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# Generating Meaningful Landscapes for Globalized Mobile Societies - Pushing an International Research Agenda

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## **Abstract (244 words)**

### **Context**

People's well-being is influenced by the ability to establish a bond with a place and attach meanings to it. Many studies show that the longer people reside in a place, the stronger their place attachment becomes. In today's global societies, the length of residency is vastly reduced because of, e.g., individualistic lifestyles, global workplaces and forced migration (e.g., caused by war or climate change). This trend challenges landscape science: people increasingly need places (landscapes) that can be appropriated easily and quickly by many cultural groups. At the same time, however, these places should not simply become trivial and exchangeable.

### **Objectives**

Place attachment/place making studies have become popular in landscape science. However, we have identified a deficit in both the development and application of theory. The research agenda proposed here shall initiate a fundamental discourse on balancing the demands of a global society with the requirements for sustainable landscapes.

### **Methods**

Literature review

31     **Results/Conclusions**

32     We propose a research agenda with the following pillars: (1) to expand theories and concepts of place  
33     attachment, to accommodate the new and unprecedented drivers generated by 21<sup>st</sup> century mobile societies,  
34     (2) to improve the understanding of how landscapes afford place attachment and identity-building in both  
35     long- and short-term resident and migrant groups, and (3) to establish scientific knowledge on the inclusive  
36     role of landscapes. Proposed research methods range from qualitative social science studies, in-situ  
37     interviews and psychological experiments to the use of social media data and 3D landscape visualization  
38     tools.

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## 1. Introduction

It has been widely recognized by geographers and sustainability scientists that landscapes<sup>1</sup> are coupled human-environment systems, most of which, broadly speaking, are cultural landscapes (Bürge et al., 2015a, b; Kienast, 2014; Turner and Gardner, 2015; Verburg et al., 2009, 2013a, b; Wu, 2010, 2013). There is a broad consensus that direct place experiences of these cultural landscapes – together with social integration in the neighbourhood and the local community – defines a sense of place and the strength of place attachments (Low and Altman, 1992; Lewicka, 2011, 2013; Scannell and Gifford, 2010; Risbeth and Powell, 2013; Theodori, 2001). Research shows that place attachment is a key component of well-being, involving feelings of safety, belonging, control, self-esteem and a meaningful life (Scannell and Gifford, 2017). Advocates of the ecosystem services concept consider place attachment, sense of place and place identity as subclasses of cultural ecosystem services (<https://cices.eu/resources/>; Hausmann et al., 2016; Lengen and Kistemann, 2012; Wartmann and Purves, 2018). Stobbelaar and Pedrolí (2011) emphasize the landscape component as an important pillar or bearer of the identity-building process. Brown et al. (2015) attempt to add a spatially explicit component to the concept by mapping place identity using a participatory GIS. Similar attempts are reported by Kayhko et al. (2011) and Hernandez et al. (2007).

Although place attachment research explicitly takes into account how people who are mobile develop a sense of place (Gustafson, 2009), so far the research has not been capable of assessing the impacts of the enormous post-1980 globalization processes and the post-2000 migration patterns caused by megatrends such as the global decoupling of capital (land) and people, the global accessibility of places, global communication technologies and increasing migration of refugees of war and climate change. These megatrends generate mobile societies that entail a strongly reduced length of residency, frequently characterized by an increasing number of people that flip back and forth between the landscapes of childhood and landscapes with no correlation to early phases of socialization or other decisive phases in life (Gustafson, 2009; Kienast et al., 2007; Lewicka, 2011, 2013; Risbeth and Powell, 2012). Manzo et al. (2008) investigated the place attachment of highly mobile people in low-income urban settings. Buijs et al. (2009), Kloek et al. (2015) and Peters et al. (2016) presented interesting comparative studies on how immigrants and natives in the Netherlands, the US, Poland and Germany use “green” areas for recreation. The landscape demands of migrants in Chinese cities were analyzed by Qian et al. (2011). A recent review by Egoz and De Nardi (2017) sheds light on the role of landscapes in promoting inclusion. Migration and establishment of place identity from a more historical perspective were studied by Drozdowski (2007) and by Zückert and Heinkircher (2016).

Lewicka (2011) found in a survey that “mobility, operationalized by the number of moves, number of different cities in which one lived, and whether one worked abroad or not, contributed to place attachment much less than the pure measure of residence length in the present place. Evidence exists that mobility may change the form of place identity.” Based on the dual-process theory of higher cognition, Raymond et al.

