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People and Nature

RESEARCH ARTICLE

Coastal residents' affective engagement with the natural and constructed environment

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Abstract

1. Coastal communities and their landscapes are subject to constant change, and today face new challenges as a result of climate change and the sustainable energy transition. To ensure the resilience of coastal communities to ongoing changes in the natural and constructed environment, it is imperative that planners and other decision-makers understand the importance of local places to residents.

2. We used an interdisciplinary, mixed-methods approach to study relationships between coastal residents and places in south Co. Wicklow, Ireland, introducing the concept of 'affective engagement'. Grounded in new materialist theory (notably actor–network theory), this term connects the meaning derived by residents from their relationships with coastal places ('affect') to the extent of their material interactions ('engagement'). 'Affect' was determined from thematic analysis of interviews and open questionnaire responses, as well as place attachment scales included in the questionnaire. Measures describing the strength of the relationship between residents and coastal places were used as a proxy for 'engagement'.

3. To understand how experienced meaning and material interaction interlink, principal component analysis (PCA) was used to join and visually explore the different measures of 'affect' and 'engagement'. Potentially mediating sociodemographic variables were investigated using a permutational multivariate analysis of variance (PERMANOVA).

4. The majority of self-selected study participants displayed strong place attachment to their most frequently visited places. We found that affective engagement does not vary with age, gender or type of place. Participants favoured natural and constructed places in equal measure. This implies that constructed places can be of high value due to their different functions for different individuals, and that landscape transformations may impact on coastal residents if they cause a change in functionality.

5. We found two domains comprising affective engagement that are not measurable by quantitative or qualitative data alone. The first of these domains is driven by

attachments to places, and the other by meanings relating to either personal or social fulfilment afforded by a place.

6. Our findings may help planners better understand the meanings behind local support for (or resistance against) landscape transformations, and how residents' affective engagement might be impacted by proposed interventions.

KEYWORDS
actor–network theory, climate change, coastal communities, coastal development, environmental humanities, mixed-methods design, place attachment, place meaning

1 | INTRODUCTION

Coastal environments are subject to ongoing change. The character of the landscape as an edge zone between land and sea means physical boundaries are ill-defined and shift over time. Meanwhile, coastal communities are historical nexuses of trade, transport and migration, with the constant coming and going of people and goods impacting on who and what is considered part of the community at any given time. Today, residents are faced with new challenges associated with climate change. These include the threat of flooding from rising water levels and increased intensity and frequency of storms, as well as landscape interventions aimed at mitigating these threats and the introduction of new structures as part of the sustainable energy transition. To ensure that changes in the landscape have a net positive impact on those most affected by them, it is more important than ever to understand the meaning of the connections between people living in coastal communities and their natural and constructed environments.

2 | BACKGROUND

Researchers from different disciplines are developing methods to evaluate the ways human beings relate to their environments, with the shared aims of ensuring the long-term sustainability of people and places, recognising their interdependent relationships and importance for community resilience. In the field of cultural ecosystem services (CES), considerable attention has been paid to the relational values that emerge from human–environment interactions, which can be contrasted with more strictly instrumental and/or intrinsic types of values (Chan et al., 2016; Fish et al., 2016). As Chan et al. (2018) describe, relational values speak to the multiple meanings of interactions beyond monetary or altruistic interpretations, to effectively provide insight into the way people and places shape one another. The latter is reflected in several studies in CES on the concept of 'sense of place'. This includes Ryfield et al.'s (2019) mixed-methods study of the cultural value of the Dublin Bay coastline in Ireland, which incorporated observational study, focus groups, interviews and cultural artefact analysis to develop an understanding of both the extent of emotional engagement with coastal places and the depth of their meanings and associated values. Similarly,

Roberts et al. (2021) used a relational qualitative approach incorporating creative engagement and interview methods to describe how CES are co-produced from people's material interactions with places at two study sites in Wales, UK, and how this contributes to human wellbeing. In their study of fishing communities in Cornwall, UK, Urquhart and Acott (2014) further emphasise the importance of non-natural landscape elements and material culture to the emergence of a sense of place, for instance boats, gear and other aspects of material fishing culture.

In the fields of sustainability science and human geography, researchers have investigated the connections between people and places using measures for nature connectedness and place attachment, with several adopting a relational approach. With regard to the latter, Stenseke (2018) has argued that relational values circumscribe meaning while relational thinking provides deeper insight into the role of place in shaping human–environment relationships; as such, the two constitute diverse but complementary pathways to reconnecting society and the natural world. In a similar vein, Ives et al.'s (2017) systematic review of the human–nature connection (HNC) identifies three strands, namely HNC as mind, place and experience, and issues a call for their further integration across different epistemological frames of reference. They specifically identify the material dimension of HNC as a potential avenue for exploration in forthcoming research (Ives et al., 2017). Drawing together nature connectedness, place attachment and wellbeing in a nationally distributed survey in Japan, Basu et al. (2020) establish direct links between human wellbeing and people's connection to nature, and show that this relationship is significantly driven by the extent of one's place attachment. Finally, studies by Enqvist et al. (2018), Himes and Muraca (2018) and West et al. (2018) emphasise the importance of understanding people–place interactions from a pluralistic perspective, to reduce knowledge bias within and between disciplines, for instance in the context of stewardship and resilience to change.

Psychologists and social scientists have explored the effects of different interactions with both natural and constructed environments on personal health and wellbeing, for example with relation to sociodemographic inequalities. Birch et al. (2020) studied the value of urban nature for the mental health and wellbeing of young people in Sheffield, UK, using creative qualitative methods such as art workshops and interviews. They found that young people from

socially deprived areas are positively affected by engagement with urban nature. White et al. (2020) conducted a narrative literature review that focused more particularly on coastal areas and other 'blue' environments, and found that these have both unique and comparable benefits for human wellbeing when compared to green space. Yet, as shown in a study by Phillips and Murphy (2021) in coastal communities in southeast Ireland, changes in the (coastal) landscape can also negatively affect residents, for example causing feelings of sadness and disappointment. Indeed, a literature review by Galway et al. (2019) establishes that people–place relationships are a key element of the research on solastalgia, which describes the spiritual, emotional and health benefits that may be lost in communities adapting to climate disruption.

Environmental psychologists also increasingly attempt to understand people's responses to landscape change, for example in the context of natural hazard risk management. Bonaiuto et al. (2016) conducted a review of the literature on place attachment and natural risk perception and found that higher levels of place attachment raise awareness of natural risks but also lead people to underestimate their effects. They found that people with high place attachment are less willing to relocate when facing risks, and are more likely to return to an area after a natural disaster has taken place (Bonaiuto et al., 2016). Similarly, Clarke et al. (2018) engaged with residents of Clontarf in Dublin, Ireland who recognised the need for flood protection but disagreed with measures proposed by the city council. They found that there are 'challenges with transformative adaptation (…) where adaptation is recognised as necessary but place attachment reduces support for specific measures' (Clarke et al., 2018). Findings from both of these studies suggest that a thorough understanding of people's attachment to local places, and related meanings, is essential when assessing the potential impact and reception of landscape change in a given community. This is also evident from work by Devine-Wright (2011) with communities around Strangford Lough, Northern Ireland on the local acceptance of tidal renewable energy, who notes that 'it is not the form of place change per se that is important, but how it is interpreted and evaluated (…) [and] second, that responses to change differ by context'.

