Implementing human health as a landscape service in collaborative landscape approaches

Paul Opdam

Wageningen University & Research, Land Use Planning Group, PO Box 47, 6700 AA, Wageningen, The Netherlands

ABSTRACT

Landscape services have been found to foster collaboration among actors in social-ecological transitions towards a more sustainable landscape. In this essay I propose that the contribution of landscape to human health could be particularly effective to play such a role. Health is important to most people in society, to business and government, and of economic and social value. Urban green space is widely known to have a positive impact on human health, but outside the urban landscape this effect is much less known. However, human health is underrepresented in frameworks of ecosystems services and applications of landscape services.

I explore how health could be incorporated into landscape approaches beyond the urban fringe. For the application in landscape approaches, it is vital that the relationship between landscape and human health is expressed in parameters that are recognized as meaningful by the various actor groups. As a health specification, I propose the concept of positive health, because it is based on well-being and subjective perceptions of health. To characterize the physical assets of landscape that associate with health, perceived landscape naturalness seems a promising concept to explore further. I offer examples of studies illustrating the relationship between landscape naturalness and 5 dimensions of positive health. I conclude with suggesting research priorities to develop a knowledge base for integrating human health in collaborative landscape adaptation.

1. Introduction

Scientific engagement with ecosystem services has long been dominated by mapping, assessment and valuation studies (Plieninger, Dijks, Oteros-Rozas, & Bieling, 2013). Theoretical frameworks (such as the cascade model, Haines-Young & Potschin, 2010) tend to focus on impact assessment, for example comparing alternative scenarios. There is an extensive literature on methods for valuation of ecosystem services (Hein, Van Koppen, De Groot, & Van Ierland, 2006; Baker, Sheate, Philips, & Eale, 2013) with emphasis on the economic benefits (Ring, Hansjürgens, Elmqvist, Wittmer, & Sukhdev, 2010). This knowledge has been successfully integrated into national and international policies. A recent development is the growing interest in implementation at the regional and local scale level (Opdam, Nassauer, & Wang, 2013), connected with an emerging consensus that a transition towards sustainable land management requires the active involvement of local communities (Tengö, Hill, & Malmer, 2017) and approaches that incorporate the diversity of cultures, beliefs and interests of the actors involved in decision-making (Diaz, Pascual, & Stenseke, 2018). Concepts like collaborative landscape governance (Görg, 2007), adaptive collaborative governance (Primmer, Jokinen, & Blicharska, 2015), landscape stewardship (Chapin & Knapp, 2015), landscape approaches (Arts et al., 2017) and nature-based solutions (Frantzeskaki, 2019) refer to modes of governance in which mixed groups of local citizens, land owners and enterprises cooperate with governmental bodies to adapt landscapes that meet future demands and challenges. These are often cultural landscapes, that have been changed to meet human needs and values. For capturing the benefits of landscape functioning to humans, Termorshuizen and Opdam (2009) proposed the term landscape services. This term parallels the ecosystem service concept, but emphasizes the cultural landscape as the provider of benefits rather than the natural ecosystem, with landscape services resulting from the interaction of humans and nature. Westerink, Opdam, van Rooij, and Steingröver (2017) and Vos, Van der Wal, and Opdam (2018) suggested that applying the landscape service concept in collaborative landscape adaptation processes can improve understanding, foster collaborative decisions and build support for shared solutions.

Collaborative action is promoted if landscape benefits are understood as being of common interest and as something of shared value to aim for (Opdam et al., 2016). Human health is undoubtedly of common interest and valued by many users of the landscape. Health has both economic and social implications. For example, disease prevention could bring down the societal costs of health care. However, in the ecosystem services literature human health is either absent or depicted in very generic terms or just mentioned as a component of welfare (Ford, Graham, & White, 2015). This underrepresentation is not consistent with the extensive literature that demonstrates the influence of urban green infrastructure on the physical and mental health of citizens (see reviews by Sandifer, Sutton-Grier, & Ward, 2015; Frumkin, Bratman, & Breslow, 2017; Shanahan, Astell-Burt, & Barber, 2019;

Bratman, Anderson, & Berman, 2019). So while human health is potentially an important landscape benefit and useful in collaborative landscape approaches, its implementation outside the urban landscape lacks a firm scientific base.

