

A selective review of environmental perceptions, attitudes, place attachment, and their spatial characterisation: contrasting the South African and global perspectives

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Abstract

This selective review points to a rich body of literature on environmental perceptions, attitudes, and place attachment in South Africa. Research works highlight that the global-North dominates in human–nature relations studies, with relatively less work done in less developed economies such as sub-Saharan Africa and South Africa. Additionally, the review of the literature on these concepts points to the complexity of these aspects in terms of their conceptual distinctions, amorphous nature, and hence the difficulties surrounding their spatial characterisation. This selective review aims to provide a contrast between South African and international studies on these concepts. This review notes that human–nature studies in South Africa are dominated by place research, which is largely influenced by the country’s spatio-political setting, where social engineering was influenced by past policies that had substantial impacts on the arrangement of space, identity, and belonging. Additionally, the review notes the dearth of literature that has attempted to spatially characterise human–nature relations in the country. Spatially characterising these concepts could be beneficial for urban and environmental planners and policymakers in the country, and assist in initiatives meant to reduce spatial inequalities in the country.

Key words: environmental perceptions, environmental attitudes, place attachment, sense of place, spatial characterisation

Résumé

Cette synthèse sélective met en évidence un riche corpus de littérature sur les perceptions environnementales, les attitudes et l’attachement à un lieu en Afrique du Sud. Les travaux de recherche soulignent que le Nord global domine dans les études sur les relations humain-nature, avec relativement moins de travaux réalisés dans les économies moins développées comme l’Afrique subsaharienne et l’Afrique du Sud. En outre, l’examen de la littérature sur ces concepts met en évidence la complexité de ces aspects en matière de distinctions conceptuelles, de nature amorphe, et donc les difficultés entourant leur caractérisation spatiale. Cette synthèse sélective vise à fournir un contraste entre les études sud-africaines et internationales sur ces concepts. Cette revue souligne que les études sur l’humain et la nature en Afrique du Sud sont dominées par la recherche sur les lieux, ce qui est en grande partie une influence du cadre spatiopolitique du pays, où l’ingénierie sociale a été influencée par les politiques passées qui ont eu des impacts substantiels sur l’aménagement de l’espace, l’identité et l’appartenance. Par ailleurs, la synthèse note la rareté de la littérature qui a tenté de caractériser spatialement les relations humain-nature dans le pays. La caractérisation spatiale de ces concepts pourrait être bénéfique pour les planificateurs et les décideurs urbains et environnementaux du pays, et contribuer aux initiatives visant à réduire les inégalités spatiales dans le pays.

Mots-clés : perceptions environnementales, attitudes environnementales, attachement à un lieu, sens du lieu, caractérisation spatiale

1. Introduction

Human–nature interactions have attracted a considerable amount of interest from scholars in the past three decades. Much human–nature research has examined environmen-

tal perceptions, attitudes, and place attachment, while there is a growing interest in incorporating spatial characterisation into these concepts (Brown et al. 2015; Maguirea et al. 2018). Spatial characterisation refers to mapping

objects of interest to determine their geographical distributions and to identify relationships and patterns that may exist between them (Bishop and Giardino 2021). Spatial characterisation of environmental phenomena such as environmental attitudes, place attachment, and environmental perceptions is an emerging but growing trend in social sciences research (Brown et al. 2015; 2020; Dlamini et al. 2020).

We can distinguish between four main bodies of research that have examined various aspects of human–nature relationships. The first body examines environmental attitudes based on surveys of peoples’ environmental attitudes and concerns (Dunlap and Van Liere 1980; Axelrod and Lehman 1993; Struwig 2010). The second area of research has gone further to examine environmental values and perceptions as determinants of environmental attitudes (Rajecki 1982; Zube 1987; Cheung 2015; Giddy and Webb 2018). Thirdly, a much larger body of literature has been on place attachment (Cuba and Hummon 1993; Scannell and Gifford 2010; Lewicka 2011; Ramkissoon 2015). Most of the studies on place attachment have tended to focus on particular geographical areas and activities, like tourist attitudes towards adventure tourism (Giddy and Webb 2018), student populations (Prati et al. 2017), and recreational areas (Williams et al. 2015). These studies show the complexity of theoretical interactions amongst human–nature variables and at times deficiencies in their understanding. Fourthly, other studies have examined how these variables determine environmentally responsible behaviours (Ajzen and Fishbein 1980; Chiu et al. 2014; Cheng et al. 2015; Ramkissoon 2015).

Understanding place identity, attachment, environmental perceptions, and how these are spatially distributed is particularly important in the South African context because of the country’s history of separate development, apartheid. This policy deliberately sought to divide people by ethnicity and creed, which has a large bearing on how people view their environment (Durrheim and Dixon 2001). The policy of apartheid divided the African population into artificial ethnic nations, each with its own homeland which was given pseudo independence. The system also saw the forced removal of black people from areas that were deemed to be reserved for white people. Upon gaining independence in 1994, South Africa was divided into nine new provinces to replace the four existing provinces and 10 black homelands. Therefore, the country has settlement patterns that are largely shaped by past governance structures that created and implemented race-based discriminatory settlement patterns (Marais et al. 2021).

