

SYNTHESIS

Landscape Online | Volume 97 | 2022 | Article 1100

Submitted: 26 April 2022 | Accepted in revised version: 30 May 2022 | Published: 30 June 2022

Sense of Place in Spatial Planning: Applying Instrumental and Deliberative Approaches at the River Lahn

Abstract

Sense of place offers a theoretical approach for understanding and assessing people-place relationships, which may support spatial planning purposes. However, the integration of sense of place into planning practice is still lacking due to multiple and diverse conceptualizations and assessment approaches as well as lacking adaptation to planning practice. Therefore, my dissertation aimed to explore a systematic integration of sense of place into spatial and landscape planning. To do so, I used Public Participation GIS (PPGIS) and Geodesign methods, and developed and applied a spatial meaningful place indicator, which is comparable with biophysical indicators used in planning practice exemplified by river landscapes. Findings highlight (1) the importance for assessment of place meanings for understanding of people-place relationship including the biophysical context and personal characteristics, (2) the significant and positive correlation between sense of place and environmental stewardship motivation, (3) the potential of integrating sense of place data into landscape design. I provide five actionable recommendations for integrating sense of place into landscape planning, such as exploration of feasibility and usefulness, an early assessment, consideration of appropriate methodological approaches, importance of transparent and inclusive process, and the integration of external support. Finally, based on the lessons learnt within this dissertation main future research directions are proposed, which include the further development of the proposed indicator and strengthening of a progressive perspective on sense of place.

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Keywords:

PPGIS, Geodesign, place attachment, place meaning, environmental stewardship

<https://doi.org/10.3097/LO.2022.1100>

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1 Introduction

River landscapes are complex social-ecological systems, which offer a wide range of amenities and services to people, e.g. stormwater retention, recreation, fresh water provision, and carbon sequestration (Vermaat et al. 2015). Thiele et al. (2019) show that river landscapes are characterized by higher landscape aesthetic quality than other landscape types in Germany. Moreover, river landscapes embody close linkages between cultural and biophysical dynamics, for example, when adapting management to hydrological fluctuation (Wantzen et al. 2016). However, many rivers worldwide are in peril, impacting both biodiversity and human lives (Vörösmarty et al. 2010). Since the beginning of the 20th century, only around 40% of the European rivers are in a good or high ecological conditions (EEA 2018), and two thirds of German flood plains disappeared (BMUB and BfN 2009). Rivers and river landscapes face complex challenges, such as climate change or loss of biodiversity (WBGU 2011), which are subjectively perceived and interpreted by people who live in, depend on, and shape these landscapes. Their backgrounds, abilities, cultural settings, and power relations influence their understanding of, and interest in, land-use changes (Stedman 2016). Yet, there is a lack of understanding how people feel emotionally attached to rivers (Verbrugge et al. 2019).

Sense of place has been proposed as a valuable approach to assess and understand the subjective relation between people and place for environmental management in general (Hausmann et al. 2016, Stedman 2016, Masterson et al. 2017) and river landscapes design in particular (Verbrugge et al. 2019). This study draws on the definition by Tuan describing sense of place as the meanings and attachments people attribute to place (Tuan 1977). Place attachments are of evaluative character, representing intensity and dimensions of the emotional connections to a place, while place meanings describe in more detail the reasons for this connection (Stedman 2016, Masterson et al. 2017). The process of formation of sense of place is influenced by individual people's and place attributes (Raymond et al., 2017b). Therefore, sense of place can be subject to

changes in a landscape. For example, place attachment showed negative correlation with expected benefits of dam constructions in a Dutch river (Ganzevoort and van den Born 2019). Other studies highlight the strong role of place meanings as a mediator between environmental characteristics and place attachment (Stedman 2003). The physical characteristics of a landscape provide the frame for the interpretation of the place (Ingalls and Stedman 2016, Masterson et al. 2017), for example, a river allows for the creation of meanings associated with fishing. In consequence, spatial or landscape planners are able to shape place meanings (Stedman 2008). And vice-versa, the current sense of place influences how people interact with and shape the landscape, thus to their environmental stewardship behaviour (Devine-Wright and Howes 2010, Gottwald and Stedman 2020).

Hence, the integration of sense of place into the planning processes holds three main opportunities: First, it could enable needs-based planning. Knowing citizens' sense of place, which means their specific place meanings and its location, can support planners to shape and design the landscape in order to create or preserve potential for certain meaning types (Stedman 2008). Second, it promotes consent-oriented planning by minimising potential land use conflicts (Ives et al. 2015). Third, it would promote a more integrated planning approach, because emotional connectedness to place can motivate cooperation efforts (Manzo and Perkins 2006) and enhance environmental stewardship (Ives et al. 2015).

