Exploring place attachment and visions of nature of water-based recreationists: the case of the longitudinal dams

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ABSTRACT
This study concerns an innovative project in the Dutch river Waal: the construction of longitudinal dams. By splitting the river into a main and secondary channel, these dams significantly impact the river landscape and the way it is used by different stakeholders. We report the results of a baseline study of the expectations local water-based recreationists (fishermen and boaters) had of the longitudinal dams before they were constructed. In addition, we explore their levels of place attachment, and use the visions of nature approach to elicit their lay philosophy of nature. We found that fishermen were more strongly attached to the area than boaters. Though expectations of the dams were generally negative, this differed significantly between fishermen and boaters, and between different dimensions of landscape change. We demonstrate the relevance of place attachment and visions of nature for understanding how recreationists perceive landscape change.

1. Introduction
Lying partially below sea level and in a vulnerably geographic location, the Netherlands continually invests in its relationship with water. The country’s landscapes reflect different phases in Dutch water management and its relationship with nature, such as the ecological turn (Disco, 2002) and ‘Room for the River’ (Wiering & Arts, 2006). This paper concerns an intervention in the river Waal, a branch of the Rhine.

In our study area, a 10 km stretch between the villages of Ophemert and Wamel in the province of Gelderland, the river flows through a largely flat landscape characterised by flood meadows covered in vegetation or riparian woodlands (Figure 1), with dikes protecting the nearby residential areas. Biking along the dike and walking through the flood meadows is a popular pastime, while fishermen often use the traditional groynes to fish from. The river itself is popular with different types of recreational boaters (especially smaller motorboats, but also recreational sailboats and canoes), yet is also challenging to navigate due to the many large commercial vessels passing through.

In other words, the Waal is a multifunctional river: a busy and crucial navigation channel for the shipping industry, but also a beloved recreational site and an important nature area (Fliervoet & van den Born, 2017). In addition, flood risk protection for nearby residents requires continuous investment, taking the projected impact of climate change into account. Rijkswaterstaat, the Dutch Directorate for Public Works and Water, is currently carrying out several measures along the river.

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This study concerns an innovative project called the longitudinal dams. In our study area, the groynes along the inner bend of the river have been replaced by dams placed parallel to the river bank. The dams split this part of the river into a main and secondary channel. Regulating the flow of water between these two channels using adjustable openings allows adaptation to both high and low water levels. In addition, it is expected that the dams will benefit safety, nature and recreation by creating a main channel for shipping and a secondary channel for recreation and nature development.

While Rijkswaterstaat thus expects several benefits of the dams for recreational use of the landscape, it is important to understand how recreationists themselves perceive these landscape changes. This paper reports the results of a baseline measurement of recreationists’ expectations of the impending landscape change, carried out in the spring of 2014 before construction of the dams. Several authors have argued the importance of taking stakeholder perspectives into account when planning and implementing landscape change. This may include stakeholders’ landscape perceptions (Buijs, 2009) and place meanings (Cheng, Kruger, & Daniels, 2003; Davenport & Anderson, 2005; Jacobs & Buijs, 2011). This is especially important when landscape change will likely engender resistance. Devine-Wright and Howes (2010) note that ‘conflicts are particularly likely when restorative places (i.e. those considered to be natural, wild or places to escape from cities) are impacted by development proposals that are interpreted to be “industrial” or “technological” in nature’ (p. 272).

In addition to their expectations of the dams, we also examine recreationists’ place attachment and visions of nature. Place attachment provides insight into people’s connection with their everyday or cherished landscapes, while visions of nature elicit people’s perspectives on and ideal relationship with nature. Although there have been earlier studies on recreationists’ place attachment (e.g. Kyle, Absher, & Graefe, 2003; Kyle, Bricker, Graefe, & Wickham, 2004), the visions of nature approach has so far not been used among recreationists. This paper also explores links between visions of nature and place attachment, and in doing so contributes to existing studies such as Buijs (2009) who discussed