Adopting a holistic and relational approach to landscape (re)development, multidisciplinary teams of marine biologists, civil engineers and other experts have started to investigate local needs and preferences for coastal infrastructure change. Evans et al. (2017) engaged with marine and coastal stakeholders to identify a range of secondary benefits that can be incorporated into coastal engineering solutions. While ecologically beneficial solutions were favoured most, opportunities for enhancing the sociocultural value of coastal structures were also mentioned (Evans et al., 2017). Moreover, a study by Fairchild et al. (2022) on the public perception of biodiversity on coastal structures found that increased complexity positively affects perception at a range of structural scales, suggesting that ecological enhancements in multi-purpose coastal engineering solutions themselves already increase sociocultural value.

Until now, few have attempted to interlink the above approaches, to better understand how place meaning, place attachment and the material conditions that sustain a person–place relationship are connected to one another. To provide an example, a mixed-methods study of place attachment and place meaning among visitors to Australia's Great Barrier Reef Marine Park by Wynveen et al. (2012) demonstrates that the type of meanings that people associate with a place impact on place attachment, but does not investigate the material reality in which people–place relationships unfold. Building on existing literature across different disciplines, as discussed, we believe that such research requires a relational, mixed-methods approach in which different measures for place attachment, meaning and material engagement are investigated as mutually constitutive elements of a person–place relationship. To achieve this, we propose an interdisciplinary research approach that uses conceptual theory from the environmental humanities in combination with quantitative and qualitative methods developed in the social sciences, in order to return focus to the immediate relationship between people and places as it unfolds within the context(s) of a material and community setting.[1]

3 | THEORETICAL FRAMEWORK

3.1 | Human–environment relationships viewed through a new materialist lens

The field of environmental humanities critically examines the many links between human culture and the natural and constructed environment. A number of theoretical lenses have been utilised to explore this goal including psychogeography (Knabb, 2006), speculative realism (Harman, 2018; Morton, 2013) and new materialism (Coole & Frost, 2010; Deleuze & Guattari, 1987; Haraway, 2016).[2] These frameworks either build on or critically respond to the tradition of phenomenology, which theorises the experience of interacting with another human, animal, object or place from the first-person (human) perspective (Heidegger, 1996; Husserl, 1982). New materialism in particular advances beyond the phenomenological focus on human subjective experience, to study relationships between different entities on the basis of a 'flat' ontology (Coole & Frost, 2010; Latour, 2007). In this understanding of the world, no distinction is made between entities belonging to the sphere of human 'culture' as opposed to non-human 'nature'; rather, these two realms are understood to be completely interlinked (Harman, 2009; Latour, 1993, 2007). This

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[1] We follow the US National Academies' definition of interdisciplinary research, as 'a mode of research by teams or individuals that integrates (…) [inputs] from two or more disciplines or bodies of specialized knowledge to advance fundamental understanding or to solve problems whose solutions are beyond the scope of a single discipline or research practice' (Institute of Medicine, 2005).

[2] Psychogeography is only loosely affiliated with the contemporary field of environmental humanities, but can be seen as an important precursor due to its interest in the meaning of human/environment interactions and its shared roots in the phenomenological tradition.

means that human and non-human beings (e.g. animals, plants, buildings and landscape settings) constitute equal parts of 'society' and should receive the same level of attention (Harman, 2009; Latour, 2007). In this study, we follow new materialism and avoid use of the term 'culture' (or 'cultural') to prioritise types of meaning derived exclusively from human social interaction. Instead, all meanings are considered equally valid. We also employ the term 'material' rather than 'physical', to denote that abstract (e.g. feelings, contexts) and virtual (e.g. digital, imagined) phenomena can have tangible effects on relationships between entities (Fox & Alldred, 2017).

3.2 | Studying relationships using actor–network theory

New materialist theory is increasingly used as a framework for empirical research (see Fox & Alldred, 2017). It offers a number of methodological approaches to qualitative, quantitative and mixed-methods research that converge around the central principle of relationality (Fox & Alldred, 2017; Haraway, 2016; Latour, 2007). An established candidate is actor–network theory (ANT), which maintains that the world consists strictly of overlapping networks of actors. Following the principle of flat ontology, an actor can be any entity that has a measurable impact on the network in which it exists (Harman, 2009; Latour, 2007). ANT explains how relationships between actors comprise repeated interactions, with each individual interaction having the capacity to influence who (or what) the actors are and how they relate to one another (Latour, 2007). As different interactions can have different outcomes, everything in the network is subject to constant change (Latour, 2007). Therefore, rather than fixed points of reference, descriptions of actor identities and relationships generated during the ANT inquiry should be seen as snapshots distilled from an ongoing series of events (Latour, 2007). The impact of actions on relationships and actor identities in the network of actors is known as the material-semiotic interface, denoting that material engagement and semiotics (or meaning-making) are deeply intertwined (Law, 2009).

In its original formulation, ANT is affected by the 'actor/system quandary', which states that the relationship between two actors in a given network is by necessity influenced by a wide range of other actors and networks (Latour, 2007; Figure 1). For example, the ability of actor A to engage with actor B may be determined by their level of disposable income, which itself is potentially the result of interactions with their employer, mortgage or rent payments, the cost of living in their area, inflation, childcare and more. Each of these can be broken down into further networks of actors. This means that in extreme cases, the ANT inquiry must describe the entire world in order to explain the relationship between two actors. Since this is impossible, it has been suggested that the researcher focus on selected interactions only (Latour, 2007). Both solutions are problematic when studying the meaning(s) of
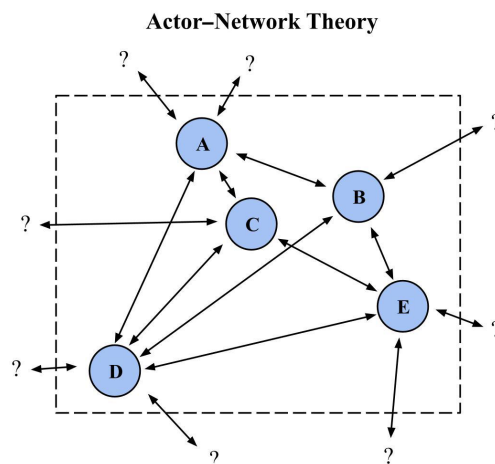

FIGURE 1 Diagram explaining actor–network theory. A to E are individual actors (human, animal, object, place, etc) in a network configuration. The arrows show relationships between these actors. Each relationship comprises repeated interactions. The question marks indicate that every actor is involved with many other actors outside the study network. Relationships with outside actors may impact on relationships inside the study network, and will therefore have to be accounted for by the researcher.