Despite these advantages, sense of place is not commonly integrated into spatial planning (Manzo and Perkins 2006, Ryan 2011). Reasons are manifold: There is a myriad of related, but incoherent concepts and terms related to sense of place, such as place attachment, place meanings, place identity or place dependence (Hernández et al. 2014), which are used inconsistently throughout different disciplines and without a coherent understanding of the relation of those terms to each other. In addition, none of the methods combines a holistic assessment of sense of place, i.e., integrating place attachments and meanings with a spatially explicit method, despite the fact that this kind of spatial information is used and needed in planning practice (Hermes et al. 2018,

Carvalho Ribeiro et al. 2019). Existing spatial assessments on sense of place tend to rely on predefined spatial delimitations, such as administrative limits of neighbourhoods or protected areas. Yet, these administrative units may only poorly represent the actual environmental exposure of an individual (Perchoux et al. 2013). This causes a lack of guidelines on how to integrate sense of place into spatial planning, which is tightly connected to the lack of indicators or methods, turning the subjective character of sense of place into a tangible and measurable component for social-ecological research (Stedman 2016, Masterson et al. 2017) and planning practice.

Therefore, the dissertation (Gottwald 2021), which is synthesized here, aimed to explore a systematic integration of sense of place into spatial and landscape planning of a river landscape, which is guided by the following objectives:

1. Develop a spatial indicator for the assessment of sense of place to enhance the systematic integration of sense of place into spatial planning
2. Apply the indicator to assess sense of place of citizens in a case study area
3. Explore the relationship between sense of place and environmental stewardship as an alternative to traditional planning practice
4. Integrate sense of place into a planning workshop and derive suggestion for integrating sense of place into landscape planning practice

2 Study area: Lahn river landscape

The Lahn river landscape was chosen to exemplify the methodological approach of this work. This study area is part of a transdisciplinary project, which offered the unique opportunity to support designing a

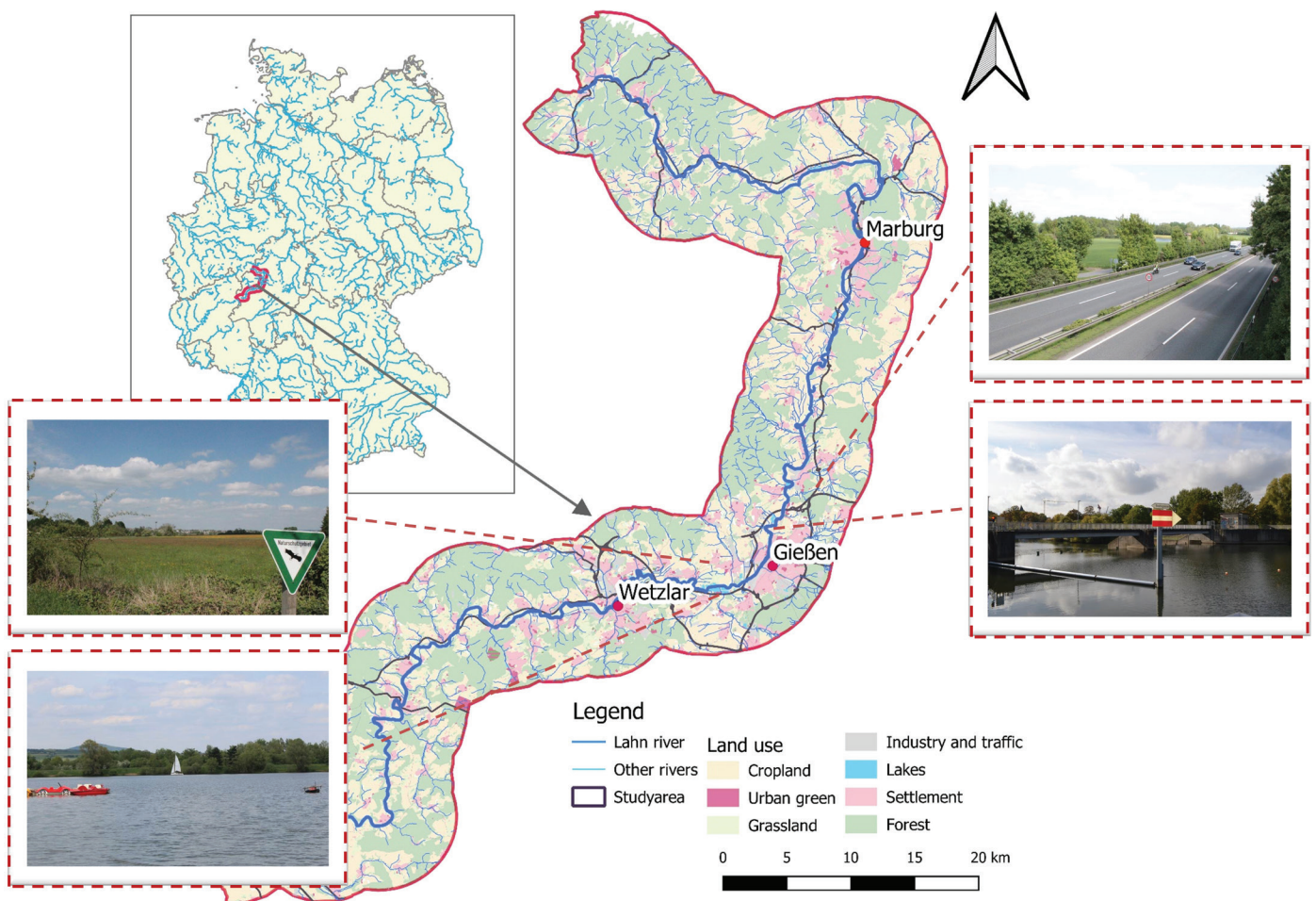


Figure 1. Study area with illustrative photographs (taken by author), (Gottwald, Albert, et al., 2021)

concept of an ecologically enhanced river landscape. Moreover, ongoing planning activities and organized environmental stewardship initiatives highlight the need to go beyond an integration of objective information and to account for the emotional connectedness that people have to the place, which encourages environmental stewardship, but has not yet been included in planning and design efforts.