In South Africa, a common focus of studies on human–nature interactions has been on environmental concern and general environmental satisfaction. Such studies form part of policy-oriented surveys such as the biennial South African Social Attitudes Survey and the sub-national Gauteng City-Region Observatory (GCRO) Quality of Life Surveys as well as scope-restricted research works (Fiedelley et al. 1998; Struwig 2010). Place attachment studies in South Africa have also received prominent attention from researchers mainly because of the country’s history of separate development. Some studies on place attachment in South Africa have ex-

plored the sense of place based on identities around conservation sites (Puren et al. 2008), attachment to community areas (Roos 2008; Chigeza et al. 2013), and effects of desegregation on attachment (Durrheim and Dixon 2001). These studies present an opportunity to analyse people’s attachment to place considering South Africa’s history of forced relocations since 1948 when the policy of separate racial development was enacted (Durrheim and Dixon 2001).

It is unclear if social engineering in South Africa has influenced people’s conceptions of space and attachment. Additionally, there is a need for the spatial characterisation of these concepts to understand how they vary in space. Brown et al. (2015) reported on the scarcity of works that have attempted to spatially characterise these human–nature concepts. This review aims to fill this research gap by providing a select review of the literature on human–nature interaction studies and their spatial characterisation in South Africa, and comparing South Africa’s and global experiences. Although specific reference is made to South African studies, this study is based on a select few studies that were identified using a search strategy that limited the selection of articles using a keywords search. Therefore, the studies may not fully represent the plethora of research on the concepts. They, however, provide a learning point for areas where research in these concepts has been relatively less. Additionally, the study is important for spatial planning targeted at integration and cohesion, such as social housing initiatives that the country has embarked upon in most of its localities.

2. Approach

To narrow down the articles on the human–nature relations concepts under study, and their spatial characterisation, a computerized search of three databases, Scopus, Google Scholar, and Web of Science (WoS), was run using keyword truncations. These databases, particularly Scopus and WoS, are considered the most reliable by researchers since they consist of the main peer-reviewed journals, conference proceedings, and books relating to various topics (Agrifoglio et al. 2021). Truncations and wildcards such as “environmental?attitudes” “place-attachment”, and phrases, e.g., “environmental perceptions”, and search operators such as “AND”, “OR”, “NOT”, “NEAR”, and “SAME” were used in the search. These were then combined with phrases such as “mapping”, “spatial characterisation”, and “South Africa” to make the search more specific. No specific dates were used for the search. Therefore, as inclusion criteria, papers related to environmental attitudes, perceptions, place attachment, and the mapping of these attributes internationally were selected, followed by those that were specific to South Africa. As exclusion criteria, papers on perceptions, attitudes, and attachment not related to environmental issues were not included. Using these criteria, a total of 860 articles were identified from Scopus, Google Scholar, and WoS. After the removal of sources with similar concepts, 99 papers were identified for review. Of these studies, 39 (39%) were from South Africa, whilst the rest were global.

Table 1. Thematic analysis (after Braun and Clarke 2012).

Steps	Approach followed
Step 1: Familiarising with the data	After the key words search strategy, articles were collated to get early impressions on the topics covered. Gaps in the literature were identified
Step 2: Generate initial codes	Open coding was used, since this is a theoretical thematic analysis (Maguire and Delahunt 2017). Key words were identified from the literature (using key word search in research articles) using WordCount software
Step 3: Search for themes	WordCount words and phrases were collated, then placed into specific themes
Step 4: Review themes	Maguire and Delahunt's (2017) approach was followed, wherein, certain questions have to be asked in reviewing themes, such as determining whether the themes make sense, whether the data support the themes, if there are any overlaps in the themes, or if any subthemes can be identified
Step 5: Define themes	During this stage, we identified the essence of the themes, and whether there were any relations between the themes
Step 6: Writing-up	Writing the report, based on the themes identified

Table 2. Number of studies assessed per environmental aspects in South Africa and globally.

Location	Environmental perceptions, values, awareness, concern, and behaviour	Environmental attitudes	Sense of place, place identity, and place attachment	Spatial characterisation, concepts, and methodology	Total
South Africa	(12)	(9)	(16)	(2)	(39)
Global	(20)	(10)	(17)	(13)	(60)
Total	32	19	33	15	99

3. Findings

Following rigorous thematic analysis methods is important for the credibility of systematic reviews (Nowell et al. 2017). Braun and Clarke's (2012) method of thematic analysis was used in identifying themes for the review. The method uses seven generic steps from defining themes based on the initial collation of information to analysing information by theme and finally reporting outputs by theme (Table 1). Table 1 outlines the thematic analysis steps followed.