people–place relationships, as they either require perpetual study or ignore potentially relevant outside influences. A more suitable third option would be to employ a combination of qualitative and quantitative measures: the former capture rich detail about the relationship itself, while the latter summarise the potential influence of external variables. It is true, as Fox & Alldred (2015) observe, that quantitative methods '[aggregate] the affective capacities of the event into numerical metrics, simplifying and thereby reducing the granularity of the event-affects represented in the research outputs'. In terms of a new materialist and ANT understanding of the interaction with a place, the risk of such simplifications, and the conclusions they support, is that they '[exclude] the outliers and aberrations that in social life may be extremely significant' (Fox & Alldred, 2015). However, Fox & Alldred (2015) also demonstrate that it is possible to critically assess typological simplifications that result from quantitative data analysis precisely through triangulation with qualitative methods, for instance to consider whether aggregations are unjustly reductive of the complexity of study data. The resulting mixed-methods approach combines descriptive, non-aggregative methods with statistical, aggregative methods to enable a more extensive analysis of the actor–network (Fox & Alldred, 2015).

3.3 | Conceptualising affective engagement

Following new materialism, and in particular ANT, we study residents' connections to coastal places using the material-semiotic characteristics of actor-relationships in a community network as the principal object(s) of study. We propose the concept of 'affective engagement' to describe the two interlinked dimensions of the material-semiotic

interface. 'Affect' denotes the meaningful (semiotic) impact on an actor that results from the interactions they experience within a network relationship, or in the words of Fox & Alldred (2017), 'it represents a change of state or capacities of an [actor]'. This differentiates our understanding of 'affect' (and by extension 'affective engagement') as experienced meaning derived from material interaction, from interpretations of the term that are based primarily on emotion, for example in education research (Maguire et al., 2017). Our definition resonates more closely with existing work in spatial geography, for instance by Duff (2010) who argues that 'to experience place is to be *affected by place*', rendering a '*distinctive variation in one's willingness or capacity to act*' (emphasis in original). However, in parallel with this understanding of 'affect' we emphasise the importance of 'engagement', rooted in the essential materiality of actor-relationships, to maintain focus on the kind(s) of interactions that constitute the foundations of experienced meaning (Latour, 2007).

Taken together, the term 'affective engagement' can be used to explain the complexity of people–place interactions in the coastal network and to assess how relationships and their participant actors change over time. To mitigate against the actor/system quandary, we propose assessing 'affect' using a combination of qualitative and quantitative instruments, while variables relevant to the 'engagement' of the relationship and potentially relevant sociodemographic variables can be summarised quantitatively. This approach makes it possible to analyse complex relationships within the study network through a primary focus on experienced meaning, while taking account of the material character and setting of people–place interactions.

4 | METHODS

4.1 | Aim

The aim of this study is to develop a better understanding of the connections between residents of coastal communities and their natural and constructed environment(s), using a mixed-methods approach that builds on the concept of affective engagement. We aim to answer the following research question: 'What characterises the affective engagement of coastal residents with their most frequently visited local places?'

4.2 | Study area

South Co. Wicklow is a largely rural area on the east coast of Ireland that is subject to significant erosion and storm flooding, with repeated loss of landscape features in recent decades (Arup, 2020). The area is experiencing widespread coastal development, both to mitigate against the effects of erosion and flooding and for the purpose of offshore renewable energy production in the Irish Sea (Wicklow County Council, 2016). Not all of these developments have been positively received in the community.

For example, the Arklow Flood Relief Scheme was met with grassroots opposition due to concerns that key places and aspects of local cultural heritage might disappear. One place that was highlighted by residents was the bend in the river near the town harbour, which supports various habitats, constitutes an important community amenity, and was said to have a natural capacity to mitigate against flooding (Dispute Over Flood Protection Works in Arklow, 2018). Additionally, research conducted with coastal communities near the study area has shown that natural and engineered changes in the landscape can have a negative impact on residents, leading to a loss of sense of place (Phillips et al., 2022; Phillips & Murphy, 2021). These findings reiterate the need to investigate people's relationships with places in the coastal landscape, in order to be able to safeguard these during periods of change (Devine-Wright & Howes, 2010).

The selected study area encompassed the coastal belt from Major's Beach in Wicklow Town to the Roadstone quarry at Arklow Rock (Figure 2). The western (land) boundary of this belt followed the M11 motorway from Dublin towards Oylegate and thus varied from 800 metres to 7 kms, distances largely consistent with the parameters for living near the coast as described in coastal wellbeing literature, (e.g. <5 kilometres from the coast; see Wheeler et al., 2012; White et al., 2013). Based on the 2016 Irish census, the population of this area was estimated to be between 25,000 and 30,000 (Central Statistics Office, 2016).[3]

4.3 | Instruments

Following Fox and Alldred (2015), we used a combination of descriptive, non-aggregative methods (semi-structured interviews and open questionnaire questions) and statistical, aggregative methods (closed questionnaire questions) to explore the affective engagement between adult residents and places in the study network in detail, measured at the human side of the relationship (details in Figure 3).

4.3.1 | Semi-structured interviews

Detailed semi-structured interviews qualitatively explored the motivation to visit a particular place, the behaviour when there, and associated feelings to expose how these aspects together impact on relationships between people and places (as also explored in Phillips & Murphy, 2021; Proshansky et al., 1983; Riechers et al., 2020). For motivations, we asked 'What is the reason you visit this place more frequently than others?'. Behaviours were discussed using the question 'What do you do when you visit this place?'. Feelings associated with a place were assessed based on the questions 'How do you feel