The river Lahn stretches over 246 km, from the shallow Rothaar mountains in the federal state of North Rhine-Westphalia, continuous for 140 km through Hessen and flows in the river Rhine (figure 3). The watershed extends over 6000 km². The landscape is characterised by an urban-periurban-rural mix with several medium- and small-sized settlements, connected through a highway next to the river. Rural areas are dominated by grassland, cropland and, with increasing distance to the river, forests. Flood regulation requirements and earlier demands for transportation of goods and hydropower generation led to the construction of around 70 sluices

and weirs. Their rather costly maintenance is debated (Albert et al. 2019). The former floodplain is lost to settlements, infrastructure and intensified agriculture, causing ecological deficits, according to Water Framework Directive assessments (LiLa n.d., HMUKLV 2015). Recreational use, specially water sport activities generate a significant pressure on the river (HMUKLV 2015). Enhancing the ecological situation requires the integration of divers stakeholder interests, such as hydro-energy production, or recreational boating, fishing, biking and hiking (Albert et al. 2019). The current situation requires rethinking the design of the river landscape as well as the planning of the design by integrating multiple interests and values.

3 Methodological approach

The dissertation consisted of three main stages of conceptual development, empirical application and

| | Objectives | Method | Key results | References |
|--|--|---|--|---|
| Conceptual development | <p>1 Developing and testing a meaningful place indicator</p> | <ul style="list-style-type: none"> Literature research PPGIS survey development | <ul style="list-style-type: none"> Meaningful place indicator assessing sense of place for spatial planning purpose, which is: <ul style="list-style-type: none"> Spatially explicit Integrates place attachment and place meanings Comparable to biophysical indicators in spatial planning | Gottwald et al. 2021a, Knaps et al. 2022 |
| Empirical application | <p>2 Identifying meaningful place characteristics</p> <p>3 Exploring relations between meaningful places and environmental stewardship</p> | <ul style="list-style-type: none"> PPGIS survey application Statistical analysis GIS analysis | <ul style="list-style-type: none"> Importance for assessment of place meanings for understanding of people-place relationship including: <ul style="list-style-type: none"> Biophysical context personal characteristics Significant and positive correlation between sense of place environmental stewardship motivation | Gottwald et al. 2021a, Gottwald and Stredman 2020 |
| Empirical application and synthesis | <p>4 Integrating meaningful places into Geodesign workshop</p> <p>Proposal of integration into spatial planning</p> | <ul style="list-style-type: none"> Geodesign workshop Survey, observation, group reflection Statistical analysis | <ul style="list-style-type: none"> PPGIS and Geodesign connected and compatible through their spatial characteristics Wisdom of the crowd and local sense of place can be integrated into and enrich river landscape design processes Multiple benefits and guidelines for integration of sense of place into landscape planning | Gottwald et al. 2021b |

Figure 2. Research objectives, structure of dissertation, and key results

Table 1. "Meaningful places" indicator assessing senses of place through a PPGIS survey.

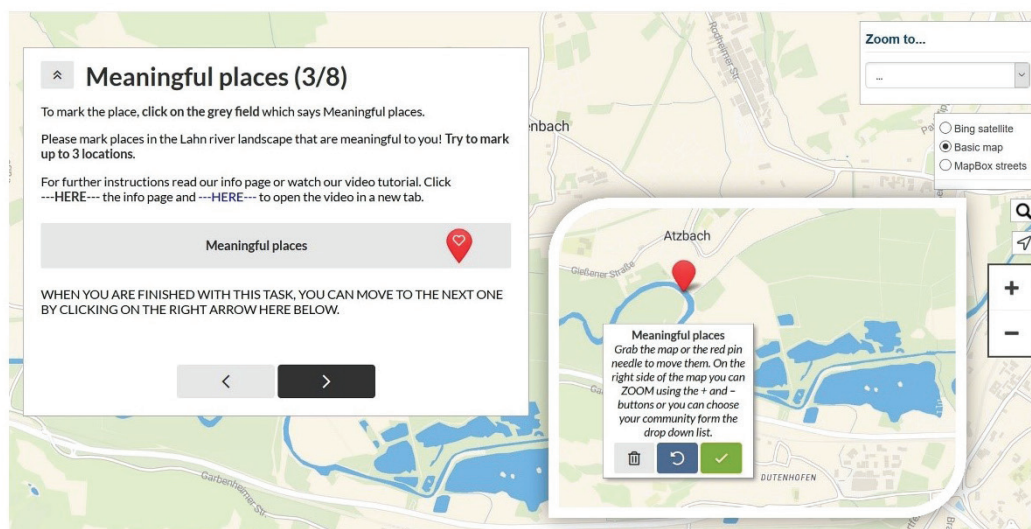
| Sense of place variables | Types of questions | Measured items |
|---|---|--|
| Place attachment <i>Emotional dimension</i> | 5-point Likert scale | Place identity: "I am very attached to this place"; "This place means a lot to me"; "I identify strongly with this place"; "I feel this place is part of me." Place dependence: "No other place can compare to this one."; "I wouldn't substitute any other place for doing the types of things I do here"; "This place is the best for what I like to do"; "I get more satisfaction out of being here than at any other place" "I feel happiest when I'm at this place" |
| Place meanings <i>Cognitive dimension</i> | Cultural ecosystem services measured through multiple choices question Free listing exercise | Aesthetic appreciation; Cultural heritage; Nature experience and education; Spiritual services; Inspiration; Biodiversity; Natural significance; Social relations; Recreation „Why is this place meaningful to you?" |

