO/2022/11.

4. Results

The researchers first determined the profile of the participants. This was done to have more knowledge about the visitors to KNP and to compare the results with previous work done on visitor profiles in the park. The profile of the participants was as follows (See Table 1).

Table 1
Participants profile.

Participants visitor status	3-day visitors
	20 overnight visitors
Average number of visits per year	2.44 times (overnight visitors)
	17 times (day visitors
Average number of days stayed	16 days
Place of Origin	1 international visitor (Australia)
	22 national visitors (South Africa)
Province of origin	10 participants – Gauteng province
	8 participants – Mpumalanga province
	2 participants – KwaZulu-Natal province
	1 participant – Western Cape province
	1 participant - North West province
Visit other national parks	16 participants answered – yes
	2 participants said rarely
	6 participants said never

- There were twenty overnight visitors and three-day visitors (a total of 23 participants).
- Overnight visitors visited the park an average of 2.44 times a year and stayed for an average of 16 days.
- The most extended stay by an overnight visitor was nineteen days, and the shortest stay was two days.
- Day visitors visited the park at least 17 times a year, with one visiting 30 or 20 times a year.
- Only one participant was an international visitor, an ex-South African who had emigrated to Australia 20 years ago.
- Most participants (10) reside in Gauteng province, followed by Mpumalanga province (8).
- Sixteen participants indicated that they visit other national parks in South Africa, two said rarely, and six said that they do not visit other national parks.
- Camping was the most preferred type of accommodation, followed by chalets.

The profile of the participants of the current research correlates well with previous research by Kruger et al. (2019), with most visitors originating from Gauteng, as return visitors and preferring camping as an accommodation style. The current research agrees with Kruger et al. (2019) that most visitors originate from Gauteng.

First and foremost, the researchers wanted to determine if the ORV operator's behaviour is still seen as problematic by assessing the view of visitors to the KNP southern section during Dec 2023, where crowding is more regular (Table 2). Participants were asked for their opinions on OSVs in the park. This fell in line with the reviewed literature, which indicated that some perceived OSVs as problematic and misbehaved, while others did not (Brett, 2018, 2022; Ferreira & Harmse, 2014).

The next question investigated participants' views on OSV operator's behaviour. The researched participants expressed several themes regarding their views on OSV operators' behaviour (Table 3) in protected areas. Three prominent themes emerged from their perspectives and are as follows: Theme 1, manoeuvring of vehicles.; Theme 2, inside information; and Theme 3, bad-mannered. For theme 1 (manoeuvring), participants said: They are rude; they block the way of sight; they push in; they park all over; no place for others; they chase (drive fast) to sightings. For theme 2 (inside information), participants said they have inside information and knew where the animals were. For theme 3 (bad-mannered), participants said they are a disgrace; they do not stay within the rules of the park, they are obnoxious. As stated in the words of the participants in this research: "*They park all over, and there is no place for other people, so we can't even see anything. They must look for* 10 min *and move on so others can have an opportunity to see*" (P 18). *They block the roads so nobody can see"* (P 18). *"They are a disgrace to others"* (P 20). *"They are rude and break the rules. They also block one's view and push in"* (P 23).

A follow-up question, how does it make participants feel when OSVs (Table 4) are at sightings, was posed to the participants who saw OSVs in a negative light. Four themes were identified. Theme 1, Angry; Theme 2, Frustrated; and Theme 3, Irritated. Regarding theme 1, angry participant 10 had the following to say: *"They make me feel angry, they must be treated the same as us"*. Participant 11 said they *"make me angry if the push in front of you"*. Participant 20 makes a powerful and extreme statement: *"I want to kill"*. Regarding theme 2, frustrated, participant 3 said: *"I felt frustrated, especially in busy times. One swears at me"*. For theme 3, Irritated, participant 18 said, "*I am irritated by them (OSVs)*". This was the first time that research determined visitors' feelings regarding the behaviour of OSVs in KNP.

For those participants who felt positively regarding OSVs, the following themes were derived from the interviews (Table 3): Theme 1, good behaviour; Theme 2, generating income; and Theme 3, helping you see animals. In the words of the participants, *"They are friendly and switch off their engines. I have no problem with them"* (P 6). "*They do have manners, and most of them are polite"* (P 4).