Our paper also aims to contribute relevant insights for landscape planning. The longitudinal dams project brings together water managers, recreationists, shipping professionals and knowledge institutes in order to jointly monitor the impacts of this landscape change (Verbrugge, Ganzevoort, Fliervoet, Panten, & van den Born, 2017). Actively including the views of local stakeholders in jointly monitoring the effects of landscape interventions is a novel approach. The aims of our research are to:

1. gain insight into the place attachment and visions of nature of boaters and fishermen along this trajectory of the Waal
2. gain insight into their expectations regarding the longitudinal dams
3. explore how these expectations are related to place attachment and visions of nature

2. Literature review

2.1. Place attachment

Place attachment is a significant and frequently employed concept in understanding local perceptions of, and responses to, landscape change. Though the literature is rife with different conceptualisations and operationalisations of place attachment (for reviews see Lewicka, 2011; Ramkissoon, Weiler, & Smith, 2012; Trentelman, 2009), partly dependent on researchers' disciplinary backgrounds (Patterson & Williams, 2005), it generally concerns the bonds people develop with places that are meaningful to them (Scannell & Gifford, 2010b, p. 1). Several studies have shown that place attachment influences people's perceptions of landscapes and landscape change. For instance, Bonaiuto, Carrus, Martorella, and Bonnes (2002) and Carrus, Bonaiuto, and Bonnes (2005) found that a sense of regional identity can lead to both higher and lower levels of support for protected natural areas, depending on the nature of the area and the proximity of the respondents. Kaltenborn (1998) showed how different levels of attachment could explain responses to environmental impacts to the landscape of Svalbard, Norway. Place attachment has also been studied specifically among recreationists, for instance linked to recreation behaviour (Bricker & Kerstetter, 2000; Budruk, Wilhem Stanis, Schneider, & Heisey, 2008) or perceptions of the condition of recreation areas (Kyle, Graefe, Manning, & Bacon, 2004).

Two frequently employed dimensions in place attachment research are place identity and place dependence, often measured using a scale developed by Williams and colleagues (see Williams & Vaske, 2003). Place identity refers to the emotional and symbolic importance of places in developing our sense of self, while place dependence concerns the importance of a place for meeting our needs, relative to other places. However, some authors (e.g. Hammitt, Backlund, & Bixler, 2006; Raymond, Brown, & Weber, 2010) have argued that a full understanding of place attachment requires inclusion of more dimensions. Raymond et al. (2010) developed a comprehensive framework distinguishing between place identity, place dependence, social bonding and nature bonding. The latter two dimensions are distinguished because attachments to social and physical aspects of the environment appear to play different roles in shaping environmental concern (Brehm, Eisenhauer, & Krannich, 2006) and pro-environmental behaviour (Scannell & Gifford, 2010a).

2.2. Visions of nature

Visions of nature is a framework for exploring people's everyday philosophy of nature, first developed in van den Born, Lenders, De Groot, and Huijsman (2001). While grounded in philosophical theory, it is a form of empirical philosophy explicitly concerned with lay philosophy rather than scholarly views. Visions of nature provide insight into three interrelated elements of people's everyday philosophy of
nature: values of nature, images of nature and images of the human–nature relationship (van den Born et al., 2001). These dimensions have been studied in their own right, but also linked to topics as diverse as nature conservation (Van Heel, Boerboom, Fliervoet, Lenders, & van den Born, 2017), river management (De Groot, 2012) and perceptions of non-native species (Verbrugge, van den Born, & Lenders, 2013). In this study, we examined both people’s images of nature as well as their images of relationship.

The concept of images of nature is concerned with what people consider to be ‘real’ nature. Since nature is a subjective and contested concept (Hajer & Versteeg, 2005; Macnaghten & Urry, 1999), understanding public views on what constitutes ‘real’ nature is important for understanding people’s responses to landscapes and landscape change (De Groot & van den Born, 2003). For instance, Vining, Merrick, and Price (2008) argued that what people consider ‘natural’ is important for understanding their view on environmental management, and Buijs, Elands, and Langers (2009) showed how different conceptions of nature could explain cultural differences in landscape preferences.