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<sup>1</sup> *Definition of “Landscape” according to the European Landscape Convention (ELC):* “Landscape” means an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors. Often the term socio-ecological system (Verburg et al., 2009, 2013a; Haberl et al., 2011) is used as synonym for “Landscape”. *Definition of Landscape Character:* The “distinct and recognizable pattern of elements, that makes one landscape different from another” (Swanwick, 2002).

(2017) hypothesized that the two types of cognitions – fast and slow – each have an as yet unknown influence on how people establish a sense of place. For the topic of migration, this insight is crucial and could open a broad field of explanation for how quickly place attachment is established and at what scale. Feldman (1990) found that with increasing mobility the attachment to concrete places decreases and is replaced by a “settlement identity”, meaning an attachment to general classes of places rather than to a place endowed with specific social or individual meanings. If this is true, we must indeed initiate a fundamental discourse about the “landscape needs” of mobile societies; we must validate and expand the current theories and concepts of place attachment.

## **2. What We Know: Space – Place and Landscape Negotiation**

Our considerations are embedded in a well-established theoretical concept of the landscape formation process (Fig. 1) (Kienast et al., 2007; Hunziker et al., 2007). One of the core theories of this concept is the space-place theory (Bourassa, 1991; Hunziker et al., 2007). This divides the conceptual framework into two components as follows.

insert Fig. 1 here

On the left-hand side of Figure 1 is the physical environment or “space” component, represented by physical elements such as urban fabric, infrastructure, fields, roads, etc. The patterns and processes of the “space” side are well understood and are covered in the landscape ecology literature as well as in the ecosystem service concept (Burkhard et al., 2012; Haines-Young et al., 2012; Helfenstein and Kienast, 2014; Kienast et al., 2009, 2015; Turner and Gardner, 2015; Verburg et al., 2013a, b). The right-hand side (“place”) is the life-world in a philosophical sense. Here, people assign and share cultural, social or individual meanings to landscape elements. In agreement with the current ecosystem service literature, the “place” side of the figure encompasses cultural services. Place meaning supports the identity regulation of individuals and societal groups. The unique setting of perceived and interpreted landscape elements forms the landscape character of a given area (Haines-Young et al., 2007; Swanwick, 2002).

The process that leads from space to place is often referred to as “place-making”, i.e., the societal construction of place. The latter depends on (1) how people appropriate the physical environment by interactions, and (2) how they socially integrate into the neighbourhood and local community. It is broadly accepted that both factors are influenced by length of residency (see, e.g., Levicka, 2011). An essential component of place making is how people perceive landscapes. Landscape perception has been embedded in well-known theoretical concepts described by, e.g., Dramstad et al. (2001), Fry et al. (2009), Hunziker et al. (2007) and Kaplan and Kaplan (1989). In accordance with current concepts of landscape perception research, we distinguish three pillars that govern perception: (1) a universal/biological/evolutionary pillar, (2) a socio-cultural pillar and (3) an individual pillar. It is debated how strongly each pillar contributes to perceiving the landscape. Pillar 1 is the most contested (Hägerhäll et al. 2018), stemming from theories such as the savanna theory (Appleton, 1975; Orians, 1986), the prospect-refuge theory, and Kaplan and Kaplan’s (1989)

114 information processing theory. These theories claim that a certain part of people's behaviour is universal  
115 (biologically/evolutionarily determined). The research in pillar 2 suggests that perception is the result of  
116 socio-cultural influences and agreements (e.g., Buchecker, 2009; Kianicka et al., 2006), while pillar 3  
117 suggests that individual attitudes and preferences, but also individual outdoor activities, shape perceptions of  
118 landscapes (Hunziker et al., 2007; Kienast et al., 2015).

119 The process of assigning meanings to landscapes is described in Brandenburg and Carroll (1995), Stedmann  
120 (2008) and Brehm et al. (2013). Place meanings represent cognitions that individuals or groups associate  
121 with an area, rather than personal bonds such as place identity and place attachment (Joergensen and  
122 Stedman, 2006; Casakin et al., 2008). The latter two concepts clearly belong to the "place" side of the  
123 conceptual model, i.e., the side that describes how landscapes are experienced by individuals.

124 As we proceed in a clockwise direction in Figure 1, we enter the negotiation realm. Based on life experiences,  
125 individuals, groups or entire societies fulfil their needs and determine their landscape demands, which are –  
126 in an ideal case – then communicated via multiple forms of landscape negotiation into planning action or  
127 changes in land use. We observe that these landscape negotiations go far beyond functional aspects and are  
128 increasingly centered around place meanings, involving societal discourses on lifestyles (Stroebele and  
129 Hunziker, 2017). As shown by, e.g., Devine-Wright and Batel (2017), place attachment and meanings play  
130 an important role in accepting or rejecting infrastructure projects. These demands, which are strongly  
131 influenced by meanings, must be balanced with "the capacity of a landscape to consistently provide long-  
132 term, landscape-specific ecosystem services essential for maintaining and improving human well-being"  
133 (Wu, 2013). The aforementioned link of meaningful landscapes to sustainability science was also broadly  
134 discussed by Opdam et al. (2018).