> *"I have no problem with them. They also have the same privileges. Sometimes a bit arrogant, and sometimes they are helpful"* (P 1). *"They bring in needed money for the park. They help you to see some wildlife, and they are friendly"* (P 14).

The participants were further asked how the OSVs affected their overall experience in the park's southern section. Two themes emerged from this question. Theme 1 did not impact my overall experience at all, and Theme 2 was an unpleasant experience. Kim and Yoon (2019) indicated that visitors who had a bad experience due to crowding on

Table 2
Participants view regarding OSVs.

Response from participants	Themes
"They also have the same privileges. Sometimes a bit arrogant. Sometimes they are helpful" (P 1). "I like to go with them, as they can go where I am not allowed" (P 2). "Friendly, switch off their engines. No problem with them" (P 7). "Prefer them as they know what they are doing. One was, however, speeding. They have to be disciplined"(P 9). "Bring in needed money for the park. They help you to see some wildlife. They are friendly" (P 15). "No, not at all" (P 16). "Personally, I don't have a problem. More sightings, more tips for them" (P 17). "We follow them to see wildlife" (P 18). "Haven't seen many this year. They are more north in the park. They do have manners. Most of them are polite" (P 5). "I think they have an advantage above us" (P 12). "Yes and no" (P 13). "They sometimes help you. If they stop in front of you it is bad" (P 14).	Good behaviour
"Yes is a problem but improved a lot" (P 3). "They chase to sightings and push in. Most of the time, they are rude" (P 8). "Obnoxious" (P 10). "Park all over, no place for other people, Can't even see anything. I look for 10 mm and move on. Give other an opportunity" (P 11). "They have inside info (know where the animals are). They block the road. Nobody have an opportunity to see the wildlife" (P 19). "They block the roads. Cannot pass. They push in" (P 20). "a massive complete disgrace for other people" (P 21). "Yes it bothers us a lot" (P 22). "They are rude, do not keep within the rules, block one's view, and push in" (P 23). Prefer them as they know what they are doing. One was, however, speeding. They have to be disciplined" (P 9)	Misbehaviour

Table 3
Views of OSV operators.

Response from participants	Themes
"Park all over, no place for other people, can't even see anything. I look for 10 mm and move on. Give other an opportunity" (P 11). They block the road. Nobody have an opportunity to see the wildlife" (P 19). "They block the roads. Cannot pass. They push in" (P 20). "They block one's view, and push in" (P 23).	Theme 1: Manoeuvring of OSVs
"I think they have an advantage above us" (P 12) "They have inside info (know where the animals are) (P19)	Theme 2: Inside information
"Sometimes a bit arrogant" (P 1). "One was, however, speeding" (P 9) "They chase to sightings and push in. Most of the time, they are rude" (P 8). "Obnoxious" (P 10). "A massive complete disgrace for other people" (P 21). "They bother us a lot" (P 22). "They are rude, do not keep within the rules" (P 23).	Theme 3: Bad-mannered

Table 4
Feelings felt by participants regarding OSVs.

Response from participants who saw OSVs as negative	Themes
"Angry and frustrated" (P 21) "Want to kill, angry" (P 20) "Angry" (P 22, 23) "Angry They must be treated the same as us" (P 10)	Theme 1: Angry;
"Frustrated, especially in busy times. One swears at me" (P 3) "Bit frustrated" (P 7) "Frustrated" (P 14) "Make me angry if the push in front of you" (P 11) "Annoyed" (9) "Demoralising" (P 18) "Angry and frustrated" (P 21)	Theme 2: Frustrated
"They irritated me (P 17 "They are an irritation", 19)	Theme 3: Irritated
Response from participants who saw OSVs as positively	
"They also have the same privileges. Sometimes they are helpful" (P 1). "Friendly, switch off their engines" (P 7). "They are friendly" (P 15) "They do have manners. Most of them are polite" (P 5). "They sometimes help you" (P 14).	Theme 1: Good behaviour
"Bring in needed money for the park" (P 15)." "More sightings, more tips for them" (P 17).	Theme 2: Generating income;
"I like to go with them, as they can go where I am not allowed" (P 2). "Prefer them as they know what they are doing" (P 9) "They help you to see some wildlife" (P 15) "We follow them to see wildlife" (P 18).	Theme 3: Helping you see animals.