synthesis, including different methods and resulting in four publications, which will be briefly presented below (figure 2):

Article I, "Using meaningful places as an indicator for sense of place in the management of social-ecological systems" (Knaps et al. 2022) establishes the "meaningful places" indicator as an approach to spatially assess sense of place in planning contexts, while accounting for the concept's complexity including cognitive and emotional dimensions. The indicator development and evaluation of its first applications were guided by established benchmarks, such as (1) being rooted in a strong scientific basis, (2) optimized for an intended purpose, (3) measurable, (4) transferable, and (5) relevant (Jackson et al. 2000, Niemeijer and de Groot 2008, Gudmundsson et al. 2016, van Oudenhoven et al. 2018).

Article II, "Combining sense of place theory with the ecosystem services concept: empirical insights

and reflections from a participatory mapping study" (Gottwald et al. 2022), applies the indicator at the Lahn region using a Public Participation GIS (PPGIS) method. The application of the "meaningful places indicator" within the dissertation, integrates the emotional dimension of sense of place through the concept of place attachment based on spatial and mostly non-spatial scales of place attachment representing the dependence and identity dimensions (Williams and Vaske 2003, Stedman 2006, Raymond et al. 2010). It acknowledges strong relation between place attachment and meanings (table 1). Place meanings describe the cognitive dimension of sense of place. They were operationalized using two approaches: first, a free listing approach assessing meanings qualitatively (Wartmann and Purves 2018), and second a list of cultural ecosystem services (CES), which draws on established CES lists in spatial assessments (Plieninger et al. 2013, Brown and Fagerholm 2015). Local citizens in the river Lahn

**Figure 3.** PPGIS survey interface, screenshot from <https://app.maptionnaire.com/en/800/>, accessed 12.11.2020

landscape located their meaningful places on an online digital map (figure 3). Statistics, such as correlation, chi-square and ANOVA analysis, were used to assess relations between (1) free-listed meanings and CES, and (2) meanings, attachments and physical environment and social settings.

Article III, “Preserving ones meaningful place or not? Understanding environmental stewardship behaviour in river landscapes” (Gottwald and Stedman 2020), further analyses the data on sense of place in the study region with regard to citizens’ local environmental stewardship behaviour. It drew on the PPGIS survey data on willingness to act at the meaningful place, participants’ socio-demographic background, and psychological attributes, such as environmental citizenship. Stepwise linear regressions revealed explanatory variables for potentially protective behaviours at individual meaningful places.

Article IV, “Integrating sense of place into participatory landscape planning: merging mapping surveys and geodesign workshop” (Gottwald et al. 2021), presents and reflects on the integration of the PPGIS survey results, specifically the meaningful places indicator, into a Geodesign workshop with eleven members of administrative institutions from local to national level. The Geodesign workshop consisted of two main steps: first, defining priority areas for nature, agriculture and recreation based on the meaningful places assessed by local citizens, and second designing nature-based solutions in two different spatial scenarios considering the previously highlighted areas. The digital map interface enabled participants interacting with the meaningful places as identified by local citizens, to draw coherent clusters of meaningful places, and finally to describe the clusters in terms of meanings and discuss potential development and preservation strategies. Workshop participants were asked to evaluate different aspects of the workshop using a short survey and a deliberative feedback session. Analysis of qualitative/narrative data (observations) and numerical data (evaluation survey) gave evidence on the potential of integrating spatially explicit information on citizens’ sense of place into a deliberative participatory process of river landscape planning.

4 Key results

4.1 Characterisation of meaningful places

The application of the indicator demonstrated that the assessment of specific place meaning types is important to better understand relationships between sense of place and socio-economic and biophysical variables. Second, the use of free-listing approaches and an established list of Cultural Ecosystem Services (CES) demonstrated that many free listed meanings could be found within the CES list (figure 4). Yet, relationship meanings, such as *Heimat* or memories, which appeared relatively often and with high attachment intensity among the free listed meanings were not reflected within the CES meaning list. Third, synergies can be found between the CES concept and the sense of place theory. The CES concept offers experience and expertise for spatial assessments, for example, in form of established lists, which is lacking in spatial sense of place research. Conversely, sense of place offers a theoretical basis for understanding human-environment relationships (Gottwald et al. 2022).