Table 2 gives an indication of the location and thematic focus of the studies identified.

Table 2 indicates that South Africa is dominated by place (identity and attachment) research, followed by those relating to environmental perceptions, values, awareness, concern, and environmental behaviour. Globally, there is an almost even spread of studies relating to all the concepts. These themes are discussed in the following subsections by comparing studies conducted in South Africa and the rest of the world.

3.1. Environmental perceptions, values, awareness, and concern

Early studies in environment–nature discourse identified environmental values, awareness, and concern as the main drivers of environmental attitudes and place attachment (Van Liere and Dunlap 1980; Zube 1987; Anderson et al. 2007; Uddin and Faisal 2007). Environmental perceptions, values, and attitudes have been researched in a wide range of communities globally (Zube et al. 1982; Fiedelday et al. 1998; De Beer and Marais 2005; Anderson et al. 2007; Schultz et al. 2014) and so has environmental awareness and concern

(Dunlap and Van Liere 1980; Axelrod and Lehman 1993; Struwig 2010). Such studies can distinctly be separated into those that have studied (i) environmental perceptions in specific locales, (ii) environmental values and their reflection on the habitual way of life, and (iii) studies and surveys on environmental awareness/concerns.

In South Africa, studies on environmental concerns have assessed how rural residents perceive their environment. Hunter et al. (2010), for example, used data from impoverished rural communities in northeast South Africa and found that both cultural and physical factors played a significant role in determining residents' perceptions of their environment. In particular, gendered interaction with natural resources was found to shape perceptions, as did the local settings. Meyer (2018), in a study of perceptions in the town of Stellenbosch, Cape Town, found that people interact with their environment based on preconceived ideas about space, such as how attached they are to their environment. Dlamini et al. (2020) and Dlamini and Tesfamichael (2020) found that sociodemographic factors such as gender, age, and socio-economic status were significant in determining perceptions about the environment. These select few studies are summarized in Table 3.

Environmental perception is a person's attitude and understanding that reflects views towards the environment (Fiedelday et al. 1998; Shaoa and Liu 2017). These perceptions are built around peoples' attitudes and understandings that reflect their customary way of life, as well as their shared beliefs (Fiedelday et al. 1998; Shaoa and Liu 2017). Environmental values, in contrast, are a significant determinant of environmental attitude and place attachment (Shaoa and Liu 2017). Noller and Kashima (1991) have indicated in their

Table 3. Example of studies on environmental perceptions, values, awareness, and concern.

	Dimension	Supporting literature
Environmental perceptions	Environmental perceptions in specific locales. Spatial bias in environmental perceptions	Van Liere and Dunlap 1980; Anderson et al. 2007; Uddin and Foissal. 2007; Schultz et al. 2014; Shaoa and Liu 2017;
Environmental values	Environmental values and its reflection on habitual way of life. Mapping place values	Zube 1987; Synodinos 1990; Dutcher et al. 2007; Shao and Liu. 2017; Brown et al. 2020
Environmental awareness/concern	Studies and surveys on environmental awareness/concerns	Axelrod and Lehman 1993; Willers 1996; Thogersen 2006; Struwig 2010
South African studies	Human activities and environmental concerns. Socio-demographic determinants of environmental perceptions	Meyer 2018; Dlamini et al. 2020; Dlamini and Tesfamichael 2020

studies that environmental values are central to a person's system of attitudes and beliefs and play a deciding role in how attitudes and perceptions are organised. In South Africa, studies on perceptions and values have mainly been on nature tourism (e.g., Giddy and Webb 2016; Wolf et al. 2019). Giddy and Webb (2016), for instance, in a study of environmental values at a national park, noted that people's values were strong determinants of environmental behaviours. Others have been on perceptions surrounding water pollution and their socio-demographic determinants (Anderson et al. 2007; Dlamini et al. 2020). Anderson, in particular, concluded that there is limited consensus among scholars as to the reasons for differences and similarities among ethnic and socio-economic groups' environmental perceptions and behaviours. They also noted the importance of demographic factors in shaping people's environmental perceptions, having found that there were similarities and differences between African and non-African households with respect to the perceptions, behaviours, and awareness of programs related to water and water pollution, and that Africans and those with lower socio-economic status are more likely to perceive water pollution as a community problem; and educational attainment playing a significant role in environmental awareness and perceptions (Anderson et al. 2007).

3.2. Environmental attitudes

Human-nature discourse in varying societies has focused on specific land-use aspects or activities. Most of these studies have been carried out in an attempt to understand the complex relationship between environmental attitudes, values, and perceptions of the environment (Fiedelday et al. 1998; Cock and Fig 2001; Franzen 2003; De Beer and Marais 2005; Anderson et al. 2007; Struwig 2010). Some have purely been on environmental beliefs and attitudes. Others have gone on to use empirical models like the New Environmental Paradigm (NEP) to measure people's environmental attitudes and values, whilst others, mostly drawn from South Africa where service delivery issues have been more prominent than in the rest of Africa, and where poor communities rely more on the environment for their livelihoods, have been on attitudes towards environmental issues like sanitation, degradation, and pollution in general.