Images of nature typology are based on a tripartite distinction between wild, Arcadian and functional nature. Swart, Van der Windt, and Keulartz (2001) characterised these images as follows (p. 234–236): wild nature centres around expansive, independent nature with an emphasis on biological processes, Arcadian nature revolves around scenery and balancing humans and nature, and functional nature emphasises human usage of the landscape. Similarly, in an empirical study Buijs et al. (2009) distinguished between wild, inclusive and functional nature.

Images of relationship are people's preferred relationship between humans and nature. Like images of nature, images of relationship influence public perceptions of and support for nature and landscape management. Examples include Bauer, Wallner, and Hunziker (2009), who showed how their Swiss respondents' views on the appropriate human-nature relationship influenced their attitudes towards rewilding, and Bang, Medin, and Atran (2007), who described how such views influence resource conflicts between European and Native Americans.

The framework is structured around four basic images: a domineering master over nature (White, 1967), a responsible steward of nature (Kanagy & Willits, 1993), an equal partner with nature (Kaltoft, 1999), and a physical and spiritual participant in nature (Salmon, 2000). In previous empirical studies (van den Born, 2006, 2008) Dutch respondents overwhelmingly rejected the Master image, strongly supported the Stewardship image, and moderately supported the Partner and Participant images. In a later study of French, German and Dutch river residents, De Groot, Drenthen, and De Groot (2011) found that an ecocentric form of stewardship was a ‘massive mainstream concept’ with 90% adherence among their respondents (p. 38). Studies using this framework make up a significant portion of the empirical literature on human–nature relationships in English-language journals (Flint, Kunze, Muhar, Yoshida, & Penker, 2013, p. 211, 212).

3. Methods

3.1. Data collection

Our target groups, recreational boaters and fishermen, are difficult to involve in survey research, especially for such a local landscape project. We constructed an online survey, and employed a combination of self-selecting and snowball sampling (Verckens, 2008) by spreading the link among the members of two aquatic sports associations and a local marina, as well as five local fishing groups. Respondents were also asked to invite fellow recreationists to participate. After a month (April-May 2014) we had collected 75 completed surveys. Ages ran between 22 and 79 years (M = 57), and more boaters (59%) than fishermen (33%) completed the survey; 8% identified as both. Respondents were overwhelmingly male (95%), which is common for this stakeholder group, especially fishermen (e.g. Kyle, Bricker, et al., 2004a). Respondents had been visiting the area for between 2 and 70 years (M = 20) and only 19% lived along the project area.

The relatively small sample size was expected due to the difficulties in reaching this group. Water-based recreationists are not often involved in such studies, yet gaining their perspectives on riverine landscape changes is crucial. The exploratory nature of our study among a rarely consulted group
enhances the relevance of the data, and sampling adequacy was carefully checked for each set of survey items (see Section 3.3).

3.2. Questionnaire development

Our online questionnaire centred on three topics: place attachment, visions of nature, and expectations of the longitudinal dams. The place attachment, images of nature and images of relationship items were largely derived from items tested in previous studies. Place attachment was measured using nineteen statements, on five-point Likert scales running from ‘strongly disagree’ to ‘strongly agree’. Place identity and dependence scales were derived from Williams and Vaske (2003), while social and nature bonding items came from Raymond et al. (2010) with some additional items we developed for our research context.

For images of nature, we asked respondents to choose to what degree they considered a list of fifteen types of nature to be ‘real’ nature, on a four-point scale running from ‘not at all’ to ‘strongly’. The items were chosen to equally represent wild, Arcadian and functional nature, and were largely based on those used in van den Born, Lenders, De Groot, and Huijsman (2001) and De Groot and van den Born (2003), with some additional items. For images of relationship we made use of the Human and Nature (HaN) scale developed in van den Born (2006) and De Groot (2012). The scale consisted of eighteen statements, based on the four basic images as discussed in Section 2.2, and answered on a five-point Likert scale running from ‘strongly disagree’ to ‘strongly agree’.