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[3] At the time of writing, population numbers at the small areas (SAs) level had not yet been made available from the 2022 Irish census. Other data from this census did not allow for an accurate estimation of population levels.
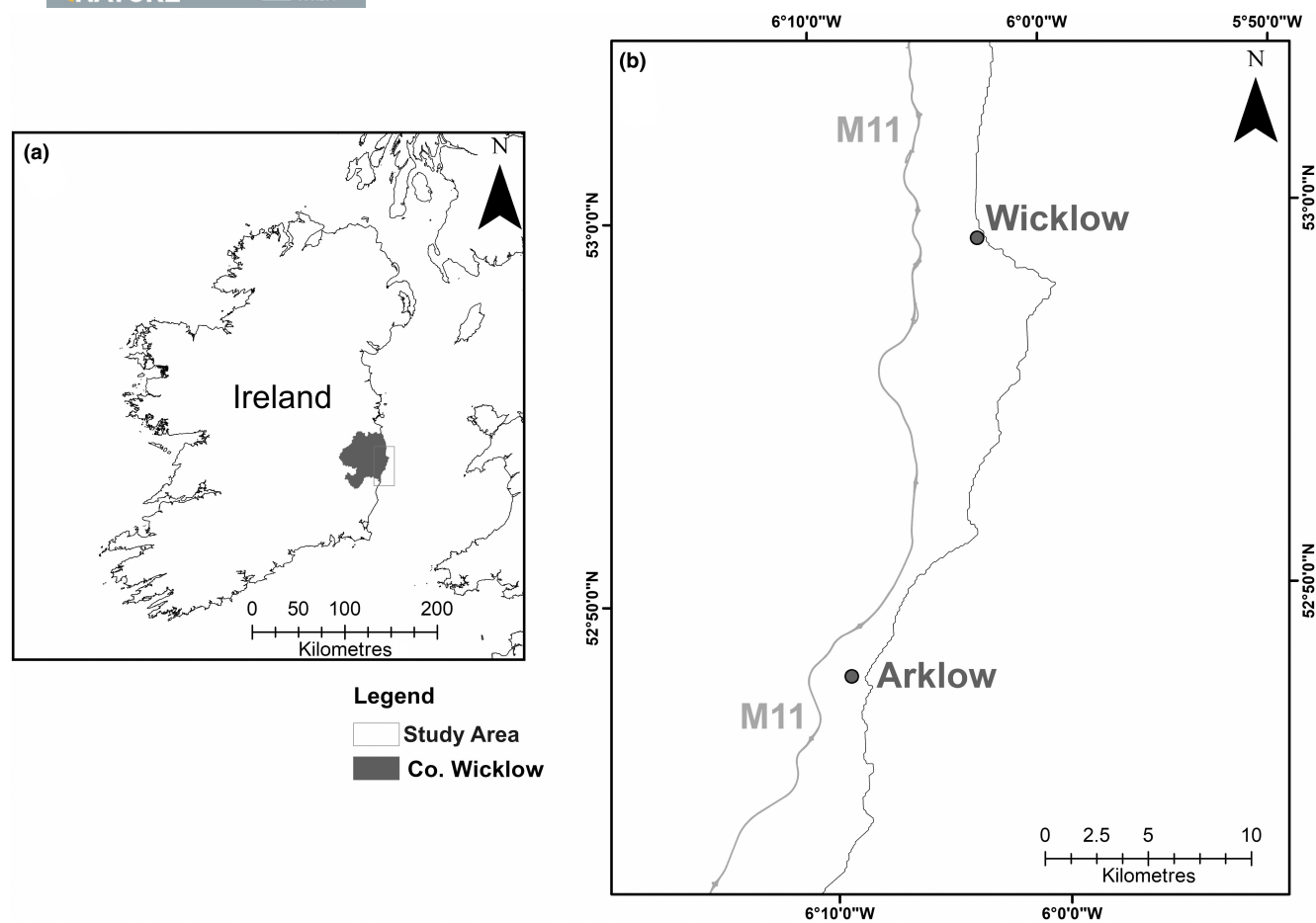
FIGURE 2 Map of Ireland (panel a) and the study area (panel b) on the south Wicklow Coast. The study area encompassed the coastal belt from Wicklow Town to Arklow and is bordered (on the land side) by the M11 motorway.

when you visit this place?' and 'Why do you think this place makes you feel this way?'. Follow-up questions were introduced where appropriate (S1).

4.3.2 | Questionnaires

We collected data through questionnaires (S2) to: (1) continue the assessment of 'affect' in coastal residents' place relationships; (2) measure variables related to 'engagement' (such as how often they want to visit a place); and (3) collect sociodemographic information that may mediate either aspect of the relationship ('affect' or 'engagement').

To address point (1), we invited open responses to the same questions that were asked in interviews. Additionally, eight agreement statements adapted from validated place attachment scales (Ardoin et al., 2012; Gonyo et al., 2021) were used as an indication or summary of a wide range of influences (i.e. actors and networks of actors) on the experienced meaning of people–place relationships.

To address point (2), we measured the strength of participants' relationships with their most frequently visited coastal places as a proxy for 'engagement', using two questions adapted from the UK national survey, the Monitor of Engagement with the Natural Environment (MENE; Natural England, 2019). Rather than reflecting on past visits,

as done in the MENE survey, respondents were asked how many visits they would like to make, and how much time they would like to spend at their most frequently visited place in the month of May. The desire of a person to visit a place may be more indicative of the strength of a relationship than the constrained reality of the frequency and length of recent visits, given that the questionnaires were distributed during the winter and at the end of the Covid-19 pandemic. We also asked respondents for the name and type of their most frequently visited place, to derive whether these places were natural (such as a beach or coastal headland) or constructed (e.g. a harbour, seawall or lighthouse).

Finally, to address point (3), we asked respondents to report several validated, quantitative demographic, social and health measures, including age, gender and general health.

4.4 | Data collection

Interview participants self-selected via email signup after completing a questionnaire, and chose to be interviewed either in-person or via video call. Online questionnaire respondents were recruited using snowball sampling after initial poster, email and social media promotion through community centres, clubs and organisations, local news media and volunteer groups. Participants'
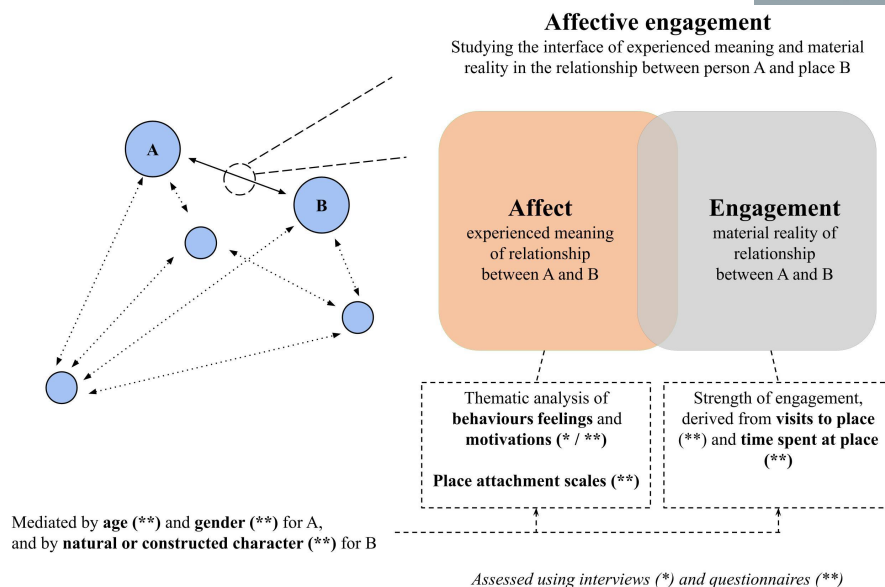
FIGURE 3 Conceptual model of affective engagement. We studied the relationship between person A and place B in a local actor–network (which can be made up of people, places, things and more) on the basis of 'affect' (experienced meaning) and 'engagement' (material reality). 'Affect' was assessed using thematic analysis of behaviours, feelings and motivations associated with A's visits to B; and from A's scores on place attachment scales reflecting on B. 'Engagement' was measured on the basis of the frequency and length of A's visits to B. Inputs for both 'affect' and 'engagement' were potentially mediated by the age and gender of person A, and by the natural or constructed type of place B.

postal codes (known as Eircodes in Ireland) were checked to remove any responses from people living outside the study area. Participation in both the interviews and the questionnaire was on the basis of informed consent. The study was piloted with six coastal residents and two independent researchers, the feedback from which informed the final questionnaires and interview guide. Data was collected between February and April 2022. This research was approved by the Human Research Ethics Committee for Sciences at University College Dublin (reference number LS-E-21-269-Buitendijk).