4.2 Meaningful places and their relation to environmental stewardship

Local environmental stewardship, or the willingness to preserve a meaningful place, is a function of people-place relations (strength of attachment and number of perceived values), and the person’s capacity to act (as defined by proxy of previous engagement experiences). People-place relations are the most powerful predictors for environmental stewardship, namely the intensity of place attachment, the number of associated meanings, and the presence of nature related meanings (Gottwald and Stedman 2020). Relationships between sense of place and the biophysical place attributes are significant, but the predictive power of personal motivation (e.g., environmental citizenship) is much smaller.

The results indicate the crucial role of place meanings (figure 5), illustrating that place meanings, such as the type of meaning and the amount of attributed meanings, are related to all considered variables: physical environment, personal attributes, place

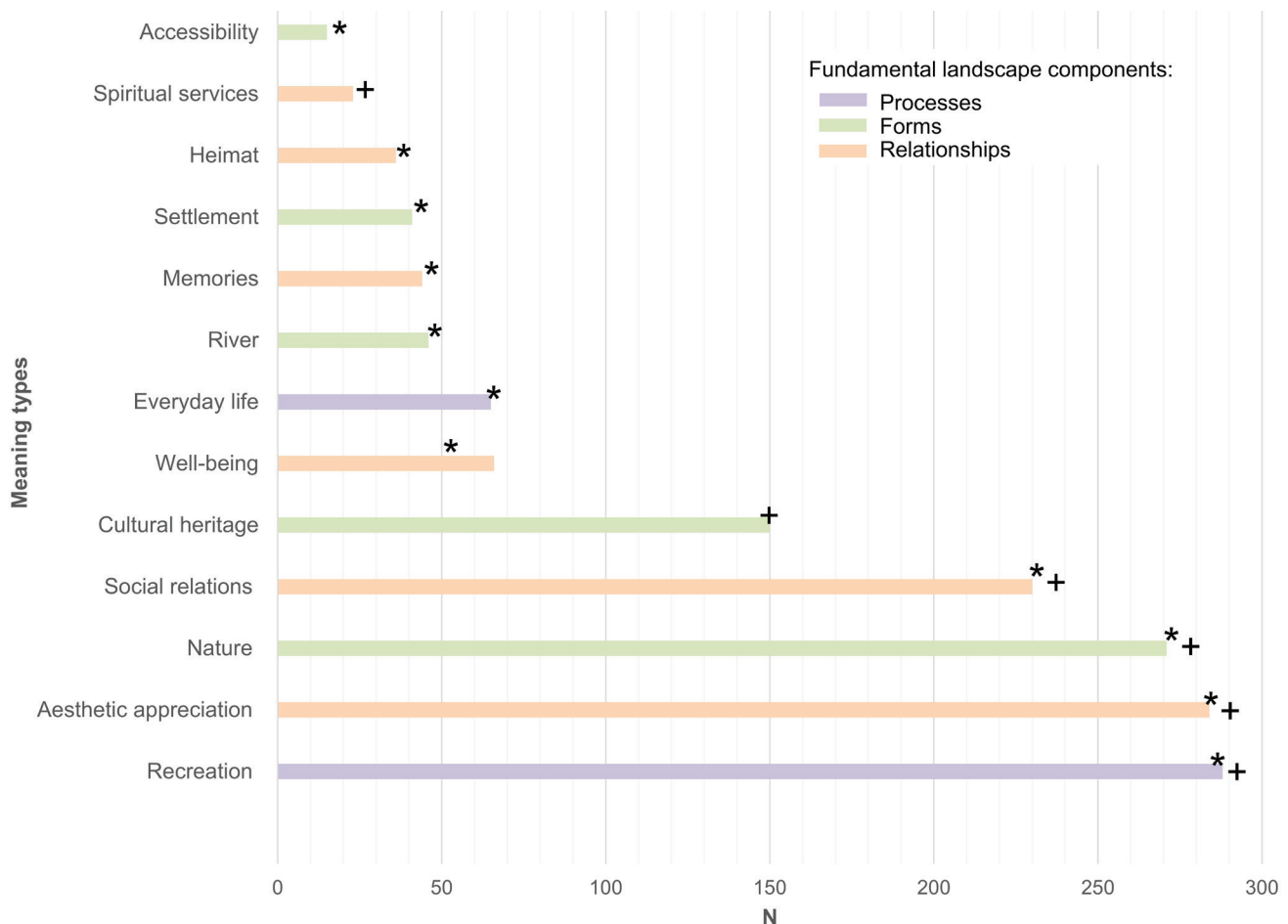


Figure 4. Frequency of place meaning types, note: *based on free listed place meanings, +based on CES place meaning list, +* combination of both, (Gottwald et al. 2022)

attachment and environmental stewardship. It can be seen as a mediator between the physical environment and place attachment, and environmental stewardship, as well as between personal attributes and place attachment, and environmental stewardship if analysed for difference between willingness to act at *all* places and act at selected places.

4.3 Integrating sense of place into a Geodesign Workshop

The results of the workshop evaluation suggest that (1) the meaningful places added local knowledge to the design process that workshop participants did not hold, which was illustrated by discussions about areas that would have been overlooked otherwise. (2) Discussion about the potential meanings of meaningful places cluster spurred discussion among participants. Yet, it was criticized that we did not disclose the specific meanings of each place. (3) Despite the newness of the sense of place theory

for the workshop participants, the majority considered the information interesting and relevant for the planning process (Gottwald et al. 2021).