135 Landscape demands are not by any means the only interests that enter the landscape negotiation arena. Since  
136 this paper is concerned with landscape aspects, we do not examine these issues more deeply but merely  
137 mention economic pressures or policy decisions as external use interests that are as important as landscape-  
138 related demands. Negotiation processes differ widely depending on the planning culture of a region. They  
139 may be top-down approaches, where planning action is delegated to technical experts trying to fulfil the  
140 demands of the population. Many countries also have institutionalized forms of bottom-up participation  
141 (Fürst et al., 2010). Alternatively, there is a wide range of spontaneous self-organized planning processes  
142 (Portugali, 2000; Portugali and Alfasi, 2008), where citizens initiate planning activities individually, as many  
143 cities have become unplannable (Portugali, 2000).

144

### 145 **3. What We Do Not Know: Will Mobile Societies Be Able to Participate in an Active Discourse on** 146 **Landscape Meanings?**

147 We know that, over the centuries, the process described in Fig. 1 has fulfilled its function in most regions of  
148 the world by generating a wealth of authentic and fascinating cultural landscapes. Contemporary migratory  
149 effects – whether through voluntary or forced migration – cause some landscapes to lose their resident  
150 population. At the same time, the landscapes of the inward migration regions must generate livable

151 environments satisfying a broad array of demands. Their success in providing landscapes that are meaningful  
152 to all groups depend on the following questions:

153

- 154 • Will there be an active dialogue on landscape issues between the increasingly mobile landscape  
155 users and the (long-stay) providers?
- 156 • How will meanings be assigned to landscapes and be socially shared in mobile societies, and by  
157 whom?
- 158 • Which landscape elements provide options or necessary affordances to allow places to be  
159 appropriated by migrant groups?
- 160 • Will there be active participation and self-organization in landscape development? Are planning  
161 agencies aware of the needs of the migrants and how can migrants be involved in these processes?
- 162 • Can landscapes maintain their inclusive and integrative role in an increasingly urban, suburban and  
163 virtual environment?
- 164 • Will landscapes become trivial and exchangeable due to these processes or could their meaning-  
165 making function even benefit from the mobile society?

166

167 These unsolved questions for both the theory and practice of landscape stewardship (Penker et al., 2013) and  
168 people's well-being (Buchecker and Degenhardt, 2015) are the starting points of this framework proposal.

169

#### 170 **4. Research Challenge: The Formation of Place Attachment in Mobile Societies**

171 The questions raised above challenge the model in Fig. 1 considerably. Is it robust enough and sufficiently  
172 process based to mimic landscape development under considerably changed boundary conditions? To answer  
173 this question, a multidisciplinary research effort should be initiated, considering hundreds of individuals  
174 having different mobility patterns, as shown in Fig. 2.

175

176 insert Fig. 2 here

177

178 This setting is in line with the analyses of, e.g., Gustafson (2009), Lewicka (2013) and Peters et al. (2016),  
179 who studied place attachment in mobile segments of the population. Table 1 highlights some examples of  
180 population segments that are highly relevant for studying place attachment in mobile societies. There should  
181 be a special focus on how mobile people perceive landscapes, either in terms of self-reflection (experiences  
182 and achievements) or social integration (values, norms, symbols and meanings) (Hunziker et al., 2007;  
183 Ströbele & Hunziker, 2017). In addition, focus-group studies should gather the visual, sensual and social-  
184 psychological landscape demands of the target groups.

185

186 insert Table 1 here

187

188 The following foci should be of special relevance in the proposed research agenda.

189

190 *Landscape meanings and the role of early phases of socialization:* It would be useful to know what  
191 landscape elements carry negative or positive connotations, depending on where people grew up, where they  
192 are currently living and what outdoor activities they engage in. One might concentrate on well-established  
193 perception concepts such as authenticity, fascination and the four Kaplan and Kaplan dimensions of  
194 complexity, coherence, mystery and legibility, as well as landscape beauty (Hunziker et al., 2007; Kienast et  
195 al., 2015), or, it might be challenging to explore the role the remembered physical space of childhood and  
196 other decisive phases in life play in landscape perception and forming place meanings in new places (Adevi  
197 and Grahn, 2012; Shamai, 1991; Sebba, 1991). Considering the currently increasing forced migration,  
198 special attention should be given to war refugees. Links to trauma research are possible and should be  
199 intensively sought. The papers of Taylor (2008), Risbeth and Powell (2013), Powell and Risbeth (2012) and  
200 Egoz and De Nardi (2017) give some indication of how this research could be focused and directed towards  
201 the novel theme of the role of landscapes in facilitating inclusion in (forced) migrations.