Jeju Island in Korea indicated it negatively impacted their intention to recommend Jeju Island as a tourism destination. Word of mouth is one of the best marketing mediums, and if visitors start to voice their anger due to crowded areas and the behaviour of OSVs in KNP, it can lead to fewer people visiting the park.

In a follow-up question, the interviewer asked about their actions when arriving at a sighting with numerous OSVs (Table 5). Two themes emerged from this question. Theme 1: I will leave and Theme 2, I will stay; The participants had the following to say: *"If I cannot see, I move on"* (P 10). *"Look at what animals there are and continue"* (P 11). *"Wait my turn, will not go back"* (P 12). *"Stop to look at what wildlife there are"* (P 15). *"I tried to move on was not possible, the road was block"* (P 22). *"I am thinking of not coming anymore"* (P 20).

The last question posed to the participants was to ask them for suggestions regarding managing OSVs in the KNP (Table 6). This was a fundamental question as OSV management is an ongoing problem in KNP (Brett, 2018; Ferreira & Harmse, 2014; Slabbert, 2022) and other protected areas such as Masai Mara in Kenya (Kabii & Wandaka, 2018).

Table 5
Actions of participants.

Response from participants	Themes
"Leave" (P 3) "Drive away" (P 9) "If I cannot see I move on" (P 10) "Look at what animals there are and continue" (P 11) "Take another route" (P 18) "I am thinking of not coming anymore" (P 20) "I tried to move on was not possible, the road was block" (P 22) "Drive off "(P 23)	Theme: I will leave
"Stop" (P 7) "Stop to look at wildlife" (P 16) "Stay to see if it's something worth to see" (P 6) "Wait my turn, will not go back" (P 12) "Stay to see if there is something" (P 13)	Theme 2: I will stay

Table 6
Management suggestions for OSVs.

Response from participants	Themes
"People are arrogant, need to be educated – courtesy" (P 4) "They help us to see game" (P 17)	Theme 1: Educate OSVs
"OSV must be the same as normal tourists" (P 3) "Need to follow rules like everyone else" (P 21) "Rules account for them as well" (P 7) "Never know how they (SANParks) will managed it" (P 16)	Theme 2: Apply rules and regulations
"Don't know everything is about money" (P10) "Must have manners and must behave as others, not superior" (P 11) "They (OSV) must also get fined" (P 21) "Policies and policing" (P 20) "Maybe more (OSVs) to alleviate the crowding" "Keep it affordable (P14) "Need to enforce rules better at sightings" (P22) "No radio communication between them must stop correct, according to regulations (P 12)	Theme 3: Better-enforced behaviour;
"To many private lodges that are allowed, maybe give them other routes to use, that is not open to public" (P 18) "More people per vehicle, consolidate, then less vehicles" (P 19) "Appoint people to manage the crowding at sightings, rules need to be implemented, report system to report bad behaviour (P 23)"	Theme 4, Different routes for OSVs;

The following themes were identified. Theme 1, Educate OSVs; Theme 2, Apply rules and regulations; Theme 3, Better-enforced behaviour; and Theme 4, Different routes for OSVs. Similar mitigation strategies or answers emerged from a study conducted on Safari Jeep Drivers (OSVs) in Ruhunu National Park in Sri Lanka, namely training of safari guides (education), no mobile phone use (no communication), limiting time spent at sightings, limiting vehicle entrance to the park and strengthening wildlife officers to implement rules and regulations firmly (Aththanayaka et al., 2019).