Local knowledge is a very important ingredient for successful planning process and cannot be fully provided by external planners. This study showed that the lack of place-based local knowledge of some participants could be compensated not only by the expertise of some other participants, but also by the sense of place information provided. They were surprised about some locations, where meaningful places clustered, which was expressed through statements such as “this means that they [survey respondents] also move around here because it is green and they can go there”. The integration of sense of place into the workshop was successful, because participants were able to work with the data, the data spurred discussions, and because participants clearly considered local citizen’s perspective and place relation, and the majority evaluated the

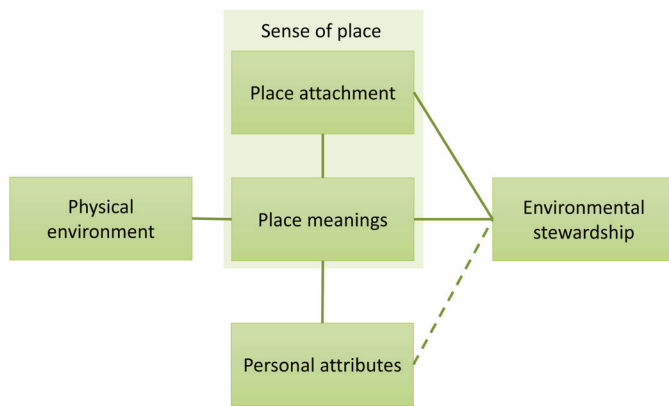


Figure 5. Relation between variables of sense of place, physical environment, personal attributes and environmental stewardship, Note: dashed line - relation only for respondents who are willing to take action at all of their located meaningful places

received information on sense of place as both interesting and relevant for their work. This encouraged the design of a proposal form integrating sense of place into a landscape planning process (Gottwald et al. 2021).

4.4 Proposal of a participatory spatial planning concept for designing NBS in river landscapes – combining instrumental and deliberative approaches

The results suggest that PPGIS survey and Geodesign workshops and their combination are suitable participatory methods. Integrating sense of place may have various benefits at different stages. For example, within the scoping phase it could influence the overall framing of the planning problem and highlight the specific meanings planners could shape. In the assessment phase, it provides a complementary information layer to the usually employed objective, biophysical indicators, and could improve potential conflict assessment between social natural landscape components. In the development of the draft plan, the Geodesign workshop may provide a platform for local stakeholder, planner and decision maker. Environmental stewardship information may be used here and citizens contacted directly for collaboration purposes through the information they have provided in the survey. Integrating sense of place in the final plan may strengthen the identification with the plan and hence decrease opposition against it. Finally, a continuous assessment of sense of place may provide insights on the impact of the

specific actions on people-place relationships and be used to adapt the plan in next iterations (Gottwald et al. 2021).

5. Conclusions

5.1 Contributions of this dissertation

This dissertation contributes mainly to place research, research on sense of place and people-place relationships. It addressed existing knowledge gaps, such as the lack of understanding of people's emotional connectedness to river. Based on the case study example of the Lahn river landscape, this work provides insights on citizens' sense of place and how sense of place relates to biophysical and personal attributes (Gottwald et al. 2022), as well as local environmental stewardship (Gottwald and Stedman 2020). Moreover, it advocates for a stronger focus on place meanings in sense of place research, as these have shown to occupy a central role in assessing sense of place and relating it to the social and environmental context, as well as to environmental stewardship.

Regarding the methodological contribution, the dissertation introduced a methodological approach to spatially and holistically assess sense of place. The meaningful place indicator includes the two main sub-concepts of sense of place, namely place attachment and place meanings. Using a participatory mapping method, respondents could rate their place attachment intensity for the different dimensions and items tested and established through various previous studies and additionally indicate their specific place meanings, combining free-listing and established CES lists. Additionally, it provides an opportunity to refer to any specific place of the individual beyond predefined administrative borders, such as neighborhood limits or parks (Gottwald et al. 2022).

Furthermore, this work illustrates potential benefits by incorporating sense of place in spatial planning. Thus, it stimulates the discussion to enhance formal and informal planning processes and instruments, such as German landscape planning towards a more a participatory approach

Finally, this work illustrates potential benefits by incorporating sense of place in spatial planning. Thus, it stimulates the discussion to enhance formal and informal planning processes and instruments, such as German landscape planning towards a more a participatory approach (Gottwald et al. 2021).

5.2 Recommendations for planning practice

Based on the results presented and discussed in my dissertation, I would like to derive five concrete and actionable recommendations for landscape planners and managers (figure 6):

First, planners should make a conscious decision on integrating sense of place. While the advantages have been highlighted, such integration of sense of place requires additional work and particular skills. Therefore, planners should consider the effort of implementing sense of place information if the project changes the landscape in ways impacting how people can use and experience their environment, such as construction of longitudinal dams. For example, plan proposal that consider changing accessible elements to the river would benefit from the integration of sense of place. In case planners decide to work with the methods presented here, resources,

skills and institutional motivation should be present and made available in order to successfully assess and integrate the information.