4.5 | Analysis and interpretation

4.5.1 | Assessing 'affect' through thematic analysis

The interviews were analysed in NVivo 12 following principles for reflexive thematic analysis (see Braun & Clarke, 2006, 2022; Byrne, 2022), to develop an initial overview of the 'affect' associated with people–place interactions. Using an inductive approach, we coded data line by line to generate four main themes and 11 subthemes, which were then used as a coding framework for open questionnaire answers (S3). Finally, the relative percentage occurrence for each theme was calculated per person by dividing the total number of times a specific theme arose in an interview or questionnaire by the total number of coded excerpts (of all themes) for the respondent (e.g. if theme A was mentioned five times and theme B was mentioned 10 times, the per cent occurrence of theme A was calculated as 33%).

4.5.2 | Assessing 'affect' using place attachment scales

The second measure of 'affect' we obtained was place attachment, using standardised scales presented in the questionnaire. Gonyo et al. (2021) outline two dimensions of place attachment: personal connection and social connection. The eight agreement statements adapted for questionnaires have previously revealed four dimensions of place attachment: biophysical, psychological, sociocultural and political–economic (Ardoin et al., 2012). However, using similar statements, Gonyo et al. (2021) went further to demonstrate that the personal connection dimension was found to be highly correlated with the biophysical and psychological dimensions, and that the social connection dimension was found to be highly correlated with the sociocultural dimension and aspects of the political–economic dimension. Therefore, we used confirmatory factor analysis (CFA) to collapse the eight agreement statements into three place attachment dimensions (personal, social and a third added in this study, willingness to protect place), which were included in further analysis of affective engagement and the visualisation described below.

4.5.3 | Assessing 'engagement' using frequency of visits and time spent at place

Previous studies examining people–place relationships in coastal environments vary between those who ask respondents about the frequency of their engagement with particular places and those who do not (Tonge et al., 2015; Wynveen et al., 2012). To assess

the influence of repeat interactions with a coastal site on residents' affective engagement, we assessed the strength of engagement as the product of the frequency of visits and the time spent per visit.

4.5.4 | Exploring affective engagement

We explored affective engagement in the surveyed Wicklow community through a principal component analysis (PCA), which integrated all measures of affect (relative occurrence of themes and place attachment scores) and engagement (strength of engagement score). A PCA is a multivariate statistical technique that can reduce the dimensionality of data (Jolliffe & Cadima, 2016). We employed this technique to simplify a range of measures of affective engagement, while capturing as much variance as possible. Prior to analysis, place attachment scores were summed by dimension (personal connection, social connection and willingness to protect). Each variable contributing to affective engagement was scaled to a range of 0–5, and included in a PCA. The first two axes of the PCA were retained for visualisation. We then considered several mediators of affective engagement in the relationship: the age and gender of the respondents and the character of the place that was visited (natural or constructed). The values of these mediators for each respondent were overlaid on the PCA to visually assess whether they impacted on affective engagement. We then conducted a permutational multivariate analysis of variance (PERMANOVA) to assess whether there were differences in affective engagement between people grouped by age, gender and their most frequently visited place (natural or constructed) using 1000 permutations and a Euclidean distance matrix of scaled affective engagement variables (Anderson, 2017).

All quantitative analysis was performed using R version 4.1.1 (R Core Team, 2021). The CFA was conducted using the R package 'lavaan' (Rosseel, 2012). The PCA was performed using the R package 'FactoMineR' (Lê et al., 2008) and visualised using the R package 'ggplot2' (Wickham, 2016). The PERMANOVA was conducted using the 'vegan' R package (Oksanen et al., 2022).

5 | RESULTS

We interviewed seven people, all over 45 years of age, of whom five were female and two were male. We received questionnaire responses from 164 people. We dropped 10 people from the quantitative analysis, either because they did not respond to relevant questions or because they were not eligible for inclusion under the resident adult population study criteria. Of the remaining 154 respondents, 101 were female (66%), 49 male (32%), and four preferred not to say or unknown (3%). Respondents to the questionnaire were from all age categories (18 to 65+), with a median age category of 45–54. Natural and constructed coastal places were visited by questionnaire respondents equally (49.4% and 50.6% respectively). Most participants were strongly attached to their most frequently visited places (65% of respondents scored a total of >=30 on summed place attachment scales, of a maximum potential score of 40).

5.1 | Themes related to 'affect' in people's interactions with coastal places

The number of interviews was limited due to uptake, and marginally lower than the range indicated in recent reports on data saturation in qualitative studies engaging relatively homogeneous study populations (Hennink & Kaiser, 2022). However, a post-hoc review of the results of our thematic analysis confirmed that saturation was achieved at the theme and subtheme level from the interview sample, with no new (sub)themes generated on the basis of the larger sample of questionnaire responses.

The most prevalent theme from thematic analysis of qualitative data was 'Personal fulfilment from coastal visits' ($n = 151$), with study participants highlighting the physical and mental benefits of visiting the coast, as expressed in the subtheme 'Nurtured by the coast' ($n = 144$). This subtheme was the main focus of most interviews, in which participants explained how visits to coastal places helped them maintain balance in their otherwise busy lives. 'Individual attachment to the coastal environment' ($n = 96$) was also a frequent subtheme, for example referring to people's perceived innate need to be near water, and the connection they felt to specific places. The second most significant main theme was 'Coastal places as nexuses of communities' ($n = 108$), which included observations on the general accessibility of the coast, the importance of good parking facilities and efforts to improve disability access. The same theme captured the capacity of the coastal landscape to connect people. Another main theme was 'Encounters with the natural coastal environment' ($n = 84$), incorporating reflections on people's experiences of natural aspects of the coast, such as the dynamic character of the environment (subtheme 'Changes in the physical environment', $n = 18$) and seeing flora and fauna ('Witnessing nature', $n = 69$). Finally, a smaller number of respondents described 'Challenges and changes in coastal environments and how to tackle them' ($n = 22$), citing concerns including public management, the impact of tourism and offshore wind farm development (for more information Table 1, Figure 4 and S3).