In this paper I explore how the benefits of the landscape to human health can be incorporated as a landscape service in landscape governance. What we need to construct the landscape-health relationship is a conceptualization of human health that is applicable in the landscape planning context, as well as indicators of landscape pattern that are associated with health. In chapter 2 I search for useful conceptualizations of health in ecosystem services frameworks to conclude that existing frameworks do not offer an appropriate health concept. Then, based on a recent review of health concepts (Haverkamp, Bovenkerk, & Verweij, 2018), I propose that the concept of positive health (Huber, Van Vliet, & Giezenberg, 2016) might be useful to our purpose, because it is based on an extensive enquiry among a broad variety of clients, health workers and organizations about how they perceived "being healthy". Next, I search for physical features of the landscape that relate to health, can be applied in both urban and rural landscapes and are recognized by people in the landscape. I propose that landscape naturalness could be an umbrella concept to identify such physical features. Finally, I give examples suggesting that positive health can be connected to landscape naturalness. I close this essay by proposing research priorities on a way forward to integrate human health in landscape governance.

2. Current position of health in ecosystem services frameworks

The application of human health in collaborative landscape management requires that we know how landscape features can be changed to improve specific aspects of human health. A further requirement is that the landscape-health relationship is applicable in a wide range of landscape types, not only with respect to urban green. As landscape services ground in ecosystem services knowledge, it is significant to learn how human health conceptualizations have been considered in ecosystem service assessment studies. A thorough review would be outside the scope of this paper, but classifications of ecosystem services reflect how human health is considered in ecosystem service assessment studies. The Millennium Ecosystem Assessment considered human health as one of the 5 dimensions of human well-being (Carpenter, Mooney, & Agard, 2009). The three distinguished categories of impacts of ecosystems on human health are: 1) direct impacts (natural disasters), 2) ecosystem mediated impacts (risk of infectious disease, food production) and 3) indirect impacts (e.g. population displacement). The positive impacts of landscape on human health were not recognized. However, the TEEB classification distinguished mental and physical health as benefits of ecosystem services (http://www.teebweb.org/resources/ecosystem-services/), but more recent classifications have not incorporated this initiative. Classifications of ecosystem services published since 2010 usually do not include human health (e.g. Bryan, Raymond, Crossman, & Hatton MacDonald, 2010; Haines-Young & Potschin, 2010; Bastian, Haase, & Grunewald, 2012; Plieninger et al., 2013; Maes, Liquete, & Teller, 2016; Gould & Lincoln, 2017; Smith, Harrison, & Pérez Soba, 2017; La Notte, D'Amato, & Mäkinen, 2017; see also the review of frameworks by Hermann, Schleifer, & Wrbka, 2011), but may include services conditional to health, such as recreation and air purification, instead of human health as a benefit (Oosterbroek, de Kraker, Huynen, & Martens, 2016). Ford et al. (2015) selected 84 ecosystem services (or ES-related) frameworks, 62% of which do not represent human health. They found that 23 frameworks included health as a relatively major feature, but often described in very generic terms. When human health is distinguished, the direct relationship between physical assets of ecosystems and a specific health component is unclear (for example in Balmford, Fisher, & Green, 2011, Fish, Church, & Winter, 2016). So from the underrepresentation of health in the general frameworks proposed for ecosystem services assessment

studies I conclude that ecosystem services studies provide little support for application of human health in landscape approaches. For such an application, Vallés-Planells, Galiana, and Van Eetvelde (2014) proposed to extend the often used CICES classification (Haines-Young & Potschin, 2010) by mental and physical health.

It could be that the underrepresentation of human health is related to the dominant economic focus of the ecosystem service concept. Although the category of cultural ecosystem services (Carpenter et al., 2009; Chan, Guerry, & Balvanera, 2012) lay more emphasis on social values, classifications of cultural ecosystem services do not pay more attention to health. Milcu, Hanspach, Abson, and Fischer (2013), reviewing 107 studies, classified cultural ecosystem services into 11 subcategories, but health is missing. In a somewhat similar review paper, but with a focus on local landscape level, Plieninger et al. (2013) selected 42 papers and distinguished 6 categories of cultural ecosystem service indicators; health is not one of these. Chen, de Vries, and Assmuth (2019) concluded that the health benefits of urban ecosystem services need more attention.

Scholars engaged with ecosystem services seem to have had difficulties with including health in ecosystem service classifications. Health often remains implicit either as a component of well-being or concealed behind social ecosystem services such as recreation. One reason for this could be the complexity of the health concept. What we need is a definition that encompasses the various aspects of health, in a way that makes sense to actors in landscape approaches.