For respondents’ expectations of the dams, a map of the project location and an artist’s impression of a longitudinal dam were displayed. Respondents were asked to rate (on a five-point Likert scale) the expected effects of the longitudinal dams on five aspects of the landscape: beauty, naturalness, flood safety, accessibility and ease of recreation. In addition, they scored their overall opinion on the planned intervention.

3.3. Data analysis

We used principal component analysis (PCA) in SPSS 21 to construct respondents’ own classifications of the place attachment, images of nature and images of relationship scales. We chose exploratory rather than confirmatory factor analysis because we added some new items to the place attachment and images of nature scales, because we wanted to see how the place attachment scale would perform in Dutch, and because the images of relationship items have shown slightly different loading patterns across studies. Since we employed multidimensional constructs with dimensions that are unlikely to be fully independent, we used oblique rotation (direct oblimin with Kaiser normalisation) to allow for correlation between factors (Costello & Osborne, 2005).

Sampling adequacy was screened using the Kaiser-Meyer-Olkin (KMO) measure, which returns a value between 0 and 1, with values closer to 1 indicating compact correlation patterns needed for reliable and distinct factors. We used > .7 for the combined data and > .5 for individual items as acceptable limits; individual items with KMO scores < .5 were dropped, as this indicates the variable has a diffuse correlation pattern that does not clearly indicate an underlying factor (Field, 2009). We also checked the correlation matrix to assess whether correlations were sufficient for PCA: we removed any items with correlations > .9 (indicating multicollinearity) or with few to no correlations > .3 (indicating independence from all other items). In addition, Bartlett’s test of sphericity, which tests whether overall correlations in the set of items are significantly different from 0, had to be significant (p < .05). For determining the number of factors to be extracted, we looked both at the number of factors with Eigenvalue > 1 (Kaiser’s criterion) and the ‘elbow’ in the scree plot (Foster, Barkus, & Yavorsky, 2006).

After rotation the pattern matrices were interpreted, with factor loadings below .40 suppressed since this indicates the variable has little substantive importance in that factor (Field, 2009). The reliability of all extracted factors was checked using Cronbach’s α, a measure of (sub)scale consistency running between 0 and 1, with 1 indicating very high reliability; in this study α > .7 was interpreted as reliable, .6 ≤ α ≤ .7 as acceptable, and α < .6 as unreliable. Finally, we employed Spearman’s ρ to assess correlations
between ordinal and/or scale variables (including mean factor scores), and Mann–Whitney tests to assess differing means between categorical groups (with $p \leq .05$ interpreted as statistically significant).

4. Results

4.1. Images of nature

Thirteen items remained after data screening, and on the basis of the scree plot a three-factor solution was chosen (Table 1). These three factors explained 58.2% of the variance. The first factor, with a high Cronbach's alpha ($\alpha = .804$) and a moderate degree of naturalness (2.72), includes three items that evoke an Arcadian image of nature: grain fields, cows and polder landscapes. Though the inclusion of houseplants is surprising, the overall image is one of balancing human influence and nature in the same landscape: Arcadian nature. The second factor has a lower Cronbach's alpha ($\alpha = .669$), and stands out because of its high mean degree of naturalness (3.67). It includes two forms of wild nature, swamp and rainforest, as well as three items associated with nature values along the river (flood meadows, birds and willows); in other words, wild nature. The item ‘the Waal river’ also loads onto this factor, showing that our respondents primarily conceive of the Waal as a natural landscape. Finally, the third factor ($\alpha = .657$) has the lowest mean degree of naturalness (1.78) and contains three functional forms of nature: football fields, fishponds and city parks. In addition, one of the wild nature items loads negatively onto this factor. This supports the interpretation of this image as functional nature.