Additionally, diverse opinions have been brought forward on the relationship between environmental attitudes, con-

cerns, values, and various socio-economic factors (Inglehart 1995; Fiedeldey et al. 1998; Dunlap et al. 2000; Barber et al. 2003). Notably, Inglehart (1995) found that the way people view the environment is related to the resources available to their communities. In poverty-stricken areas, where people rely on the land for survival, their attitudes and values will reflect this and people will perceive the environment as a resource to be utilized for personal survival (Inglehart 1995). Such individuals will be concerned less about environmental conservation (Fiedeldey et al. 1998; Shao and Liu 2017). However, if people's basic material needs are satisfied, they are more likely to embrace "post-materialistic" values, striving for environmental protection, aestheticism, and concern (Inglehart 1995). The variation in the perceived importance of environmental issues in the different environments suggests that environmental values, attitudes, and attachments are shaped by social and physical location and are therefore socio-economically and politically determined.

In South Africa, Fiedeldey et al. (1998), for example, in a study of environmental concerns in South Africa, found that quality of life is linked to the way people perceive their environment and that the nature of the environment itself is a determinant of peoples' quality of life. De Beer and Marais concluded on the importance of geopolitics in determining people's environmental concern, whilst Struwig et al. (2010) used a large-scale survey in determining that socio-economic factors and ethnicity play a relevant role in determining environmental concerns. Giddy and Webb (2016, 2018) in their studies of environmental concern in national parks in South Africa concluded on the link between adventure tourism and visitations to national parks as important in determining people's environmental behaviours. Table 4 provides selected literature on international and South African studies on environmental attitudes, and some on the theoretical approaches to the study, while Table 5 provides examples of studies on place attachment, identity and dependence.

Human-nature discourse in southern Africa remains understudied compared to other studies globally. However, South Africa has attracted some attention in this field, mainly because of its ethnological diversity and land use patterns and activities, especially adventure tourism. Environmental attitudes and issues in South Africa are embedded and shaped by history as much as any other socio-political issues (Cock and Fig 2001). Environmental attitudes and attachment to

Table 4. Conceptualisation of environmental attitudes: International and South African literature.

	Dimension	Supporting literature
International studies	Environmental beliefs and attitudes	Van Liere and Dunlap 1980; Uddin and Foaisal 2007
	Use of New Ecological Paradigm in assessing environmental attitudes	Zube, et al. 1982; Zube 1987; Gooch 1995; Dunlap et al. 2000; Kim et al. 2006; Ahlroth et al. 2011; Andrade et al. 2019
South African studies	Environmental attitudes in South Africa	Willers 1996; Fiedelday et al. 1998; Cock and Fig 2001; De Beer and Marais 2005; Anderson et al. 2007; Hunter et al. 2010; Struwig, et al. 2010; Fink 2010; Giddy and Webb 2015; Giddy and Webb 2018

Table 5. Examples of studies on place attachment, place identity and place dependence.

	Dimension	Supporting literature
Place attachment	Place attachment and environmental behaviour. Reviews of research in place attachment and related concepts. Social psychology of place attachment. Mapping place attachment	Ajzen, and Fishbein 1980; Hidalgo and Hernaendez 2001; Vaske and Kobrin 2001; Stedman 2003; Raymond 2010; Halpenny 2010; Lewicka 2011; Lee et al. 2012; Ramkissoon 2015; Van Veelen and Haggett 2016; Shaoa and Liu 2017; Brown et al. 2020
Sense of place	Person-to-place bond, be it negative or positive, weak or strong	Agyekum and Newbold 2019; Nelson et al. 2020; Gillespie et al. 2022
Place identity	Place identity as an element of place attachment	Williams et al. 1992; Zenker and Rutter 2014
Place dependence	Place dependence as an element of place attachment	Williams et al. 1992; Cuba and Hummon 1993; Vaske and Kobrin 2001; Halpenny 2010

place differ by race, geographic location, locus of control and various other variables, not least because of policies and legislation (Shaoa and Liu 2017). In South Africa, some studies have been conducted in investigating rural inhabitants' environmental attitudes and what shapes them (Cock and Fig 2001; Anderson et al. 2007; Hunter et al. 2010). Other studies in South Africa have explored environmental attitudes and satisfaction with the quality of life in general (Pillay et al. 2006; Struwig 2010). Some have been conducted on adventure tourism (Giddy and Webb 2016), and human-nature environment in rural areas (De Beer and Marais 2005), and for service delivery issues (Fiedelday et al. 1998; De Beer and Marais 2005; Anderson et al. 2007; Struwig 2010) but not to interrogate their relationships to other attributes like attachment to place. Socio-economic and demographic factors play a big role in shaping people's attitudes towards their environment (Cock and Fig 2001; Dlamini et al. 2020). These studies are comparable to some studies carried out in more developed countries, where distinct variations were apparent. The variations in the perceived importance of environmental issues in the different countries suggest that environmental attitudes and the importance of environmental protection are socio-economically, politically, and culturally determined (Struwig 2010).