3. A health concept that connects to people

Health has many faces: physical and mental, social and economic, cure and disease prevention, etc. Individuals differ in their perception of "being healthy". So for embedding health in landscape services-based approaches, we are looking for a conceptualization of health that is meaningful to most people and unifies the important aspects. A recent practice-oriented review of health concepts by Haverkamp et al. (2018) is helpful. The authors concluded that there is no obvious logic to select one out of five health concepts as the best one; rather these need to be considered as a family of related concepts. They argue that the best choice depends on the application in a particular practice.

Similar to the concept of landscape, health has a descriptive and a normative dimension: the state of health of a person or a community can be described with objective facts but also evaluated in relation to personal or cultural values. For application in collaborative landscape adaptation, I consider a high degree of subjectivity of the health concept as an important asset. Haverkamp et al. (2018) considered how the five health concepts differ in recognizing the subjective dimension of health. The positive health concept developed by Huber, Knottnerus, and Green (2011) is at the pole position at the subjective side. The 5 health concepts also differ in their relation to well-being, which is a central concept underlying ecosystem services. In some concepts well-being is excluded or used as an objective concept. Huber et al. (2011) used well-being in a subjective sense and considered well-being indicators as measures for health. I therefore conclude that of the 5 health concepts the one proposed by Huber et al. (2011) is most appropriate for application in landscape services-based approaches. It focuses on individual competencies to stay healthy, to recover from and cope with anomalies rather than on a state without anomalies (Huber et al., 2016). The authors give terms like "functioning, resilience and self-governance" a central place. The implication of this health concept is that a person with a disease can feel healthy.

Huber et al. (2016) elaborated this concept further to a more operational level. The relation to well-being is made very explicit in the 6 health dimensions. These dimensions were extracted from a survey among 140 people in 7 stakeholder domains, including health care and patients. Huber et al. (2016) asked them to mention key words that describe what health means to them. The variation in answers was described by 32 aspects of health, which subsequently were clustered
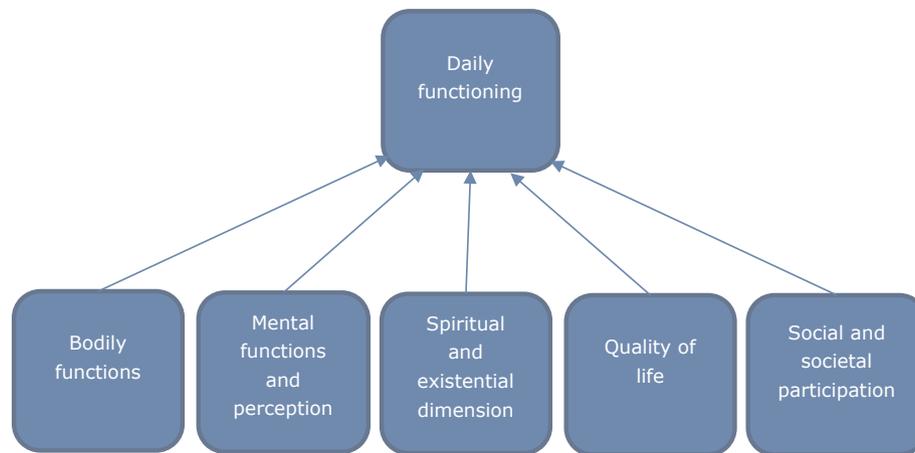
Fig. 1. The six dimensions of positive health (Huber et al., 2016), with daily functioning interpreted as the result of the five other dimensions.

into the following six health dimensions.

1. Bodily functions: e.g. physical functioning, complaints and pain, energy
2. Mental functions and perception: e.g. cognitive functioning, emotional state, esteem/self-respect, self-management, resilience
3. Spiritual/existential dimension: e.g. meaningfulness, striving for aims, future prospects, acceptance
4. Quality of life: e.g. experiencing happiness, enjoyment, flourishing, zest for life, balance
5. Social and societal participation: e.g. social and communicative skills, meaningful relationships, social contacts, accepted, meaningful work
6. Daily functioning: e.g. able to do daily activities, ability to work, health literacy

The dimension of daily functioning can be considered as the outcome of the 5 others (Fig. 1). These 5 dimensions provide a basis for developing practical indicators of health that could be connected to the impact of landscape.