Second, planners should assess and integrate sense of place in the earliest stages, as it can already inform the scoping process (Gottwald et al. 2021).

Third, planners should consider the appropriate methodological approach for the assessment and integration of sense of place. There are different methods for assessing sense of place, for an overview see Raymond and Gottwald (2020). Using map based, digital and participatory methods offer a lot of advantages. They are spatially explicit, offering a good fit with current planning practices, and provide a simple, communicative tool; in particular, PPGIS tools are able to reach a wide audience helping to integrate people which are underrepresented in other formats by providing a non-confrontational platform, which is time and place independent (Garcia et al. 2020). Solely assessing sense of place through for example PPGIS is not sufficient, it needs to be combined with other participatory methods, such as the presented Geodesign workshop (Gottwald et al. 2021).

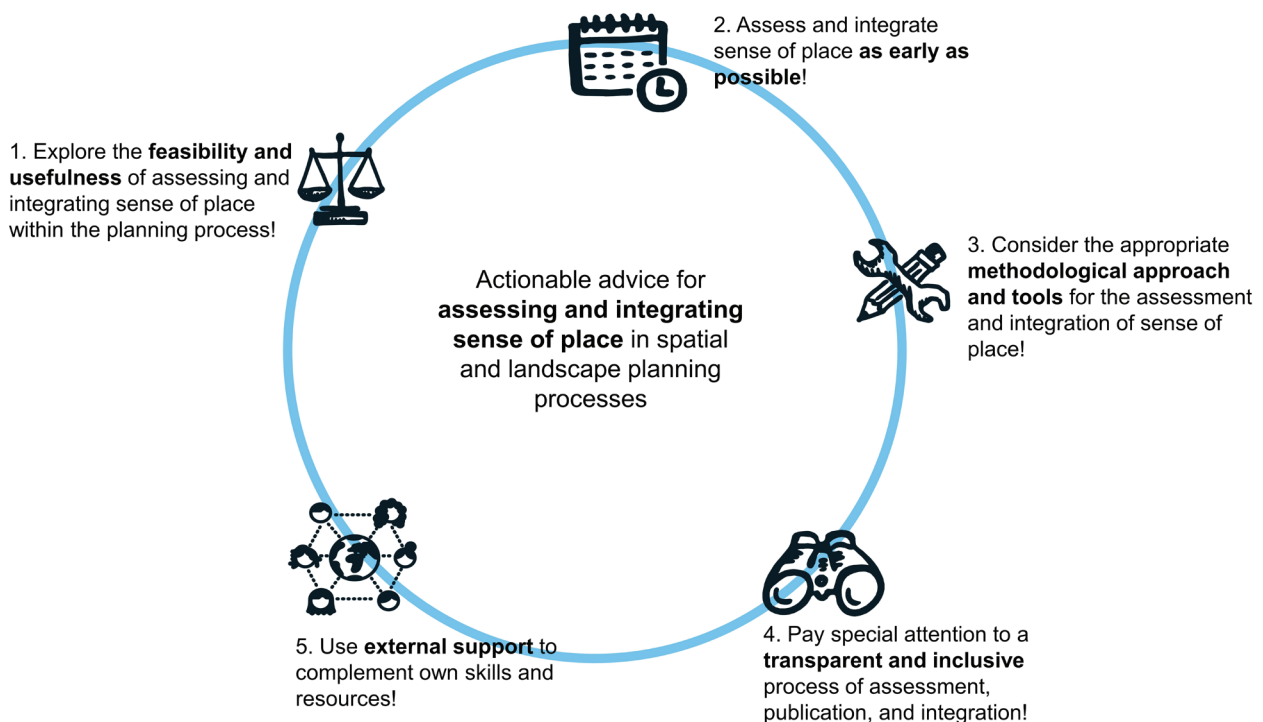


Figure 6. Actionable advice for planners around using and integrating sense of place in planning processes

Fourth, planners should pay attention to a transparent and inclusive process of assessment, publication, and integration, including a geographic and socio-economic representativeness. To do so, a random sample could be drawn, making use of a reliable data source, such as communal registers. Otherwise, an open invitation to the public could be published specifically at places reaching people that are usually underrepresented, such as younger people and minorities. In case of employing digital methods, potential challenges arising through the digital divide should be considered (Garcia et al. 2020). This can be done by adapting the assessment tool, such as the PPGIS survey, to the intended user groups, for example, by taking into account the size of letters or using intuitive symbols for different age groups (Gottwald et al. 2016). Further, the data should be made available to the public and provided in a format, which fits the purpose and receivers, for example, using easy to read hot spot maps.

Fifth and finally, planners should use external support to complement their own skills and resources. The analysis of sense of place information can reach from geostatistical to statistical analyses, including descriptive statistics and geo-visualizations, as well as more exploratory statistics (Gottwald and Stedman 2020, see e.g., Gottwald et al. 2022). Further, these need to be integrated into participatory processes (Gottwald et al. 2021). There are companies specialized in leading through modern participation process using PPGIS methods, as for example demonstrated in Gottwald and Helle (2018).