202

203 For all mobile groups, the meanings of the landscape elements seen or experienced at the place of origin and  
204 at the current place could be analyzed, as was done in an earlier study on local long-term residents and  
205 tourists in Alpine settings (Kianicka et al., 2006). This is aimed at identifying landscape elements with  
206 different physical appearances but similar self-related meanings in the new environment. Various forms of  
207 visualization should be explored to gain insight into various cognitive, psychological and cultural aspects of  
208 assigning meanings and establishing a bond with a place. Nowadays, such visualizations range from simple  
209 hand drawings to visual 3D video labs with devices to measure physiological reactions (Grêt-Regamey et al.,  
210 2013; Shinazi and Thrash, 2018).

211

212 *Social interactions (Manzo et al., 2006, 2008):* Despite the strong focus on landscape, we do not neglect the  
213 fact that place-identity development is strongly influenced by social networks, both at the individual and the  
214 community level. Some authors, (e.g., Hidalgo and Hernandez, 2001) even suggest that social interactions  
215 are more important than attachment to physical places. We argue that many social interactions evolve while  
216 engaging in landscape-related activities, such as gardening or taking part in outdoor activity groups, and that  
217 social interactions and landscape-related activities are mutually dependent on each other. As shown by  
218 several authors, leaving traces of one's own activities in a landscape can support place attachment and the  
219 identity-building process (Buchecker, 2009; Buchecker et al., 2003; Manzo et al., 2006). It would be  
220 interesting to investigate what activities are possible in the various study regions that allow mobile people to  
221 leave traces, thus appropriating places. In urban environments this could be activities such as urban  
222 gardening or ways of being involved in landscape stewardship. In rural environments it could consist of  
223 participating in farming activities or even having one's own piece of land. The latter has been suggested as a  
224 driver of place attachment by Jorgenson and Stedman (2006) (ownership predictor) and the former in a study  
225 by Mühlmann and Buchecker (2013).

## 5. Impacts

This research will improve our theoretical understanding of the landscape-forming processes of increasingly mobile, global societies. The findings will contribute considerably to the implementation of the recommendations of landscape conventions, (e.g., the European Landscape Convention (ELC)) and show how the public can be involved in a participatory way in protecting, managing and designing sustainable landscapes that balance demands and capacity of a landscape properly (Opdam et al., 2018; Wu 2013).

The research agenda should also be supported by the Global Land Project (GLP), the International Association for Landscape Ecology (IALE), the International Association People-Environment Studies (IAPS) and the Global Landscape Forum. The knowledge gained in the proposed research will not only be crucial for establishing and expanding theories of landscape experience and place attachment, but also for establishing novel forms of landscape planning, ranging from very formalized strategic master plans to spontaneous planning activities (Portugali and Alfasi, 2008). These planning activities should be able to incorporate – besides the current negotiation rules – the newly gained knowledge about the landscape demands of mobile groups and novel planning rules and incentives. Technically, the foreseen models come closest to the “Pimp your landscape” tool developed during an Interreg III A project (Fürst et al., 2010) or other multiple-criteria platforms, e.g., those described by Koschke et al. (2012), Brown and Robinson (2006) or Villa et al. (2014). Finally, the knowledge gained will contribute considerably to understanding the role of landscapes in the migration process. At present, leading think tanks such as the MPI (Migration Policy Institute) ascribe inclusive and integrative potential almost exclusively to urban areas. Investigating the inclusive potential of all landscapes – including rural areas – is considered an innovative step forward.