4. Identifying landscape features related to human health

The last two or three decades have witnessed a fast growing body of knowledge about the relationship between urban green space and human health. To mention just a few findings: more urban green is associated with lower adult mortality, fewer premature babies and better achievements at schools (Sandifer et al., 2015). Literature reviews have commented that there is still insufficient knowledge about the causal mechanisms and emphasize the complexity of the relationship due to interference of several potential causal factors (Ward Thompson, Roe, & Aspinall, 2012; Chen et al., 2019). Dose-effect relationships are rare (Shanahan, Fuller, & Bush, 2017). The majority of studies used an indicator for the quantity or density of green space (Kondo, Fluehr, McKeon, & Branas, 2018), for example the percentage of green elements within a certain radius of a sample site.

For decision making in adapting the landscape for health benefits, landscape indicators are needed that are associated with health and also guide actors in defining appropriate interventions in the landscape pattern. The indicator "amount of green space" is often used in urban studies, and varies considerably within urban landscapes, but beyond the urban fringe the landscape is mostly green. Therefore, the "amount of green space" does not serve as a generic indicator for physical landscape characteristics in landscape-health relationships. Less often used in urban studies is the indicator "landscape naturalness as perceived by humans". This indicator has several advantages as a more general landscape indicator associated with health. Firstly, humans are

capable of perceiving naturalness by physical features of the landscape. Ode, Fry, Tveit, Messager, and Miller (2009) proposed that curvy shapes are experienced as more natural than geometric shapes, and late succession vegetation (e.g. an old growth forest) as more natural than early succession ones (a young forest, a grassland). Naturalness can also be experienced by observing phenomena that reflect natural processes, such as water streams or characteristic animal species (Hausmann, Slotow, Burns, & Di Minin, 2016). For example, Howley (2011) found that water related features were dominant in visual landscape preference, and Lindemann-Matthies, Junge, and Matthies (2010) concluded that plant diversity is attractive to humans. Hahn, Heinrup, and Lindborg (2018) concluded that landscape heterogeneity correlates with people's valuation of landscapes. This evidence suggests that people can perceive landscape naturalness by measurable physical features. A second argument for landscape naturalness is that the features associated with naturalness show a considerable variation in rural landscapes. A third argument is that features representing naturalness have been associated with positive health impacts in urban landscapes. For example, biodiversity was found to correlate with human well-being (Fuller, Irvine, Devine-Wright, Warren, & Gaston, 2007; Carrus, Scopelliti, & Lafortezza, 2015), structural variation of the landscape around work places with well-being of workers (Gilchrist, Brown, & Montarzino, 2015) and perceived naturalness around business sites to subjective restorative effects in workers (Colley, Brown, & Montarzino, 2016). On the other hand, among the 27 interventions to improve health benefits in urban landscapes proposed by Shanahan et al. (2019) none relate to altering the degree of naturalness of landscapes.

5. Evidence for relationships between landscape naturalness and positive health

For this chapter I selected examples from the literature to illustrate the relationship between perceived naturalness of the landscape and the 5 basic dimensions of positive health. Because we are especially interested in the impact of landscape to health beyond the urban fringe the emphasis is on studies in rural landscapes and studies that encompass the whole urban–rural gradient.

Bodily functions. In Japan, Park, Tsunetsugu, and Kasetani (2010) performed experiments in which they compared physiological responses of individuals walking through a forest and urban landscapes respectively for about half an hour. The individuals in the forest showed lower salivary cortisol concentration, lower pulse rate and blood pressure, and increased parasympathetic nervous activity, suggesting that they were more relaxed than those who walked in the city. Based on a large nation-wide data-set, Liddicoat, Bi, and Waycott (2018) found correlations between the occurrence of respiratory diseases and vegetation and species diversity in local government areas in Australia. In a

Finnish study, Hanski, von Hertzen, and Fyhrquist (2012) detected that the environmental diversity around homes influenced the composition of bacterial classes on the skin of adolescents. When they compared individuals with allergic disposition to healthy individuals, they noticed that the former had a lower bacterial diversity and lived in surroundings with less biodiversity. It was not the diversity of plants in the yard, but the richness in native flowering plants in the landscape and the diversity of land use types that related to the occurrence of allergic disposition. Donovan, Gatziolis, Longley, and Douwes (2018) concluded that vegetation diversity lowered the risk of being asthmatic in children. In their review Sandifer et al. (2015) argued that there is enough evidence to conclude that microbiological diversity in the landscape affects the bacterial flora on the human skin, and thereby the human immune system, but the mechanisms behind the relation with landscape and species diversity remain unclear so far (Aerts, Honnay, & Van Nieuwenhuyse, 2018).