4.2. Images of relationship

Data screening led to deletion of two items, so the final analysis was conducted with 16 items. A four-factor solution was chosen based on the scree plot (Table 2), explaining 68.9% of the variance. Respondents reproduced the theoretical classification of the images: the second, third and fourth factor

<table>
<thead>
<tr>
<th>Item</th>
<th>Factor loading</th>
<th>Mean degree of naturalness</th>
<th>Standard deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arcadian nature</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cows in the meadow</td>
<td>.863</td>
<td>3.17</td>
<td>.844</td>
</tr>
<tr>
<td>Grain fields</td>
<td>.809</td>
<td>2.48</td>
<td>.875</td>
</tr>
<tr>
<td>The polder</td>
<td>.721</td>
<td>3.27</td>
<td>.827</td>
</tr>
<tr>
<td>Houseplants</td>
<td>.630</td>
<td>1.96</td>
<td>.892</td>
</tr>
<tr>
<td>Mean degree of naturalness (Arcadian)</td>
<td></td>
<td></td>
<td>.683</td>
</tr>
<tr>
<td>Cronbach's alpha</td>
<td>.804</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wild nature</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The rainforest</td>
<td>.728</td>
<td>3.87</td>
<td>.502</td>
</tr>
<tr>
<td>Flood meadows</td>
<td>.655</td>
<td>3.64</td>
<td>.536</td>
</tr>
<tr>
<td>Birds brooding in the grassland</td>
<td>.653</td>
<td>3.72</td>
<td>.583</td>
</tr>
<tr>
<td>A swamp</td>
<td>.619</td>
<td>3.59</td>
<td>.699</td>
</tr>
<tr>
<td>The Waal river</td>
<td>.483</td>
<td>3.68</td>
<td>.573</td>
</tr>
<tr>
<td>Willows alongside the river</td>
<td>.448</td>
<td>3.52</td>
<td>.704</td>
</tr>
<tr>
<td>Mean degree of naturalness (Wild)</td>
<td></td>
<td></td>
<td>.371</td>
</tr>
<tr>
<td>Cronbach's alpha</td>
<td>.669</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Functional nature</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A football field</td>
<td>.827</td>
<td>1.36</td>
<td>.690</td>
</tr>
<tr>
<td>A fishpond</td>
<td>.800</td>
<td>2.01</td>
<td>.979</td>
</tr>
<tr>
<td>Willows alongside the river</td>
<td>-.621</td>
<td>3.52</td>
<td>.704</td>
</tr>
<tr>
<td>A city park</td>
<td>.501</td>
<td>2.27</td>
<td>.827</td>
</tr>
<tr>
<td>Mean degree of naturalness (Functional)</td>
<td></td>
<td></td>
<td>.568</td>
</tr>
<tr>
<td>Cronbach's alpha</td>
<td>.657</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: *Due to loading negatively onto this factor, scores for this item were reversed for calculating mean factor scores and Cronbach’s alpha.

Data screening resulted in deletion of two items: Weeds in the garden and A dandelion alongside the road. The KMO-measure was acceptable (.740) and Bartlett's test was highly significant ($p < .001$). Items are listed per factor in descending order of factor loadings. Mean degree of naturalness is the average association with real nature, running from 1 (‘not at all’) to 4 (‘strongly’).
are all easily recognisable as the partner, master and participant, respectively. The partner includes the four items most clearly expressing an equal position of humans and nature ($\alpha = .827$), the master includes all three items expressing human superiority over nature ($\alpha = .742$), and the participant includes four items expressing human submergence in nature ($\alpha = .743$).

The first factor is very reliable ($\alpha = .892$) but slightly less clear compared to the original model, though it reflects the image of the steward as having a caretaking responsibility towards nature. It includes all four stewardship items, including the item *Human beings are part of nature and are also responsible for it*. At first glance this item seems distinct from the steward, since it frames humans as part of nature, but it was found to be an important element of the lay conceptualisation of stewardship (van den Born, 2008).

Table 2. Factor analysis images of relationship.