5.3 Future research directions

Finally, I would like to highlight two major future research directions that directly build on the theoretical and methodological contributions. First, the meaningful place indicator and its application could be further developed. Integrating the findings from Gottwald et al. (2022) the provided list of place meanings in the survey, which had been based on CES only, could be extended by relationship meanings. Further, the geometry needs to be acknowledged more explicitly. In spatial terms, people are not necessarily connected to a single point, but to a more extended area or route. Although this dissertation was able to respect the specific location of

the meaningful place, it did not consider the spatial extension or scale of attachment. There are several methods available to assess sense of place across different geographic scales, such as participatory mapping, focus groups or spatial navigation methods (Raymond and Gottwald 2020). Further, the spatial extension could be integrated in the analysis of the data by asking if the place represents a single point, a route or an area. Finally, digitalization provides yet another set of methodological possibilities to explore sense of place, for example using mobile phone application (Bell et al. 2015) and big data from social media platforms (Guerrero et al. 2016, Oteros-Rozas et al. 2017). Yet, within my dissertation I could show the tight relation between CES and place meaning types related to forms and processes. This could be a starting point for investigating more in depth how geotagged social media data could be used to explore sense of place.

Second, until recently most research on sense of place, focused on the premise of static and immobile lifestyles, assuming an important role of continuity, enclosure, and the so-called genius loci for the creation of place meanings. This theoretical approach, also called essentialism (Lewicka et al. 2019), has been recently contested, because societies are becoming more mobile, including diverse and new types of mobility (Büscher and Urry 2009), facilitated through digital advancements, and in consequence, modes of attachment change. In response, studies have highlighted attachments and meanings created and understood through more progressive approaches (Di Masso et al. 2019, Lewicka et al. 2019). These account for a dynamic lifestyle and assume mobility as the natural human condition (Massey 1991), understanding places as open, modern, and heterogenic in their physical, social and historical features (Lewicka et al. 2019). The relationship between mobility and sense of place is complex, it can be seen as opposing or complementary (Gustafson 2001). Substantial knowledge gaps exist regarding scientific theoretical understanding and empirical evidence on the intersection between mobility patterns and sense of place. Empirical studies are still scarce that (1) consider people's everyday life settings and environments, (2) combine both essentialist and progressive approaches as complementary, and (3) account for the different types of mobility,

such as corporal travel, physical movement of objects, imaginative travel, virtual travel and communicative travel (Büscher and Urry 2009, Di Masso et al. 2019). Until now, theoretical advances are missing empirical evidence and provide many opportunities for further theoretical development. The here presented meaningful place indicator could be applied to integrate people's every day environments into the assessment of sense of place. Due to their place-based focus, methods such as PPGIS and Geodesign are suitable to integrate mobility aspects.

About this work

This work is a synthesis of a cumulative dissertation for the degree of doctor of engineering (Dr. Ing.), entitled "Sense of Place in Spatial Planning: Applying Instrumental and Deliberative Approaches at the River Lahn", submitted to the Institute of Environmental Planning, Faculty of Architecture and Landscape, in 2021. This synthesis is an extract from this thesis, published at the institutional repository of the Leibniz University Hannover for long-term archiving (DOI: <https://doi.org/10.15488/11500>)

It comprises results of four published articles:

Knaps, F., Gottwald, S., Herrmann, S., Albert, C. (2022): Using meaningful places as an indicator for sense of place in the management of social-ecological systems [Manuscript submitted for publication]. Institute for Environmental Planning, Leibniz University Hannover.

Gottwald, S., & Stedman, R. C. (2020). Preserving ones meaningful place or not? Understanding environmental stewardship behaviour in river landscapes. *Landscape and Urban Planning*, 198(103778). <https://doi.org/10.1016/j.landurbplan.2020.103778>

Gottwald, S., Albert, C., & Fagerholm, N. (2021). Combining sense of place theory with the ecosystem services concept : empirical insights and reflections from a participatory mapping study. *Landscape Ecology*, 0123456789. <https://doi.org/10.1007/s10980-021-01362-z>

Gottwald, S., Brenner, J., Albert, C., & Janssen, R. (2021). Integrating sense of place into participatory landscape planning: merging mapping surveys and geodesign workshops. *Landscape Research*. <https://doi.org/10.1080/01426397.2021.1939288>

Acknowledgements

This research was funded by the German Federal Ministry for Education and Research, Bundesministerium für Bildung und Forschung (BMBF), through a grant for the PlanSmart research group (Funding Code: 01UU1601A), by the Graduate Academy of the University of Hannover for the data assessment (Project Number 60470376). I would like to thank all citizens who spent

time and effort to respond to the survey, as well as all participants of the workshop. I would like to thank Birgit Böhm from the MenschUmwelt consultancy for professional facilitation of the workshop. Further, I would like to thank to the many colleagues that made this work possible, in particular my supervisor and co-supervisor Christian Albert and Ron Janssen, our project leader Barbara Schröter, and my PlanSmart Phd fellows Jennifer Henze, Paulina Guerrero and Mario Brillinger. Special thanks go to the other co-authors of the published articles within this dissertation: Richard Stedman, Nora Fagerholm, and Jana Brenner.

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