Other studies have closely linked peoples' values, beliefs, and norms people have on their spaces to environmental attitudes (Kaiser et al. 1999). Various studies have attempted to examine the links between environmental attitude and behaviour towards environmental issues like pollution and land degradation (Dunlap and Van Liere 1980; Van Liere and Dunlap 1980, 1981; Zube et al. 1982; Zube 1987; Kaiser et al. 1999). These studies went further to examine how different parts of the population differ with regard to environ-

mental attitudes and behaviour. In general, age, levels of education, political ideology, and income have been found to be consistently predictive of environmental attitude and behaviour (Van Lierer & Dunlap, 1980; Willers 1996), with the young, well-educated and politically liberal the most concerned about the environment. Findings reveal that gender is related to environmental concerns but not as consistently as the variables listed above (Van Lierer & Dunlap, 1980). These factors then build peoples' perceptions of their environment (Fiedeldey et al. 1998; Shaoa and Liu 2017) and determine whether landscapes are useful to the individual or not, and hence the values attached to these landscapes (Zube et al. 1982; Zube 1987).

Gooch (1995), for example, extensively studied environmental beliefs and attitudes in the Baltic States, through a comparative analysis of interviewee responses from Tartu, Estonia, Riga, Latvia, and Ostegotland. These studies are based on the NEP scale on the measure of environmental attitudes. The NEP explores the domain that nature should be utilised by humans for their benefits (Gooch 1995). This then sets out environmental belief systems and leads to derived beliefs concerning environmental conservation, pollution, population, and general environmental attitudes. The expected association between support for the NEP, post-material values, and environmental concern was not strongly supported by the results of the Baltic samples. The study then used the direct personal experience of the environment and the general representations of environmental problems to explain these discrepancies. Scott and Willits (1994) conducted almost similar but state-wide research in Pennsylvania using the NEP in assessing behaviours that were environmentally pro-active, and also found no correlation between positive environmental attitudes and environmental behaviour. Indeed, the re-

searchers concede that these studies represent societies of Western origin only and that similar studies elsewhere might yield different results based on the socio-economics of the countries concerned.

3.3. Place attachment

Place attachment discourse has evolved tremendously since the early 1970s (Lee et al. 2012). Human–nature interactions give meaning and value to places, implying that people eventually get attached or emotionally bonded to places they are familiar with. This is the concept of place attachment (Vaske and Kobrin 2001). The valuation and functional meaning of place attachment, however, varies across disciplines, and also functionally. In social psychology circles, place social bonding refers to interpersonal relationships which occur in a place (Scannell & Gifford, 2010) and fosters “group belonging” (Ramkissoon 2015). Raymond (2010) found that natural settings set the context for social experiences and the bonds which are consequently formed. These communal relationships hold important meanings in outdoor recreation settings (Ramkissoon 2015).

In addition, place attachment is often assumed to develop specifically as a function of social relationships that occur in places. In environmental psychology discourse, Vaske and Kobrin (2001) describe place attachment as the internalised perceptions of an area (i.e., identity), as well as the fulfilment of motivational goals gained through frequenting an area (i.e., dependence). Cuba and Hummon (1993) describe place identity as the dimension of self that defines the individual’s personal identity in relation to the physical environment and place dependence as the aspect of place attachment that allows an individual or individuals to communicate qualities of the self-to-self or other. Place dependence is about the fulfilment of goals and may be viewed as the functional aspect of place attachment, whereas place identity is the emotional or symbolic aspect (Lewicka 2011). From these definitions, we can deduce that place attachment is the emotional relationship that one builds with the place, acquired through being in constant touch with that place to such an extent that the place forms part of one’s identity.

Place attachment seems to have been first introduced as a concept in recreation and tourism, to represent a person’s valuing of a recreation setting. Lee et al. (2012) conceptualised this valuation as consisting of functional and emotional-symbolic meanings. This can be in the form of a tourist’s attraction to a temporary, recreational setting, which is purely functional, whilst residents of that area may see it as a home with symbolic and emotive meanings. Therefore, place attachment comprises different emotions, knowledge, beliefs, and behaviours that arise from cultural, social, and psychological contexts. (Lee et al. 2012).

Other place-based studies have used “sense of place” to depict attachment. Nelson et al. (2020) reviewed the literature on the sense of place and noted the general lack of understanding and consistent use of the term in the literature. Findings from their review indicated that the sense of place evolves over time, and its definition varies over time and on the discipline and context in which it is analysed. Gillespie

et al. (2022) define the sense of place as the relationship between people and place, whether these relations be weak, strong, positive, or negative. They note the evolution of sense of place from early geographers such as Relph (1976) and Tuan (1977), to mention but a few. In line with these early geographers, they concede that a sense of place is “both subjective and inter-subjective, conscious and unconscious, transactional, contingent, and dynamic” (Gillepse et al. 2022: 1).