## 6. References

- Adevi AA, Grahn P (2012) Preferences for Landscapes: A matter of cultural determinants or innate reflexes that point to our evolutionary background? *Landscape Research* 37: 27-49.
- Bourassa S (1991) *The Aesthetics of Landscape*. Belhaven Press.
- Brandenburg AM, Carroll MS (1995) Your place or mine - the effect of place creation on environmental values and landscape meanings. *Society and Natural Resources* 8: 381-398.
- Brehm JM, Eisenhauer BW, Stedman RC (2013) Environmental Concern: Examining the Role of Place Meaning and Place Attachment. *Society & Natural Resources*, 26:5, 522-538.
- Brown DG, Robinson DT (2006) Effects of heterogeneity in residential preferences on an agent-based model of urban sprawl. *Ecology and Society* 11: Article 46.
- Brown G, Raymond C and Corcoran J (2015) Mapping and measuring place attachment. *Applied Geography* 57: 42-53.
- Buchecker M (2009) Withdrawal from the Local Public Place: Understanding the Process of Spatial Alienation. *Landscape Research* 34: 279-297.
- Buchecker M, Hunziker M, Kienast F (2003) Participatory landscape development: overcoming social barriers to public involvement. *Landscape and Urban Planning* 64: 29-46.
- Buchecker M, Degenhardt B (2015) [The effects of urban inhabitants' nearby outdoor recreation on their well-being and their psychological resilience](#). *Journal of Outdoor Recreation and Tourism*, 10, 55-62. doi: 10.1016/j.jort.2015.06.007



- Buijs AE, Elands BHM, Langers F (2009) No wilderness for immigrants: Cultural differences in images of nature and landscape preferences. *Landscape and Urban Planning* 91: 113–123.
- Bürgi M, Salzmann D, Gimmi U (2015a) 264 years of change and persistence in an agrarian landscape: a case study from the Swiss lowlands. *Landscape Ecology* 30: 1321–1333.
- Bürgi M, Silbernagel J, Wu J, Kienast, F (2015b) Linking ecosystem services with landscape history. *Landscape Ecology* 30: 11–20.
- Burkhard B, Kroll F, Nedkov S, Müller F (2012) Mapping ecosystem service supply, demand and budgets. *Ecological Indicators* 21: 17–29.
- Casakin HP, Kreidler S (2008) Place attachment as a function of meaning assignment. *OpenEnvironmentalSciences*, 2, 80–87, doi:10.2174/1876325100802010080
- Devine-Wright P, Batel S (2017) My neighbourhood, my country or my planet? The influence of multiple place attachments and climate change concern on social acceptance of energy infrastructure. *Global Environmental Change* 47: 110–120.
- Dramstad WE, Fry G, Fjellstad WJ, Skar B, Helliksen W, Sollund M-LB, Tveit MS, Geelmuyden AK, Framstad E (2001) Integrating landscape-based values—Norwegian monitoring of agricultural landscapes. *Landscape and Urban Planning* 57: 257–268.
- Drozdowski D (2007) A place called ‘Bielany’: negotiating a diasporic Polish place in Sydney . *Social & Cultural Geography*, 8:6, 853–869.
- Evans, JSBT, Stanovich KE (2013) Dual-Process Theories of Higher Cognition. *Advancing the Debate. Perspect Psychol Sci* 8(3): 223–241.
- Egoz, S, De Nardi A (2017) Defining landscape justice: the role of landscape in supporting wellbeing of migrants, a literature review, *Landscape Research*, 42:sup1, 74–89,
- Feldmann R (1990) Settlement identity: Psychological bonds with home places in a mobile society. *Environment and Behavior* 22: 183–229.
- Fry G, Tveit MS, Ode A, Velarde MD (2009) The ecology of visual landscapes: Exploring the conceptual common ground of visual and ecological landscape indicators. *Ecological Indicators* 9: 933–947.
- Fürst C, König H, Pietzsch K, Ende HP, Makeschin F (2010) Pimp your landscape - a generic approach for integrating regional stakeholder needs into land use scenario design and sustainable management support. *Ecology and Society* 15(3): 34.
- Grêt-Regamey A, Celio E, Klein TM, Wissen Hayek U (2013) Understanding ecosystem services trade-offs with interactive procedural modeling for sustainable urban planning. *Landscape and Urban Planning*, 109: 107–116.
- Gustafson P (2009) Mobility and Territorial Belonging. *Environment and Behavior* 41: 490–508.
- Haberl H, Fischer-Kowalski M, Krausmann F, Martinez-Alier J, Winiwarter V (2011) A Socio-metabolic Transition towards Sustainability? Challenges for Another Great Transformation. *Sustainable Development* 19: 1–14.
- Hagerhall CM, Sang AO, Englund JE, Ahlner F, Rybka K, Huber J, Burenhult N (2018) Do Humans Really Prefer Semi-open Natural Landscapes? A Cross-Cultural Reappraisal. *Frontiers in Psychology* 9: 822 DOI: 10.3389/fpsyg.2018.00822.
- Haines-Young R, Langanke T, Potschin M (2007) Landscape character as a framework for the assessment of environmental change. In: Petrosillo I, Muller F, Jones KB; et al (eds.): *Use of landscape sciences for the assessment of environmental security*. NATO Science for Peace and Security Series C-Environmental Security, pp. 165–174.
- Haines-Young R, Potschin M, Kienast F (2012) Indicators of ecosystem service potential at European scales: mapping marginal changes and trade-offs. *Ecol. Indicators* 21: 39–53.
- Hartig T, Korpela, K, Evans G, Gärling T (1997) A measure of restorative quality in environments. *Scaninavian Housing and Planning Research*, 14, 175–194.
- Helfenstein J, Kienast F (2014) Ecosystem service state and trends at the regional to national level: A rapid assessment. *Ecological Indicators* 36: 11–18.
- Hernandez B, Hidalgo MC, Salazar-Laplace ME, Hess S (2007) Place attachment and place identity in natives and non-natives. *J. Environmental Psychology* 27: 310–319.
- Hidalgo MC, Hernandez B (2001) Place attachment: Conceptual and empirical questions. *J. Environmental Psychology* 21: 273–281.
- Hunziker M, Buchecker M, Hartig T (2007) Space and Place – Two Aspects of the Human-landscape Relationship, in: Kienast F, Wildi O, Ghosh S (Eds.), *A Changing World. Challenges for Landscape Research*. Landscape Series, Springer, pp. 47–62.
- Jorgensen BS, Stedman RC (2006) A comparative analysis of predictors of sense of place dimensions: Attachment to, dependence on,