<table>
<thead>
<tr>
<th>Item</th>
<th>Factor loading</th>
<th>Mean level of agreement</th>
<th>Standard deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Stewardship of nature</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>St Human beings have a responsibility to protect the natural environment</td>
<td>.923</td>
<td>1.35</td>
<td>.762</td>
</tr>
<tr>
<td>St We have to ensure that we leave enough nature intact for future generations</td>
<td>.811</td>
<td>1.53</td>
<td>.704</td>
</tr>
<tr>
<td>Pr Nature wants to grow and prosper, just like humans do</td>
<td>.806</td>
<td>1.12</td>
<td>.753</td>
</tr>
<tr>
<td>St Human beings are part of nature and are also responsible for it</td>
<td>.800</td>
<td>1.17</td>
<td>.742</td>
</tr>
<tr>
<td>St I feel an obligation to protect the natural environment</td>
<td>.785</td>
<td>1.07</td>
<td>.759</td>
</tr>
<tr>
<td>Pt The grandeur of the natural environment enables me to experience the insignificance of human beings</td>
<td>.472</td>
<td>0.95</td>
<td>.868</td>
</tr>
<tr>
<td>Mean level of adherence (Stewardship)</td>
<td></td>
<td>1.20</td>
<td>.617</td>
</tr>
<tr>
<td>Cronbach's alpha</td>
<td>.892</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Partnership with nature</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pr I can have a relationship with nature just like I have with my friends</td>
<td>.872</td>
<td>0.05</td>
<td>.899</td>
</tr>
<tr>
<td>Pr I would like to have a relationship with nature just like I have with my friends</td>
<td>.866</td>
<td>0.04</td>
<td>.892</td>
</tr>
<tr>
<td>Pr Humans and nature are of equal value</td>
<td>.766</td>
<td>0.32</td>
<td>1.042</td>
</tr>
<tr>
<td>Pr Humans and nature deserve to be treated as equals</td>
<td>.650</td>
<td>0.73</td>
<td>1.031</td>
</tr>
<tr>
<td>Mean level of adherence (Partnership)</td>
<td></td>
<td>0.29</td>
<td>.786</td>
</tr>
<tr>
<td>Cronbach's alpha</td>
<td>.827</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Mastery over nature</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ma Human beings have more value than nature</td>
<td>.853</td>
<td>−0.11</td>
<td>.938</td>
</tr>
<tr>
<td>Ma Human beings have the right to alter nature radically</td>
<td>.837</td>
<td>−0.56</td>
<td>1.017</td>
</tr>
<tr>
<td>Ma Nature cannot be allowed to stand in the way of economic progress</td>
<td>.705</td>
<td>−0.21</td>
<td>1.044</td>
</tr>
<tr>
<td>Mean level of adherence (Mastery)</td>
<td></td>
<td>−0.29</td>
<td>.813</td>
</tr>
<tr>
<td>Cronbach's alpha</td>
<td>.742</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Participation in nature</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pt I would like to spend a week alone along the river, in order to feel one with nature</td>
<td>.769</td>
<td>0.39</td>
<td>1.077</td>
</tr>
<tr>
<td>Pt When I am surrounded by nature I experience something greater than mankind</td>
<td>.679</td>
<td>0.77</td>
<td>.879</td>
</tr>
<tr>
<td>Pt I often feel an intense connection with nature</td>
<td>.416</td>
<td>0.79</td>
<td>.890</td>
</tr>
<tr>
<td>Pt The grandeur of the natural environment enables me to experience the insignificance of human beings</td>
<td>.400</td>
<td>0.95</td>
<td>.868</td>
</tr>
<tr>
<td>Mean level of adherence (Participation)</td>
<td></td>
<td>0.72</td>
<td>.701</td>
</tr>
<tr>
<td>Cronbach's alpha</td>
<td>.743</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: Data screening resulted in deletion of two items: *Technology and science will enable us to solve environmental problems in the future and I sometimes feel one with the universe*. The KMO-measure was acceptable (.765) and Bartlett's test was highly significant ($p < .001$). Items are listed in descending order of factor loadings. Mean level of agreement is the average agreement with a statement or image, running from −2 (‘strongly disagree’) to 2 (‘strongly agree’). Abbreviations refer to the original image items belonging to (Ma = Master, St = Steward, Pr = Partner, and Pt = Participant).
This lay image of stewardship is thus more ecocentric than the traditional steward of nature (cf. Kanagy & Willits, 1993). The factor also contains one partner and one cross-loading participant item. The partner item, *Nature wants to grow and prosper, just like humans do*, fits reasonably well within the image of this ecocentric steward. Since the participant item cross-loads with factor four, and with rather low factor loadings, the first factor is interpreted as the steward of nature.