In South Africa, place attachment studies have largely been defined by a past experience where the society was defined along ethnic lines (Di Masso et al. 2013). These studies can be grouped into broad categories, namely, reactions to the loss of attachment and identities; social place attachment, and changing spaces and identities. Sense of place has been studied concerning people’s place identities in relation to cultural or tourist sites in South Africa. Other researchers in South Africa have noted that a disturbance of cultural symbols, or of spaces to which residents attach some form of value, may lead to “social disruption” (Marais et al. 2018:1) and losses in symbolic meanings of places. Puren et al. (2008), for example, explored symbolic meanings as part of the sense of place of local inhabitants in the Vredefort Dome World Heritage Site, in the Free State province of South Africa. Their study used a mixed-methods approach to explore and understand what constitutes a sense of place for local inhabitants in the area. The study found that sudden and radical changes to the spatial environment may have a detrimental effect on local inhabitants who have a long history with the site and who have developed a strong place identity. The study heightened the potential depth and intensity of human experience—a sense of belongingness and a complete identity with the place. In essence, therefore, people assign value to their places, and a disruption of such values may lead to decreased identification with a place (Puren et al. 2008; Marais et al. 2018). Some of these studies are depicted in Table 6.

It is unsurprising that place attachment studies have been dominated by those dealing with identities and changing spaces, since the country came out of a history where space and identity were formed along ethnic lines because of a long history of separate development (Di Masso et al. 2013). With desegregation that started in 1994, white people, who felt their spaces and identities were being threatened, reacted in a variety of ways as a means of preserving their identities and spaces (Dixon and Durrheim 2004). Some found solace in “gated” communities, which created a sense of safety amid a sea of danger (Hook and Vrdoljak 2002; Roos 2008). Black people, on the other hand, felt entitled to regain spaces that were repossessed from them, including protected areas (Roos 2008; Cundill et al. 2017), with this commonality giving them a sense of communal attachment. For example, Chigeza et al. (2013) noted in their study of the sense of community in a South African rural setting that the attachment that community members have to their community develops from their interdependent relationships with one another and is expressed as an identification with the community and a commitment to the survival and promotion of the community (Chigeza et al. 2013), and through discussions on identities and place bonds (discursive practice) (Di Masso et al. 2013). Notably, however, none of these studies have specifically

Table 6. Place attachment dimension in South Africa.

Dimension of place attachment	Brief description	Selected studies
Reactions to loss of attachment and identities	The effects of displacement and dislocation especially amongst white people led to a sense of alienation. Creation of gated communities	Durrheim and Dixon 2001; Hook and Vrdoljak 2002; Puren et al. 2008; Di Masso et al. 2013
Social place attachment	Community attachment; discursive practice	Dixon and Durrheim 2004; Roos 2008; Chigeza et al. 2013; Marais et al. 2018
Changing spaces and identities	Communities feel entitled to land previously set aside for conservation, as this land forms part of their heritage and identity.	Jordaan 2017; Cundill et al. 2017

aimed at spatially characterising these concepts for an urban set-up such as Gauteng, nor how they have changed over time since 1994 when the policy of desegregation was enacted.

3.4. Spatial characterisation of human–nature dimensions

Brown et al. (2015) have reported on the scarcity of works that attempt to spatially map human–nature relations. Only a few studies in the last two decades have attempted to use various exploratory data analysis techniques and geographic information systems (GIS) (Brown et al. 2015). Mapping environmental perceptions, attitudes, and place attachment can assist urban and environmental planners and policymakers understand how people use certain spaces, and give recommendations on sustainable use of resources (Jordaan 2017). Additionally, studies can unravel individuals’ and groups’ place-protective or pro-place actions when changes to the environment are proposed or happen.

A variety of research methods have been used to analyse and measure human–nature dimensions from different viewpoints (Di Masso et al. 2013). Several studies have assessed place attachment, environmental perceptions, and attitudes from theoretical viewpoints, with relatively fewer attempting to map these concepts. Mapping human-nature dimensions is not easy, as these concepts are considered “amorphous” in nature (Maguirea and Klinkenberg 2018 p.1). Methods such as public participatory geographic information systems (PPGIS) have been used in various research circles by involving the public in the use of geospatial technologies in the decision-making process (Brown et al. 2020). Brown et al. (2015) extensively used PPGIS in their studies in Southern Australia in measuring various human–nature relations phenomena, such as how participants’ socio-demographic and home location attributes influence place attachment. Their studies found that there is a spatial element in the distribution of place attachment values, home location, and socio-demographic variables. The study found that place attachment is influenced by occupational roles such as farming or conservation, as well as home location, especially in coastal versus non-coastal contexts. Brown et al. (2020) also provided a summative review of lessons learnt in the past two decades on the use of PPGIS. The review found that empirical studies attest to the link between social and geographic context to, *inter alia*, the predictive value socio-demographic factors on “sense of place concepts”, participants’ attitudes in

determining place attachment, and low correlates between socio-demographic factors and land-use decisions. The review also attested to the importance of the consideration of socio-political systems on land-use decisions and place values in the PPGIS process.