Thematic analysis found both correspondence between some themes and conflict between others. Respondents' appreciation of the multiple functions of the coastal landscape was evident in their deliberations on the pros and cons of different coastal sites, for example conflict between the importance of economic development, aesthetics and biodiversity. In this way, participant reports on the experienced meanings of interactions with coastal places incorporated perspectives and interests beyond the immediate relationship or the local network.
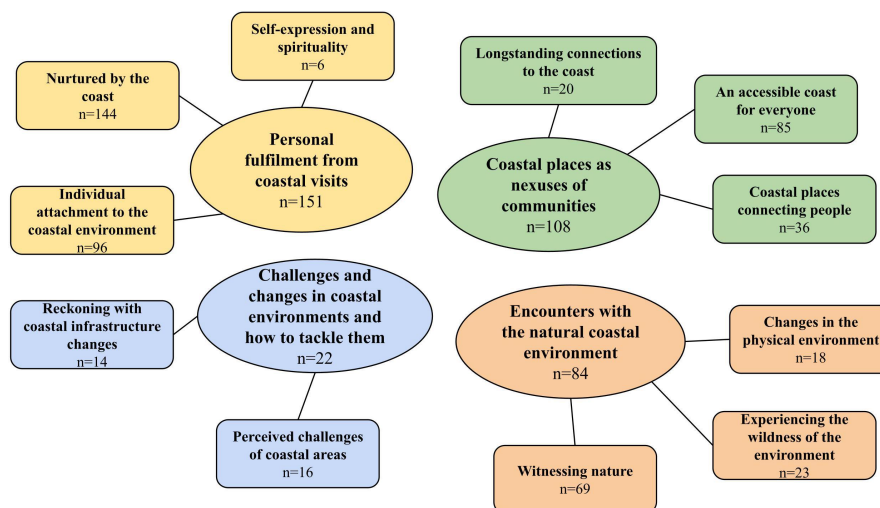
5.2 | Dimensions of place attachment as further measure of 'affect'

The CFA is a statistical approach employed to validate the structure of observed variables by confirming their underlying factors. It enables researchers to examine whether there is empirical support for the idea that observed variables are indeed related

TABLE 1 Example quotes for themes (and subthemes) of 'affect', or experienced meaning, in people–place engagement among coastal residents of Wicklow, Ireland, generated by thematic analysis of interviews and open questionnaire questions.

Theme	Example
Personal fulfilment from coastal visits	'Healthier, renewed in mind and spirit.' (Nurtured by the coast) 'It's not the prettiest beach on the planet, but it's our beach.' (Individual attachment to the coastal environment)
Coastal places as nexuses of communities	'I first met my neighbours when I came here (…) and I'm still friends with the people that I met on the beach on that first day.' (Coastal places connecting people) 'My childhood revolved around being in the sea or on the sea.' (Longstanding connections to the coast)
Encounters with the natural coastal environment	'It's a moving environment, it's not static.' (Changes in the physical environment) 'Enjoy the encounter of my body with nature.' (Experiencing the wildness of the environment)
Challenges and changes in coastal environments and how to tackle them	'I regularly clean up after dirty campers'(Perceived challenges of coastal areas) 'They did some work on [the Wicklow Head walk] to make it more accessible, and make it a bit safer, so now there's so many people on that walk… I find it frustrating, unless you go really, really early in the morning.' (Reckoning with coastal infrastructure changes)

FIGURE 4 Themes and subthemes associated with 'affect' in Wicklow residents' interactions with coastal places generated from reflexive thematic analysis of semi-structured interviews, and subsequently used as a coding framework for open questionnaire answers. n = number of respondents coded for a particular (sub)theme for the interviews and questionnaires combined (total n = 154).

5.3 | Exploring affective engagement

We created a visual representation of the affective engagement of residents of south Co. Wicklow with the coast by constructing a PCA comprising eight variables measuring various aspects of 'affect' or 'engagement'. To reiterate, for 'affect', these were the results from qualitative analysis weighted according to their relative occurrence per participant (four variables from main themes), and quantitative data on place attachment (three variables based on the dimensions). For 'engagement', this was the quantitative data on people's visits to places on the coast (one variable resulting from the product of frequency and duration of visits). Axes 1 and 2 of the PCA capture 54% of the variation in the affective engagement of surveyed respondents (Figure 5). There are no differences between groups defined by age (PERMANOVA, $F_{5,153}$ = 1.062, p = 0.375), gender (PERMANOVA, $F_{2,153}$ = 0.487, p = 0.804) or constructed/natural place preferences (PERMANOVA, $F_{1,153}$ = 0.586, p = 0.627) across the affective engagement space (Figure 5; S5).

All three place attachment variables derived from quantitative scores have a strong positive association with one domain of affective engagement (PCA axis 1), while the second domain (PCA axis 2) is best represented by the qualitatively revealed themes 'personal

to the underlying latent (unobserved) constructs, either identified through a theoretical framework, previous models or both (Mueller, 1996). We employed a CFA for our observed data to validate the two dimensions of place attachment identified in Gonyo et al. (2021): personal connection and social connection. Our data support these two dimensions. Both the personal connection and social connection groups had high Cronbach's alpha scores (0.92 and 0.81 respectively), indicating high internal consistency. All items included in the personal connection group had high factor loadings (>0.77). A factor loading closer to 1 indicates a stronger effect of the item on the factor. 'I feel connected to the culture of this place' had the highest factor loading onto the social connection factor (0.95), while the item, 'I think this place strengthens the local economy' had the lowest factor loading (0.61) (Table 2). For further understanding of place attachment as a feature of affective engagement, we also considered the single scalar statement, 'I am willing to invest my time and effort to protect or make this a better place', which we categorised as 'Willingness to protect'. The CFA was then used to justifiably collapse place attachment into three place attachment dimensions for further analysis (personal, social and willingness to protect variables) as sums of their constituent statements.

TABLE 2 Dimensions of place attachment among coastal residents of Wicklow, Ireland, defined by confirmatory factor analysis (CFA) of eight agreement statements relating to place attachment adapted from Gonyo et al. (2021). Cronbach's alpha, RMSEA, CFI, TLI and Chi-square were all used to confirm the validity of the resulting dimensions (see footnote[a]).