5. Discussion

There appears to be some ambiguity regarding the perception of OSVs among the current participants. The findings suggest that it is impossible to conclude that all visitors generally see OSVs as problematic. Therefore, further research and analysis may be necessary to determine the specific perceptions of visitors towards OSVs in the remaining sections of the park and not just the southern section, which will offer a more holistic perspective of the park. More research is needed in other iconic protected areas in Africa and the world to determine if this is a global problem. However, the reality is that the results indicate some issues with OSVs at sightings in KNP, and this notion must be considered. This is a long-standing issue (Ballentyne et al., (2017)), and management must address it successfully (Brett, 2018) as it already impacts visitor experiences. This study identified issues such as obstructing traffic and the clustering of OSVs at sightings, making it difficult for other visitors to view wildlife. The findings of this research regarding visitors views of OSV correlates with the work carried out by Ferreira and Harmse (2014) as well as Kabii and Wandaka (2018), who indicated that some of the main challenges with OSVs in protected areas are irresponsible manoeuvring, too many vehicles around the animals' sightings, parking too close to the animal, remaining too long at a sighting, and driving off the established roads in protected areas. Research by Ferreira and Harmse (2014) and Ballantyne et al. (2017) conducted a couple of years ago in KNP identified similar problems, and still, OSVs seem to be a problem, regardless of management suggestions on crowding management in KNP, made these researchers. One can only wonder if these recommendations were implemented at all. It is clear from the just mentioned that some OSV

operators do have behavioural issues and tend to be ignorant of the rules and regulations of the park. This is regardless of the implementation of the self-regulation project launched in 2015 by the OSV operators in the park (Izwi, 2016). The management implication is that SANParks needs to carefully consider what needs to be done about managing OSVs in the park. The report of Ballantyne et al. (2017), in which SANParks commissioned the research, gave several possible solutions that can be implemented for OSV and crowding. However, from the results of this study, little was addressed. The 2018–2028 official management plan of KNP, done by SANParks, also lists the sighting congestion as a threat on page 41, with the same problem still existing five years later (South African National Parks, 2018).

There is a strong connection between negative perceptions of the OSVs and negative emotional responses among some participants. The results showed that the participants with negative feelings towards OSVs experienced anger, frustration, and irritation. Discussion regarding the participants' negative feelings regarding Kim and Yoon's work (2020) can be cited as this research focused on crowding in Jeju Island, Korea. They found that visitors got angry at crowded areas, which, in turn, may negatively impact their environmentally responsible behaviour (ERB). However, this was due to crowding in general and not crowding caused by OSVs. Discussion of positive feelings of participants. Here, it can be recorded that unfortunately, none of the peer-reviewed sources investigated in this research identified any positive views of participants regarding OSVs. An article published by Izwi, the voice of risk (2016), highlighted some of the positives of OSVs in KNP. The OSV industry allows KNP to stay competitive; it is responsible for bringing in over 4% of overseas tourist arrivals and contributing close to R26 million to SANParks. Furthermore, OSVs contribute to the South African National Park's responsible tourism strategy by reducing vehicle numbers whilst ensuring a superior wildlife encounter. OSV operators likewise assist conservation efforts by reporting suspicious and illegal activity (poaching) in the KNP.

Depending on the individual and the situation, this emotional response could lead to various outcomes. For instance, some visitors may choose to avoid areas where OSVs are prevalent, thus reducing their overall enjoyment of the park and resulting in a negative perception of it. Others may become confrontational with OSV operators or park authorities, as in the past, potentially creating conflict and tension among visitors. Alternatively, some visitors may suppress their negative emotions, leading to stress or decreased satisfaction with their park experience. It is important to note that the statement does not provide any information about the frequency or severity of these emotional responses. It does not suggest that all visitors who perceive OSVs as problematic experience negative emotions. After investigating the park regulations documents, also named "Code of Conduct", it was found that visitors and OSV operators are made aware of their behaviour in the park under point eight, "drive safely", and point fourteen, "driving areas" (Consolidated rules and regulations). It states that in the document, summons will be issued to offenders (South African National Parks, 2023). If regulations are in place, the problem then lies with the execution of the regulations, and this can be due to two reasons: the park might be understaffed, or the current official is not doing their duty.