Other non-typological methods like “softGIS” have emerged as urban-focused participatory tools for measuring human–nature relations and resultant environmental behaviour (Brown et al. 2020). Brown et al. (2020) define softGIS as a collection of internet-based surveys which allow the locality-based studies of human experiences and everyday behaviour. This tool has been used, for instance, in Finland to measure urban pollution levels, wherein studies indicated that traffic congestion was the major cause of environmental problems in the city of Helsinki (Hasanzadeh 2014). Using weighted average visualisation, this technique was found useful in the sense that it was capable of capturing the gradual transition of pollution levels from one area to the other, thus preserving the perceptive quality of information being presented (Hasanzadeh 2014).

Other studies have made use of specifically developed concepts to measure human–nature phenomena, such as the Place Analysis System (PAS). The PAS is a GIS system that enables the development of models for the PAS (Maguirea and Klinkenberg 2018), and the “environmental spatial bias” (Schultz et al. 2014). Maguirea and Klinkenberg (2018) used PAS to analyse place attachment for a park in Canada. Through the use of the model, the researchers demonstrated the spatial variability of place attachment between various groups under different weather conditions. Schultz et al. (2014), on the other hand, used a variety of items (e.g., the severity of environmental problems in a community and perceptions of the seriousness of world environmental problems) to measure spatial bias in environmental perceptions. The study consistently found a bias in environmental perceptions, wherein participants perceived environmental problems to be more severe worldwide than in their communities. The studies also found that spatial bias was stronger in smaller communities, amongst younger respondents, those with higher environmental concern, and in countries with higher scores in happiness and environmental sustainability. This belief, according to Schultz et al. (2014), is unrealistic considering that environmental problems are interdependent within natural ecosystems. In the psychological literature, this unrealistic perception of global environmental problems as more severe than local envi-

ronmental problems has been called “environmental hyperopia” (García-Mira et al. 2007) and “spatial optimism” (Gifford et al. 2009).

Yet other studies have considered the organisation of space as based on “spatial bias”, relating to space being organised along biases such as socio-economic status, and at times race. The concept of spatial bias has been linked to the “deprivation theory” (Inglehart 1995) and the “spatial mismatch hypothesis” (Kain 1992). The deprivation theory suggests that greater environmental concern is linked to greater exposure to pollution and environmental degradation, whilst the spatial mismatch hypothesis posits that there is a spatial difference in the perception of environmental problems from the core of urban centres to their peripheries; the core is dominated by the more affluent residents and the periphery by the poor. These socio-economic differences then express themselves in environmental perceptions. In terms of the spatial mismatch hypothesis, Kain (1992) found that in American societies, where city fringes are dominated by relatively poor and unemployed Black residents who normally do not have the means to commute to the city centroids daily to seek better economic opportunities, environmental sentiments in these areas tended to vary from the centroids in reflection of the spatial socio-economic urban set-up.

On the other hand, other studies have used a variety of statistical spatial data analysis techniques in mapping human–nature relations. These studies include, for instance, examining techniques such as standard deviation ellipses to assess soil and sediment contamination (Baojun et al. 2008) crime, using geodemographics (Breetzke and Horn 2009) spatial autocorrelation techniques to measure satisfaction levels with local government performance (Cheruiyot et al. 2015), disease, using Bayesian spatio-temporal techniques (Kumarac et al. 2017), poverty, also using spatial autocorrelation techniques (Katumba et al. 2019). Andrade (2019), for example, used statistical measures of spatial analysis such as global Moran’s *I*, global *G* (Getis and Ord 2010), and Geary’s *C* (Geary 1954) to determine whether the response variable, attitudes towards the desert and found a link between socio-economic status and environmental attitudes.

In South Africa, human–nature studies have mainly been influenced by the “spatial targeting” phenomenon, which is a reflection of the country’s past policy of apartheid. Spatial targeting is a concept where spatial support by policymakers is directed to certain regions at the expense of others (Todes and Turok 2017). Under apartheid, spatial targeting was highly instrumental and played a role in reproducing social divisions. It also led to the “core-periphery” (Peberdy et al. 2017) concept, where the core, mostly urban areas were allowed to prosper at the expense of peripheral, urban fringe areas that were dominated by a largely Black, poor majority. After 1994, when South Africa attained political independence, various policies aimed at desegregation were enacted¹. Following the enactment of these policies, most human–nature

¹ For a full analysis of these policies, refer to the various works of Todds, P.A. (University of the Witwatersrand, Johannesburg), and Turok, I. (Human Sciences Research Council, Pretoria) in exploring spatial targeting in South Africa, with an extensive review of the

research in South Africa has attempted to explore the effects that the sudden and radical policy changes to the spatial environment may have had on local inhabitants who have a long history of living under separate development that resulted in the creation of spaces along racial and economic lines. For example, McLennan et al. (2015) asserted that poverty and deprivation are spatially differentiated in South Africa, with the highest levels of both occurring in the former homelands (or Bantustans)² and, to a lesser but still significant extent, in urban informal settlements.