Stewardship is given the highest overall agreement (1.29 on a scale from −2 to 2), with two items expressing humanity’s responsibility to protect and preserve nature scoring especially high (1.35 and 1.53 respectively). Partnership has a lower level of agreement, though still positive (0.29). Our respondents reject Mastery, with a mean level of agreement of −0.29, and moderately agree with the ecocentric image of Participation (0.72), though they seem less drawn towards the more esoteric elements of submersion in nature when compared to the steward.

### 4.3. Place attachment

Four items from the place attachment scale were deleted through successive rounds of data screening; analysis of the remaining 15 items resulted in a three-factor solution explaining 67.3% of the variance (Table 3). The first and third factors are readily interpretable: in the first factor we recognise *place identity* ($α = 0.874$), expressing the degree to which the river area has become an inextricable part of respondents’ lives, while the third factor corresponds to *place dependence*, the degree to which the area meets respondents’ recreational needs ($α = 0.832$). This gives further support to the validity of these identity and dependence scales, also when translated into Dutch.

The second factor, though very reliable ($α = 0.880$), is more difficult to interpret, as it contains all social and natural bonding items. This ran contrary to our expectations, as we expected social and natural bonding items to load onto separate factors. However, the high reliability and moderate-to-strong factor loadings indicate that this factor is an expression of an underlying construct, not an amalgamation of two unconnected concepts. Closer examination of the items in the factor shows that, while they differ in emphasising natural or social aspects of the river area, they share the development of a sense of belonging. The social items emphasise belonging with people, while the natural bonding items express belonging to the natural landscape. The items thus share a sentiment of being part of a greater natural and social whole. This union of natural and social dimensions resonates with the ‘place’ dimension of Scannell and Gifford’s (2010b) model. We termed this dimension *belongingness*.

Mean scores all show slight to moderate agreement, with belongingness receiving the highest average scores (0.81). This factor also includes the most agreed on item, about sadness over loss of nature (1.24). Place identity scores moderately as well (0.58), while place dependence has the lowest (though still positive) mean score of 0.12.

Bivariate correlations revealed that longer histories of recreating in the area were linked to higher levels of place identity ($r = 0.28, p < 0.05$). Only belongingness was correlated with visions of nature: higher levels of belongingness were associated with higher steward ($r = 0.33, p < 0.01$) and participant scores ($r = 0.24, p < 0.05$), and with higher naturalness attributed to wild nature ($r = 0.24, p < 0.05$).

Mann–Whitney tests showed that respondents living in the area had significantly higher identity scores than non-locals ($U = 193.50, p < 0.01$). In addition, fishermen scored higher on all dimensions compared to boaters ($U_{identity} = 241.00, p < 0.001$, $U_{dependence} = 157.00, p < 0.001$, $U_{belongingness} = 179.00, p < 0.001$).

### 4.4. Expectations of the measures

Table 4 shows the expectations regarding the longitudinal dams for fishermen, boaters and the entire sample (including respondents identifying as both), both for the overall impact as well as for five specific dimensions of landscape change. Respondents generally reported negative expectations of the longitudinal dams. Expected effects on accessibility, beauty and naturalness reached mean scores of around −0.40, and flood safety was the only dimension where the overall mean score was positive (0.20).
The fishermen in our sample were much more pessimistic than the boaters; especially the differences in expected effects on accessibility and ease of recreation are notable. Mann–Whitney tests confirmed that four out of six scores differed significantly between fishermen and boaters, with the expectations...
regarding accessibility standing out as highly significant (Table 4): the pessimism of the fishermen is likely tied to the removal of the groynes, these being popular fishing spots.