5.1. Management suggestions and solutions regarding OSVs

First, educating OSV operators could be a solution to the problem. It is suggested by the participants that SANParks must educate OSV drivers/operators regarding the rules and regulations, and more signage governing their use of the park is necessary. However, according to the self-regulated program implemented by OSVs, this already forms a part of the accreditation process (Izwi, 2016). Therefore, the question arises: Where does the problem lie? The problem may be fourfold. First, some operators may discard the training/education provided in the program. Second, it might be due to bad governance and the fact that OSV offenders are not summoned. Third, the park might need more personnel to do meaningful full policing of this enormous area. Fourth, a report conducted on sector skills analysis for conservation, hospitality tourism and travel services by CATHSSETA (The Culture, Art, Tourism, Hospitality, and Sport Sector Education and Training Authority in South Africa) found that people employed in the conservation sector focus has shifted from regular conservation duties to community engagement aspects and anti-poaching, distracting employees from what was seen as everyday operations (CATHSSETA, 2023).

Second, better enforcement of behaviour – there is a need for better enforcement of the rules and regulations related to OSVs. Ballantyne et al. (2017) suggested this as a management tool, but it seems not to have been implemented by park management. Possible solutions might be to be more vigorous with the policing or employ more staff to control the area; OSV operators guilty of misbehaving must be suspended for a specific time; a reporting platform might be a solution where offenders can be reported; no radio or mobile phone communications between the OSVs – it is clear from the results that radio communications between the OSVs contribute to congestion which was confirmed as a problem by Kabii and Wandaka (2018). Maybe the park can reward OSV's good behaviour as well. This might be a draw card for OSVs to improve their behaviour. No radio or mobile phone communication between the OSVs can be a solution. This may be the best plausible solution to addressing congestion, but OSV guides overall behaviour.

Third, use technology to manage OSV crowding by implementing an application that uses GPS tracking to indicate the location of all OSVs. A control room must monitor this application, and as soon as there are too many OSVs at a sighting, say more than 5, a notice must be sent to the OSV operators to move on. Noticeably, all OSVs must be registered on the application, each with a unique number, enabling park management to identify wrongdoers and those who behave appropriately. This must be combined with a reporting system/platform, and it is suggested that a reporting platform be developed, allowing all visitors and OSVs to report bad behaviour or to help monitor and track issues related to OSV use within the park. Ballantyne et al. (2017) also recommended this as a management solution.

Fourth, game viewing routes for OSVs only. This might also be a plausible solution. Ballentyne et al., (2017) also mentioned this as a possible solution. As the park is over 2 million hectares, there is room for routes allocated only to OSVs. A test run can be implemented in the south section of the park, which is recommendable at the Skukuza rest camp (the largest camp in the park), as numerous routes join in this area. This can be tested over one year to see if it is implementable in other regions.

Therefore, based on Higginbottom et al. (2003), six core elements originate from the different models discussed; the first would be to develop management objectives to address the problem with OSVs. Consequently, the management objectives are first, education of OSV drivers and operators regarding rules and regulations; second, better enforcement of laws and regulations; third, employ more personnel to regulate rules and regulations; fourth, develop a reporting system for the bad behaviour of OSVs; fifth, investigate the possibility to discontinue two-way radio communication between OSVs and last investigate possible technology that can be used to monitor OSV movement in the park to prevent crowding of OSVs at sightings.

The next step of the sic core elements is to implement management actions (Higginbottom et al., 2003). Implementing management actions involves implementing plans and strategies to the specific management objectives set in the above paragraph. Here are steps that can be followed to implement management actions effectively: first, clearly define goals and objectives; second, develop an action plan outlining the steps, resources, responsibilities, timelines, and milestones necessary to achieve the desired management objectives set; third, allocate resources for example resources such as finances, human resources, technology, and materials required for successful execution (Hockings et al., 2004).

The next step of the six core elements is implementing a monitoring program for OSVs in the southern section of Kruger National Park

requires a structured approach to ensure environmental conservation, visitor safety, and adherence to park regulations (Higginbottom et al., 2003). This can be done by monitoring parameters such as frequency and routes of OSV usage, compliance with speed limits and off-road driving restrictions, to name but a few. Data Collection can also be a monitoring method, regular patrols and observations by park rangers or designated monitoring personnel, GPS tracking systems to monitor OSV movements and routes, and installation of sensors or cameras in critical areas to monitor activity. The next step is the mechanism for effective feedback (Higginbottom et al., 2003). This will require reporting and evaluation, such as reports on watching and sharing findings with park management, stakeholders (OSVs), and relevant authorities. Adaptive Management uses collected data to adapt and refine OSV management strategies. Implement changes to regulations or operational practices based on monitoring results. The second last step would be to have full stakeholder participation in the new management process developed, therefore OSV operators and park management. The last would be to document the management framework that will be followed to guide management in OSVs-related issues in the park.