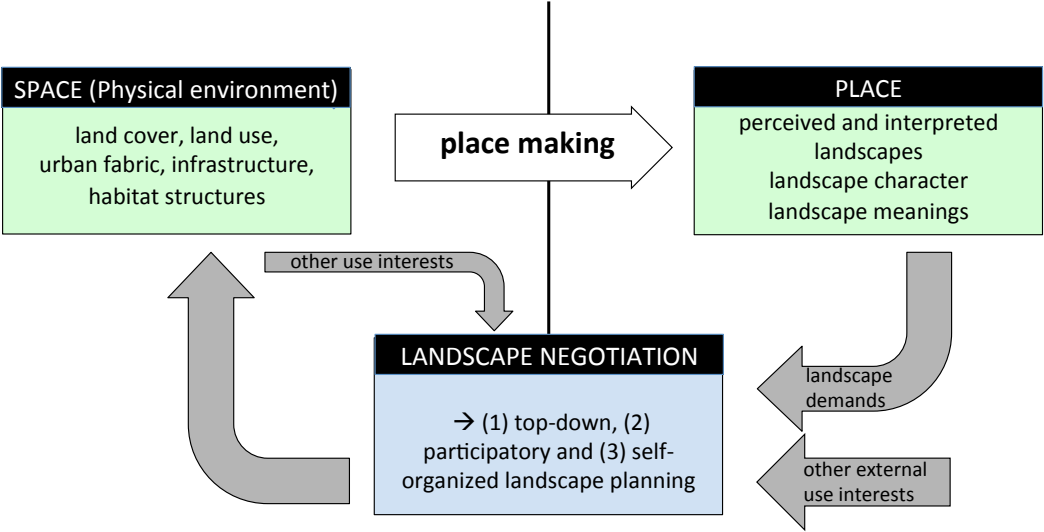
- and identification with lakeshore properties. *J. Environ. Manage.* 79:316–327.
- Kahneman D (2003) A perspective on judgment and choice: Mapping bounded rationality. *American Psychologist* 58(9): 697-720.
- Kaplan R, Kaplan S (1989) *The experience of nature. A psychological perspective.* Cambridge University Press.
- Kayhko N, Fagerholm N, Asseid BS et al (2011) Dynamic land use and land cover changes and their effect on forest resources in a coastal village of Matemwe, Zanzibar, Tanzania. *Land Use Policy* 28: 26-37.
- Kianicka S, Buchecker M, Hunziker M, Müller-Böker U (2006) Locals' and tourists' sense of place: a case study in a Swiss Alpine village. *Journal of Mountain Research and Development*, Vol. 26, No. 1, pp. 55-63.
- Kienast F (2014) Landscape - increasingly important for Environmental Decisions (in German). *GAIA* 23: 294.
- Kienast F, Frick J, van Strien MJ, Hunziker M (2015) The Swiss landscape monitoring program - a comprehensive indicator set to measure landscape change. *Ecological Modelling* 295: 136-150.
- Kienast F, Ghosh R, Wildi O (eds.) (2007) *A changing world: Challenges for landscape research.* Landscape Series. Springer.
- Kienast, F, Bolliger J, Potschin M, deGroot D, Verburg PH, Heller I, Haines-Young R (2009) Assessing landscape functions with broad-scale environmental data: insights gained from a prototype development for Europe. *Environmental Management* 44:1099–1120.
- Kloek ME, Buijs AE, Boersema JJ, Schouten MGC (2013) Crossing borders: review of concepts and approaches in research on greenspace, immigration and society in Northwest European countries. *Landscape Research* 38: 117-140.
- Koschke L, Fürst C, Frank S, Makeschin F (2012) A multi-criteria approach for an integrated land-cover-based assessment of ecosystem services provision to support landscape planning. *Ecological Indicators* 21: 54-66.
- Lengen C, Kistemann T (2012) Sense of place and place identity: Review of neuroscientific evidence. *Health & place* 18(5):1162-1171
- Lewicka M (2011) Place attachment: How far have we come in the last 40 years? *J. Environmental Psychology* 31: 207-230.
- Lewicka M (2013) Localism and Activity as two dimensions of people-place bonding: The role of cultural capital. *J. Environmental Psychology* 36: 43-53.
- Low S, Altman I (1992) *Place attachment.* New York: Plenum Press.
- Manzo LC, Kleit RG, Couch D (2008) Moving three times is like having your house on fire once: The experience of place and impending displacement among public housing residents. *Urban studies* 45: 1855-1878.
- Manzo LC, Perkins DD (2006) Finding common ground: The importance of place attachment to community participation and planning. *Journal of planning literature* 20: 335-350.
- Mühlmann P, Buchecker M (2013) Aktive Partizipation – Bürger als Freiwillige in der Landschaftspflege. *NuL* 45 (10/11), 2013, 307-314
- Opdam P, Luque S, Nassauer J, Verburg PH, Wu JG (2018) How can landscape ecology contribute to sustainability science? *Landscape Ecology* 33(1):1-7.
- Penker M, Enengel B, Mann C, Aznar O (2013) Understanding Landscape Stewardship – Lessons to be Learned from Public Service Economics. *Journal of Agricultural Economics* 64: 54-72.
- Peters K, Stodolska M, Horolets M (2016) The role of natural environments in developing a sense of belonging: A comparative study of immigrants in the U.S., Poland, the Netherlands and Germany. *Urban Forestry and Urban Greening* 17: 63–70.
- Portugali J (2000) *Self-Organization and the City*, Springer, pp. 49-72.
- Portugali J, Alfasi N (2008) An approach to planning discourse analysis. *Urban Studies* 45: 251-272.
- Powell M, Rishbeth C (2012) Flexibility in place and meaning of place by first generation migrants. *Tijdschrift voor Economische en Sociale Geografie* 103: 4-17.
- Qian JX, Zhu H, Liu Y (2011) Investigating urban migrants' sense of place through a multi-scalar perspective. *J. Environmental Psychology* 31: 170-183.
- Raymond CM, Kyttä M, Stedman R (2017) Sense of Place, Fast and Slow: The Potential Contributions of Affordance Theory to Sense of Place. *Frontiers in Psychology* 8 (Article 1674).
- Rishbeth C, Powell M (2013) Place Attachment and Memory: Landscapes of Belonging as Experienced Post-migration. *Landscape Research* 38: 160-178.