Mental functions and perception. In their review Bratman et al. (2019) conclude that in a "wealth of studies" the association between experiencing nature and psychological well-being was demonstrated. Some of the evidence applies to landscapes outside the urban landscape. A cognitive restoration after intensive psychological activity was better performed during walks in woods and open countryside than in urban settings in Scotland (Roe & Aspinall, 2011). In California, a similar comparison revealed positive effects on the performance of the verbal working memory, which can be related to the capacity of problem solving and advanced reasoning (Bratman, Daily, Levy, & Gross, 2015). The same investigation also provided evidence for nature to decrease anxiety, rumination and negative affect. In a similar comparative approach, Berman, Kross, and Krpan (2012) measured five times higher effects of walking in nature on working-memory capacity and positive affect in individuals with major depressive disorder as compared to healthy individuals. In none of these comparisons of urban and nature environments landscape naturalness indicators had been specified. The amount of green landscape surrounding homes has been related to the capacity to restore from stressful live events by Van den Berg, Maas, Verheij, and Groenewegen (2010). In an analysis of the large Dutch National Survey of General Practice dataset, they found that respondents reported less health complaints following a stressful event with an increasing amount of green vegetation within a 3-km zone.

Spiritual and existential dimension. Only one study was found. Coldwell and Evans (2018) investigated the impact of visiting the countryside on perceived well-being of urban dwellers. Well-being indicators included life satisfaction and meaningfulness of activities. Countryside visits were more closely associated with life satisfaction than visits to urban green-space.

Quality of life. McMahan and Estes (2015) performed a meta-analysis on 32 studies in which the effect of exposure to natural environments on subjective well-being was investigated. Their conclusion was that even short periods of exposure to natural environments had a positive effect on emotional well-being. Visiting nature outside the city by urban dwellers was associated with well-being and happiness (White, Pahl, Wheeler, Depledge, & Fleming, 2017). Respondents in a UK national survey were more likely to report high levels of experiential well-being after visiting the landscape outdoors, and perceived their life more worthwhile the more frequent these visits were. Dallimer, Irvine, and Skinner (2012) measured perceived biodiversity along a gradient from urban landscape to rural landscape in and around Sheffield, UK. The level of observed species richness of birds, butterflies and plants was positively related to self-reported well-being, but this was not found for actual species richness (suggesting that to assess naturalness people used indicators that were not accurate predictors of real diversity). Marselle, Irvine, Lorenzo-ArribaS, and Warber (2016) investigated the relationship between perceived naturalness and biodiversity in the landscape and the degree of post-walk happiness. Perceived naturalness was not specified, but scored by participants in the investigation along a 7-point scale. The participants were also asked how many species of birds, butterflies and plants they thought were in the area in which they had walked and indicate this on a 5-point scale. The authors found that this relationship is influenced by the duration and the perceived physical intensity of the walk, and is mediated by the degree to which people feel emotionally restored by the walk. This observation suggests that the perception of naturalness and biodiversity level of the landscape "offers opportunities for a restorative experience, which then contributes to positive emotional well-being" (Marselle et al., 2016, p. 227). A similar complex interaction was suggested by Zhang, Howell, & Iyer, 2014), who found that people who feel more strongly connected to nature were more inclined to report a higher degree of self-esteem and life satisfaction. However, this effect was mediated by their capacity to engage with nature's beauty. Thus, this would mean that people who perceive the beauty of the landscape's naturalness would experience a stronger benefit of being connected to nature on quality of life aspects.

Social and societal participation. Zhang, Piff, and Iyer (2014) showed pictures of beautiful nature to people, based on the assumption that "subjective perceptions of beauty may shift the individual's perspective from the self and towards others, a process that should underlie pro-sociality" (Zhang, Piff, & Iyer, 2014, p. 63). After enjoying the beauty of nature participants who played games were more generous to each other, an effect that appeared greatest in individuals who are most sensitive to perceive natural beauty (rather than naturalness). In a similar experiment, Zelenski, Dopko, and Capaldi (2015) investigated cooperative behaviour of individuals who played a fish harvesting game in which they were confronted with a commons dilemma. Individuals that watched a video of natural landscapes were more cooperative and made more sustainable decisions (using a long-term time frame) than individuals that watched videos of beautiful architecture. That watching nature had the effect of shifting people's preferences to longer term strategies was also found by Van der Wal, Schade, Krabbendam, and Van Vugt (2013) in laboratory experiments. The experimental evidence of these studies indicates an effect of enjoying natural landscapes on cooperative and sustainable behaviour, but does not reveal indicators for landscape naturalness.