6. Conclusion

The research aims to determine visitors' perceptions regarding OSVs in the southern part of the KNP and fill the void of research regarding OSV operations in protected areas. The study makes two significant contributions. First, it provides practical assistance by offering insights into the management of OSVs. It identifies management solutions or approaches that can be employed to address the issue of OSV operators' bad behaviour. These findings can be directly applied in the field to improve the management of OSVs and mitigate any negative impacts associated with their operations. Secondly, the study contributes to the literature on protected area management, specifically focusing on OSV management. This research can contribute to other national parks across Africa and the world, which are experiencing similar problems with OSVs, to manage OSVs better. It explores participants' feelings towards OSVs and examines how the presence of OSVs influences other visitors' overall experience within the park. This aspect of the research is novel, as it sheds light on an area that has not been extensively studied before. The study fills a gap in the existing literature on protected area management by identifying and documenting participants' sentiments and the impact of OSVs on their park experience.

The limitation of the research is that it was conducted during the December holiday season. In contrast, June/July are the busiest times in the park, which may result in different perceptions of visitors when there are more visitors. Another limitation is that the research was only conducted in the park's southern section. Expanding the study to other areas of the KNP could provide a more comprehensive understanding of the issue.

In summary, the research offers valuable insights into visitors' perceptions regarding OSVs in the KNP. However, further research is needed to develop comprehensive management strategies to address the OSVs in other national parks where the problem exists globally.

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CRediT authorship contribution statement

P. van der Merwe: Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Visualization, Writing – original draft, Writing – review & editing.

Declaration of generative AI and AI-assisted technologies in the writing process

During the preparation of this work, the author(s) used CHATGTP to interpret some of the findings better. After using this tool/service, the author(s) reviewed and edited the content as needed and took full responsibility for the publication's content.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

The authors do not have permission to share data.

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Appendix 1. Visitor numbers to Kruger NP

	April	May	June	July	August	September	October	November	December	January	February	March
2010–11	116,172	92,961	147,801	123,434	139,860	138,200	112,948	90,482	151,587	106,955	71,399	94,488
2011–12	131,264	92,956	110,664	152,941	150,520	120,446	136,821	93,286	136,821	99,184	70,990	95,030
2012–13	103,246	90,939	105,511	143,446	149,110	140,961	129,255	104,269	157,694	96,668	71,271	123,155
2013–14	103,246	105,093	135,458	153,634	162,700	166,417	130,287	114,685	180,328	108,281	87,960	108,827
2014–15	138,515	117,299	123,185	174,837	165,121	164,661	161,899	120,507	184,256	111,534	85,735	112,244
2015–16	143,377	114,710	128,336	180,720	177,131	178,045	158,683	126,965	181,235	121,464	98,568	157,984
2016–17	125,777	132,305	143,278	189,506	183,683	177,477	171,684	132,095	189,874	135,603	105,813	130,629
2017–18	178,403	124,290	132,547	210,471	192,525	202,212	179,738	138,934	198,001	128,897	105,869	140,863
2018–19	156,587	125,075	140,095	191,175	201,506	212,292	174,475	129,835	192,317	121,413	103,822	143,536
2019–20	140,351	123,503	168,484	174,178	209,005	217,634	159,590	134,122	188,569	129,904	104,338	83,383
2020–21	0	0	30,396	39,669	77,101	108,585	109,165	86,342	145,896	93,072	57,647	81,873
2021–22	121,626	90,281	98,656	102,173	121,227	123,179	131,102	96,026	155,077	101,512	71,451	110,507
2022–23	126,739	101,037	130,114	171,747	169,502	158,847	153,222	106,330	180,029	118,968	73,009	113,977

(Slabbert, L. 2023. Visitors numbers to Kruger National Park).

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