Peberdy et al. (2017) explored this concept further linking it to the derivation theory and referred to it as the core-periphery hypothesis. These researchers explored inequalities at the neighbourhood level, using measures of “residential segregation” which utilise variables such as race groups and poverty levels to characterise levels of spatial inequalities. These measures have also been used elsewhere. Reardon and O’Sullivan (2004) proposed the use of two variables: (i) exposure to segregation and (ii) evenness/clustering in the nature of the segregation. Importantly, researchers in South Africa have linked social deprivation to these variables in measuring the spatial distribution of environmental sentiments (Peberdy et al. 2017). For instance, Peberdy et al. (2017) in studying the distribution of poverty and inequality in the Gauteng City-Region of South Africa found a link between levels of environmental pollution and income levels, with the clustering of these along racial and socio-economic lines. Other researchers e.g., Dixon and Durrheim (2004) and Di Masso et al. (2013) explored the effects of exclusion and desegregation on the organisation of space in South Africa, and concluded that space is still distributed along racial and economic lines, long after the enactment of policies aimed at reversing the effects of spatial targeting in the country.

4. Implications of the review

This selective review of the literature has explored some of the nuances surrounding the studies on human–nature relations and their spatial characterisation, in light of the studies conducted in South Africa viz-a-viz some of those from the rest of Africa and the world. The following implications are noted from the review:

- The studies included in this study are by no means exhaustive. The measures of human–nature relations, particularly in South Africa, need to be further developed.
- Mapping human–nature phenomenon is complex and can be abstract and dynamic.
- The dynamism of the constructs measured, namely environmental perceptions, attitudes, and place attachment call for the operationalisation of these concepts in planning and decision-making. Therefore, as indicated by Brown et al. (2015), these concepts change during a person’s lifetime, calling for more longitudinal studies in addition to cross-

literature on spatial targeting in the rest of the continent in the past 50 years.

² These were separate states set aside for Black people within South Africa, as part of the policy of separate development (apartheid).

sectional research that dominates human–nature relations discourse.

- From a policy perspective, environmental attitudes, perceptions, and place attachment can help urban planners and policymakers understand why individuals express certain forms of sentiments to proposed land-use changes, provision of amenities, social housing, parks, and protected areas. Policy research studies can also gain an understanding of how people use certain spaces and give recommendations on sustainable resource use.

5. Conclusions

The literature indicates that there is a strong body of theoretical knowledge on environmental perceptions, attitudes, and place attachment. Research points to the complexity of these variables as determinants of environmental behaviour, as people seem to apply different norms for different environmentally responsible behaviours, regardless of experience. Borrowing from existing theories in human–nature relationships (e.g., the NEP), people build conceptions of their environment based on value orientations regarding their spaces. These conceptions then determine levels of environmental perceptions, attitudes, and place attachment. Understanding people's perceptions, attitudes, attachment, and values has been found to determine environmental behaviours especially in relation to their spatial characterisations—and is therefore important for environmental planning and policy formulation.

Opportunities abound in mapping human–nature constructs in South Africa, such as the use of PPGIS in measuring the effects of “spatial targeting” to explain human–nature spatial patterns in the country. Future studies could, for instance, delve further into addressing whether, with the passage of time, peoples' perceptions or their attachment to place has changed, considering the plethora of initiatives on desegregation in South African society. Evidencing place attachment through more discursive studies in various socio-economic, cultural, and political settings (e.g., is place attachment in black communities perceived the same as in white communities? Do these perceptions differ in terms of economic factors, gender, and place of residence) could be leveraged to bridge the geographic and social boundaries to foster integration, which is crucial for addressing social cohesion challenges in the country. However, this review of the literature has enabled us to highlight the complex ways in which people relate to their environment, especially in ethnically diverse societies like South Africa that rely more on the environment for their livelihoods and sustenance. Post 1994, South Africa enacted policies aimed at reducing inequalities and reversing the legacy of apartheid. This study can therefore be beneficial for spatial planning targeted at integration and cohesion, such as social housing initiatives that the country has embarked upon in most of its localities.

However, this selective review of the literature has its limitations. Some articles in other databases outside those used in this study, namely Scopus, Google Scholar, and WoS may have been missed. Secondly, only articles published in English were selected for review. In the South African context,

there is a considerable body of literature that has been written in Afrikaans, and these were excluded from this review. Lastly, a snowballing technique from the references used in the selected articles could have added additional papers that could have added to our review.

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