Dimension (CFA factor)	Agreement statement (CFA item)	Standardised factor loading	Cronbach's alpha
Personal connection			0.92
	I like the mix of plants, animals and landscapes in this place	0.77	
	I think the natural parts of this place are beautiful	0.78	
	This is a special place for me and/or my family	0.94	
	I am very attached to this place	0.94	
Social connection			0.82
	I think this place strengthens the local economy	0.61	
	I feel connected to the other people who visit/the community around this place	0.83	
	I feel connected to the culture of this place	0.95	
Single item place attachment dimension excluded from the CFA			
Willingness to protect	I am willing to invest my time and effort to protect or make this a better place	NA	NA

[a]RMSEA = 0.20, $p < 0.001$ for H0: RMSEA ≤ 0.05; CFI = 0.91; TLI = 0.85; Chi-square = 92.13, DoF = 13, $n = 154$, $p < 0.001$.
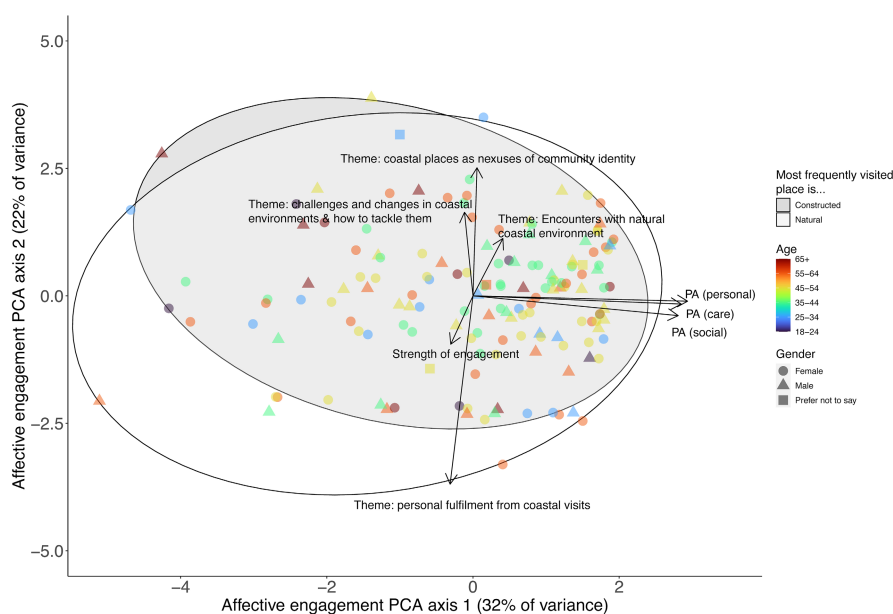

FIGURE 5 Illustrating affective engagement of the surveyed Wicklow community using principal component analysis (with 'affect' = themes and place attachment; 'engagement' = strength of engagement). Arrows represent the strength and direction of the relationship of each of the affective engagement variables across the community. Points represent respondents ($n = 154$), where circle = female, triangle = male, and square = prefer not to say. The colour of each point corresponds to the respondent's age, scaling from blue (18–24) to red (65+). Ellipses group together respondents who have a preferred place that is constructed (grey) or natural (white).

fulfilment from coastal visits' (negative loading) and 'coastal places as nexuses of community identity' (positive loading) (Table 3). Alternatively, for a less nuanced approach, all measures of place attachment could be summed and scaled into a single measure to avoid overweighting the PCA (S4).

6 | DISCUSSION

This paper aimed to characterise the affective engagement of residents of south Co. Wicklow, Ireland with their most frequently visited natural and constructed coastal places using a conceptual model based on actor–network theory. We understood affective engagement to be situated within the relationship between

a resident and a place, at the interface of experienced meaning and material reality. Our study confirmed the complexity of affective engagement with local places, identifying several themes and dimensions of affect along with measures of the strength of engagement. Respondents generally displayed high levels of place attachment to coastal places when assessed using standardised place attachment scales. We found that for the surveyed community, affective engagement did not vary with age, gender and type of place. Additionally, we found that qualitative and quantitative inputs inform two domains of affective engagement, one driven by place attachment and the other by either the personal or the social fulfilment provided by places. We found that rich qualitative information demonstrates variations in people's affective engagement in more detail than quantitative data. Our PCA results

TABLE 3 Variables contributing to domains of affective engagement for coastal residents of Wicklow, Ireland, revealed using principal component analysis.

Affective engagement variable	Factor loadings	
	PCA axis 1 (domain 1)	PCA axis 2 (domain 2)
Variables measuring 'affect'		
Place attachment (personal)	0.587	−0.021
Place attachment (social)	0.562	−0.078
Place attachment (willingness to protect)	0.569	−0.032
Theme: encounters with natural coastal environment	0.082	0.225
Theme: coastal places as nexuses of community identity	0.011	0.502
Theme: challenges and changes in coastal environments and how to tackle them	−0.023	0.328
Theme: personal fulfilment from coastal visits	−0.063	−0.738
Variables measuring 'engagement'		
Strength of engagement (combination of number of visits and time spent)	−0.061	−0.190

showed that all measures of (quantitative) place attachment were strongly correlated, but (qualitative) themes diverged so that, for example, people who strongly valued coastal places as nexuses of community identity did not strongly or frequently identify the value of achieving personal fulfilment from coastal visits. Neither approach would suffice by itself to explain affective engagement, confirming the need for a mixed-methods approach to understanding people–place connections.

6.1 | Affective engagement does not vary with age or gender

Among our sample population, coastal residents' affective engagement is heterogeneous and does not vary with gender or age. However, we cannot generalise this finding beyond our sample population, as our sample was older and more female than the national and regional averages (Central Statistics Office, 2021). The skew in the demographic of our respondents is likely due to participant self-selection, which could reflect either availability to take part or a true response bias (their heightened interest in the topic, be it due to high place attachment to the area or other reasons). The relatively high proportion of females and older people may counter each other's effects, as some studies have found that females are less likely than males to support development (Devine-Wright, 2011; Phillips & Murphy, 2021), while a review by Lewicka (2011) found that age shows erratic relationships with place attachment, indicative that it is moderated by other factors. While a larger study focused on recruiting under-represented groups might be able to tease out the potential effects of age and gender on affective engagement, our work indicates that these demographic parameters are most likely to interact with other variables (e.g. geographic differences, socioeconomic status) to produce effects.

6.2 | Affective engagement does not vary between natural and constructed environments

Our findings suggest that affective engagement is similar for interactions with natural and constructed places. The equal variance in the affective engagement of coastal residents with different types of places suggests that people do not by default seek out natural environments over constructed ones. This echoes findings by Urquhart and Acott (2014) on the importance of non-natural landscape elements to coastal communities, but stands in contrast with studies on coastal and marine place attachment that suggest that people have a preference for pristine or untouched environments over constructed ones (Devine-Wright & Howes, 2010; Wynveen et al., 2012). For example, in their study of place attachment and place meaning in visitors to the Great Barrier Reef, Wynveen et al. (2012) found that a lack of built infrastructure (or a pristine environment) became more important as the strength of place attachment increased. In comparison, the majority of our respondents scored high on place attachment scales but did not seem to have a preference for natural or constructed places. Instead, they were concerned with the impact of change on their most frequently visited places, reflecting on this even when not directly prompted to do so (as expressed in the theme 'challenges and changes in the coastal environment and how to tackle them').

Our findings imply that for highly attached coastal residents, losses of meaning or sense of place during landscape transformations (as described in Galway et al., 2019; Phillips & Murphy, 2021; Phillips et al., 2022) should not be primarily associated with the transition of a place from natural to constructed, but rather with a change in function (as also argued by Devine-Wright, 2011). For example, an increase in visitor numbers due to improvements to a coastal walk in the study area caused the landscape to have a reduced ability to provide 'personal fulfilment from coastal visits' for several participants, even if the place retained a natural typology (i.e. the 'type of place' remained the same; Table 1, S3). This mirrors findings from

recent studies that ambiguous habitats such as saltmarshes can be undervalued or overlooked for their physical characteristics, but are instead (or also) valued for the way that people interact and relate with them (Thomas et al., 2022). It was also found that past 'inappropriate' changes to estuarine environments were perceived to have affected respondents' interactions with the environment that were integral to their wellbeing (Roberts et al., 2021).