- Scannell L, Gifford R (2017) Place attachment enhances psychological need satisfaction. *Environment and Behavior*, Vol. 49(4):359-389.
- Sebba, R (1991) The Landscapes of Childhood: The Reflection of Childhood's Environment in Adult Memories and in Children's Attitudes. *Environment and Behavior* 23: 395-422.
- Schinazi, V.R., & Thrash, T. (2018). Neural correlates of geographic and spatial thinking. In Montello, D. (Ed.), *Handbook of Behavioral and Cognitive Geography*. Cheltenham, UK: Edward Elgar.
- Shamai S (1991) Sense of place: An empirical measurement. *Geoform* 22: 347-358.
- Stedman RC (2008) What do we “mean” by place meanings? Implications of place meanings for managers and practitioners. In *Understanding concepts of place in recreation research and management*, ed. L. E. Kruger, T. Hall, and M. C. Stiefel, 61–82. Gen. Tech. Rep. PNW-GTR-744. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station.
- Stobbelaar DJ, Pedrolí B (2011) Perspectives on Landscape Identity: A conceptual challenge. *Landscape Research* 36: 321-339.
- Ströbele M, Hunziker M (2017) Are suburbs perceived as rural villages? Landscape-related residential preferences in Switzerland. *Landscape and Urban Planning*, 163, 67-79.
- Swanwick C (2002) Landscape Character Assessment: Guidance for England and Scotland. Prepared for the Countryside Agency and Scottish Natural Heritage by Carys Swanwick. Countryside Agency.
- Taylor K (2008) Landscape and Memory: cultural landscapes, intangible values and some thoughts on Asia. In: 16th ICOMOS General Assembly and International Symposium: ‘Finding the spirit of place – between the tangible and the intangible’, 29 sept – 4 oct 2008, Quebec, Canada.
- Theodori GL (2001) Examining the effects of community satisfaction and attachment on individual well-being. *Rural Sociology* 66: 618-628.
- Turner MG, Gardner R (2015) *Landscape ecology in theory and practice*, 2nd edition. Springer, New York.
- Verburg PH, Mertz O, Erb KH, Haberl H, Wu WB (2013a) Land system change and food security: towards multi-scale land system solutions. *Current opinion in Environmental sustainability* 5: 494-502.
- Verburg PH, van Asselen S, van der Zanden EH, Tehfest E (2013b) The representation of landscapes in global scale assessments of environmental change. *Landscape Ecology* 28: 1067-1080.
- Verburg PH, van de Steeg J, Veldkamp A, Willemen L (2009) From land cover change to land function dynamics: a major challenge to improve land characterization. *J Environ Manag* 90:1327–1335.
- Wu JG (2010) Landscape of culture and culture of landscape: does landscape ecology need culture? *Landscape Ecology* 25(8):1147-1150.
- Wu JG (2013) Landscape sustainability science: ecosystem services and human well-being in changing landscapes. *Landscape Ecology* 28(6):999-1023.
- Villa, F, Bagstad KJ, Voigt B, Johnson GW, Portela R, Honzak M, Batker D (2014) A Methodology for Adaptable and Robust Ecosystem Services Assessment. *Plos One* 9: Article Number: e91001
- Zückert M, Hein-Kircher H (2016) Migration and Landscape Transformation. *Changes in Central and Eastern Europe in the 19th and 20th Century*. Vandenhoeck & Ruprecht.