Correlations between place attachment and expectations of the dams were limited but consistently negative: we found negative relations between identity and assumed benefits for ease of recreation \( r = -0.24, p < 0.05 \), and between dependence and assumed benefits for ease of recreation \( r = -0.25, p < 0.05 \) and overall benefits \( r = -0.26, p < 0.05 \). In other words, respondents with stronger attachments to the local landscape appeared more pessimistic about the dams’ impact on their recreation. Regarding images of nature, respondents who consider Arcadian nature to be natural were more positive about the measures as a whole \( r = 0.40, p < 0.001 \), as well as their expected effects on accessibility \( r = 0.41, p < 0.001 \) and beauty \( r = 0.32, p < 0.01 \).

Finally, three out of four images of relationship were associated with expectations of the dams, all of them positively. Higher steward scores were correlated with more positive expectations regarding effects on flood safety \( r = 0.26, p < 0.05 \), and higher master scores with aesthetic benefits \( r = 0.28, p < 0.05 \). However, partnership with nature showed the most consistent correlation pattern, with higher partnership scores associated with more positive expectations on all dimensions apart from flood safety \( r \) between .25 and .36, \( p < 0.05 \).

5. Discussion and conclusions

Collecting public perception data is increasingly recognised as vital for understanding controversies over landscape change. This study has demonstrated the relevance of two concepts: place attachment and visions of nature. Based on our findings among a sample of Dutch water-based recreationists, we formulate three implications for scholars and practitioners.

Firstly, this study highlighted the importance of recognising diversity in stakeholder perspectives. The significant differences between fishermen and boaters in both place attachment and expectations regarding the longitudinal dams reinforce the notion that stakeholder groups such as ‘citizens’ and ‘recreationists’ are not monolithic entities. When reaching out to these groups, communication should be tailor-made to their specific perspectives, acknowledging differences both within and between these broad groups. This is also important when actively engaging them, such as in participatory monitoring (Verbrugge et al., 2017). Our results also show that expectations differed significantly depending on the aspect of landscape change (e.g. naturalness, safety, accessibility). To capture these important nuances, researchers and practitioners collecting perception data should elicit perceived or expected impacts of landscape interventions on these different dimensions, and not just ask for an overall opinion.

Secondly, one major benefit of collecting public perception data is the opportunity to anticipate sources of conflict regarding landscape interventions. Among our respondents, we found that both place identity and dependence were negatively correlated with expected benefits of the dams, which confirms findings from previous studies indicating that higher levels of attachment may signal increased resistance to change. Specifically, this correlation was found regarding expected effects on ease of recreation, indicating that this is the dimension of the landscape most strongly tied to our respondents’ sense of identity and dependence.

Belongingness did not significantly correlate with expectations regarding the dams; this could be explained by the social bonding items in this factor, which might be less relevant to the expected impacts of this intervention compared to identity, dependence and nature bonding. More surprisingly, correlations between images of relationship and expectations regarding the dams were largely limited to the partner: adherents to the partnership image had more positive expectations of the dams on almost all dimensions, which indicate that these respondents view the construction of the dams as a form of human cooperation with nature. The lack of a clearer pattern with the other images of relationship is surprising considering the findings from previous studies (e.g. Verbrugge et al., 2013, 2017). Further studies into the images of relationship among this important stakeholder group would be a fruitful avenue for future research, both using larger data-sets or qualitative methodology such as interviews or focus groups.
Devine-Wright and Howes (2010) suggested a strong likelihood of resistance arising when ‘natural’ places are impacted by technological interventions. Our analysis of images of nature indicated that our respondents view the Waal river as a natural landscape, which can help explain the generally negative expectations regarding the longitudinal dams. We also found positive correlations between naturalness attributed to Arcadian nature, and expectations of the dams; in other words, a broader view of what constitutes ‘nature’ was associated with less resistance to these human constructions. The Waal has historically been extensively modified by humans, for example, by constructing the traditional groynes, and as such it may not meet naturalness criteria of ecologists or other professionals. That our respondents appear to have different ideas about what makes landscapes ‘natural’, however, demonstrates the added value of visions of nature research for anticipating sources of conflict.

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