To understand the deterioration of the person–place relationship and to predict the potential impact of further landscape changes, regardless of the physical severity of these changes, it is imperative to query the deeper meanings associated with interactions with a site, for example the motivation to visit it, and whether proposed landscape changes inhibit the capability of people to undertake their activities (Devine-Wright, 2011; Riechers et al., 2020; Thomas et al., 2022). In the case of the coastal walk in our study, this refers to the ability (or lack of ability) of a place to provide personal fulfilment through solitude; or in the case of enjoying interactions with saltmarshes, the capability of individuals to undertake their chosen activities (Thomas et al., 2022). Our approach to the analysis of place change facilitates the necessary redevelopment of the landscape while contributing to the long-term sustainability of the local community. This complements existing efforts to mitigate against other negative impacts of coastal change, for example by incorporating suitable community and environmental benefits in planning legislation or infrastructural design (Evans et al., 2017; Roberts et al., 2021; Walker et al., 2014).

6.3 | Affective engagement comprises multiple domains

Our study of the relationships between people and coastal places found that affective engagement is not driven primarily by either personal, social or protective attachments to places, nor revealed using a single type of data or information. Confirming arguments by Enqvist et al. (2018), Himes and Muraca (2018) and West et al. (2018) on the need for a pluralistic perspective on people–place attachments, we found two domains of affective engagement that are both relational in character. The first of these is driven by personal, social and protective attachments to places; the second by deeper experienced meanings relating to either 'personal fulfilment from coastal visits' or 'coastal places as nexuses for community identity'. This suggests that study respondents are divided in their affective engagement into those who primarily value their spaces for personal fulfilment, and those valuing their places for social interaction (Table 3, Figure 5). Indeed, when place attachment scores were combined into one variable (S4), the same division in the experienced meanings domain of affective engagement remains.

6.4 | The value of integrating quantitative and qualitative measures of affective engagement

Researching the links between place meaning and place attachment, Wynveen et al. (2012) established that increases in meaning led to a

'distinct cognitive, emotional, and possibly behavioral (...) response', which in turn elicited greater attachment to a place. After an exploratory qualitative phase to develop quantitative instruments, they used agreement scales for both place meaning and place attachment, with 'affect' understood as a dimension of place attachment (Wynveen et al., 2012). In contrast, in the current study we considered both place meaning and place attachment as dimensions of 'affect' in people–place relationships, while separately emphasising the importance of material interaction or 'engagement'. In this way, as evidenced in the PCA, one can use a combination of quantitative and qualitative measures to determine whether meaning is more important to place attachment than repeated engagement, or vice versa.

At a more general level, our study supports Wynveen et al.'s (2012) observation that quantitative measures of place attachment do not communicate the specific meanings associated with places (also Lewicka, 2011). They can also be misinterpreted (Harris & Brown, 2010). For example, study participants' responses to social place attachment statements (e.g. 'I feel connected to the other people who visit/the community around this place' and 'I feel connected to the culture of this place') may vary according to their perceptions of who 'other people' are and what constitutes the 'community' or 'culture' of a place. This is confirmed by qualitative inputs to the project, in which participants express positive perceptions of locals while being ambivalent towards tourists and other visitors (Table 1, S3). Meanwhile, qualitative reports on place attachment do not convey the strength of engagement (Wynveen et al., 2012).

Our visualisation of affective engagement confirms previous arguments that assessments of people–place relationships based on either quantitative or qualitative inputs alone are insufficient to fully understand the meanings of and attachments to a place (Wynveen et al., 2012). Rather, a mixed-methods approach is required to assess the importance of a site to the community, and consequently to predict the potential impact of place change (Devine-Wright & Howes, 2010). Regardless of the method used, researchers should be wary of temporal and place-based differences, and researcher bias, both of which can subconsciously prioritise, or generate, different meanings in different places.

6.5 | Future directions and limitations of the current research

Community- and area-specific research on the basis of resident engagement is essential to establish the meanings and values of specific places, especially in a changing world (Stephenson, 2008). The place scale of the research must be selected carefully as this is likely to impact residents' attachment (Lewicka, 2010). Our newly developed methodology to understand affective engagement, grounded in new materialist theory, is transferable and can be used to assess people–place relationships in a wide range of contexts, including non-coastal and/or non-Irish. In each context, it renders critical baseline information for the management of cultural heritage, including by emphasising the links between physical sites and intangible practices, and

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between community meanings and community participation in planning and decision-making processes (Hansen et al., 2022; Ounanian et al., 2021).

With reference to the planning process, affective engagement could be developed further to predict residents' responses to proposed landscape changes, and their likelihood to care for changed places. Household surveys, representative of the coastal community, would remove self-selection bias and ensure a better range of place attachment values across the responses than found in the current study. A larger qualitative sample, striking a better balance between qualitative and quantitative methods, may reveal additional insights into affective engagement. Methods might also be adapted to better understand the multiple functions of places, and the role played by specific meanings and their associated experiences in strengthening (or weakening) community networks. For example, longitudinal panel studies of affective engagement with members of the community, spanning a transition period, will help to assess how change is impacting people–place relationships, and may contribute to a better understanding of community resilience to change.

7 | CONCLUSION

This research explored connections between people living in coastal communities and the natural and constructed environment, with particular attention to the interface between experienced meaning and material reality as captured by the term 'affective engagement'. We engaged with coastal residents using a mixed-methods approach to reveal two domains comprising affective engagement that are generated regardless of type of place, but are not measurable by quantitative or qualitative data alone. Our work extends the scope of research of environmental humanities theory through an applied test using empirical data, and introduces an important new perspective to existing literature on place attachment by emphasising the material character of people–place connections. Our findings are relevant to policymakers and other coastal decision-makers, highlighting the importance of community consultation on different meanings associated with the coastal landscape prior to planned interventions, to ensure the long-term sustainability of people–place relationships.

CONFLICT OF INTEREST STATEMENT

The authors declare that they have no conflict(s) of interest to disclose.

DATA AVAILABILITY STATEMENT

To protect respondents' anonymity, full interview transcripts cannot be shared. Sample quotes from the interviews can be found in the codebook (S3). R code and associated data are available on Zenodo: http://doi.org/10.5281/zenodo.10037663.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

Supporting Information S1. Interview guide.

Supporting Information S2. Questionnaire.

Supporting Information S3. Codebook generated from thematic analysis.

Supporting Information S4. Alternative PCA with PA as single measure.

Supporting Information S5. Table S1 and S2 showing model outputs looking at factors driving AE.