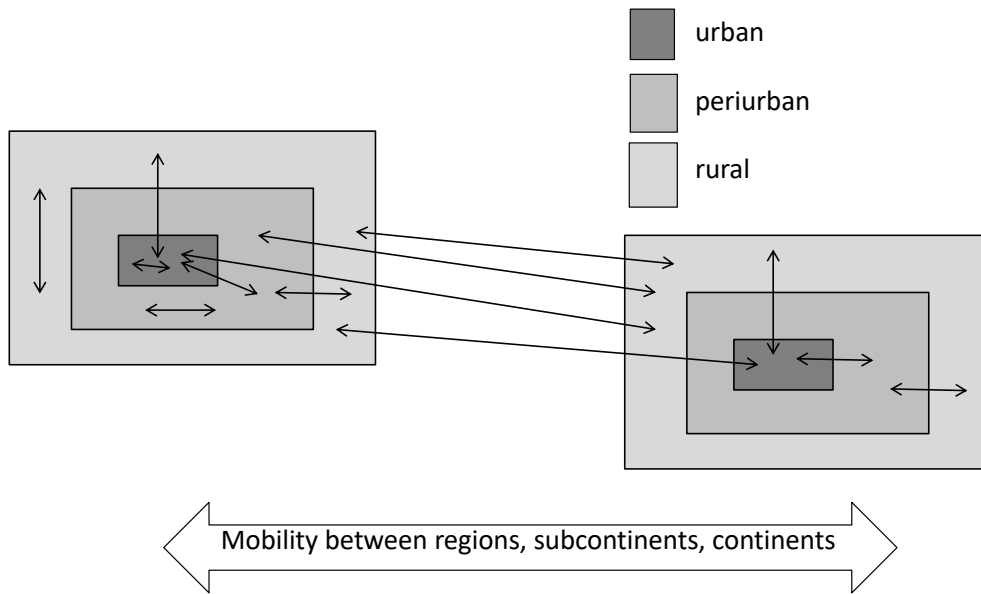
397 **Figure Captions**

398

399 Fig. 1: Conceptual framework.



400  
401 Fig. 2: Schematic mobility patterns of the population.



402

403

404 Table 1: Proposed segments of the population that are highly relevant for place attachment studies in the  
405 context of mobile societies.  
406

|                     |                 |           |         |                                |       |        |                     |
|---------------------|-----------------|-----------|---------|--------------------------------|-------|--------|---------------------|
| voluntary migration | short-term stay | skilled   | retired | moving within the same culture | young | male   | Socially integrated |
| forced migration    | long-term stay  | unskilled | active  | moving to different culture    | old   | female | Not integrated      |

407