6. A way forward

In this essay I have argued that human health is underrated in landscape approaches based on landscape services, despite the evidence collected in urban landscapes for a positive impact of green space on various aspects of human health (Chen et al., 2019). This under-representation is unfortunate because human health could play an important role as a common value in collaborative landscape adaptation processes, for example in building a shared vision of desired future landscapes. In this essay I propose a way forward to develop human health as a key benefit of nature to people in landscape approaches, not only in urban landscapes, but in rural landscapes as well. This way forward is built on two interrelated building blocks: the concept of positive health and the concept of landscape naturalness. With these building blocks, a knowledge chain can be constructed linking values perceived by people to physical pattern characteristics that can be changed in the landscape. I propose to prioritize research to develop such a knowledge chain in landscape science and investigate its application in collective landscape action.

6.1. Developing positive health as a landscape benefit

Although a rich literature tells us that the amount of green space in urban landscapes has a positive impact on various dimensions of human health (Bratman et al., 2019; Shanahan et al., 2019; Chen et al., 2019), health is underrepresented in current ecosystem services frameworks and in on the ground applications of landscape services. I take this as an argument for the need of an applicable, comprehensive conceptualization of human health. The positive health concept (Huber

et al., 2016) seems particularly suitable to capture the various dimensions of health. The concept is in agreement with the growing emphasis on prevention of diseases and disorders rather than on cure alone (Chen et al., 2019) and is based on a broad stakeholder-based inventory. I found evidence that all five health dimensions are positively affected by natural assets of rural landscapes. Therefore, the concept of positive health seems worthwhile to explore further in relation to ecosystem and landscape services approaches.

A first research priority is to develop practical indicators for each of the five health dimensions. These indicators must be meaningful to people and they must connect to social and economic values. A second priority is to link these indicators to landscape pattern, to physical assets of the landscape that can be changed by actors. Knowing the relationship between a feasible physical change (how much change is required?) and a desired gain in health benefits is essential in negotiations about designing future landscapes.

A third challenge is to learn more about how the five dimensions of positive health are understood and appreciated by actor groups engaged in a landscape adaptation process. The study by Huber et al. (2016) was done in The Netherlands, and it remains to be seen how this conceptualization of human health is appreciated in other parts of the world. For application in participatory processes it is important to understand how indicator values based on the five dimensions are interpreted by various actors. For example, a positive impact of landscape to health may be experienced by citizens as an improvement of daily functioning (social value), but for companies it could mean higher productivity (economic value), while health insurance companies and governments would be interested in cost reduction in health care (Hartig, Mitchell, De Vries, & Frumkin, 2013).

6.2. Developing landscape naturalness as a landscape characteristic associated with health benefits

To build the connection to the landscape, we need to identify landscape characteristics that are associated with health effects and that can be changed in the real world of the local landscape. We still know little about which features of the landscape matter to human health (Sandifer et al., 2015). One of the limitations of the current knowledge base is that most work was done in relation to urban landscapes. Landscape pattern indices used in these studies are not meaningful beyond the urban fringe. A research challenge is to identify landscape characteristics that can be applied all along the urban rural gradient. I propose to explore the merits of indicators based on landscape naturalness. In most of the studies summarized in this essay, no such indicators were specified. In some studies landscape naturalness was implicit by using indicators based on vegetation and species diversity (see Aerts et al., 2018, for a recent review on impacts of biodiversity on health). So there is a strong need for studies that identify landscape naturalness indicators that are associated with positive human health impacts and compare the advantages of the indicator with other potential indicators for application in landscape governance. Another research priority is to find out how landscape naturalness relates to other landscape services and investigate the opportunities for synergy between health impacts and benefits of other services.

6.3. Dose-impact relationships

Assessment models describe the potential impact of a particular change in the landscape on a particular health indicator. Bratman et al. (2019) propose a conceptual model for plan assessment in which a certain natural feature is linked with a health indicator, accounting for variation in exposure and experience of people in an urban context. The model shows how a prospected value of a natural feature giving rise to a certain impact on health. In solution-oriented approaches in which stakeholders negotiate about added value such a relationship should be used in a reversed sequence (Opdam, Luque, Nassauer, Verburg, & Wu,

2018): a desired health impact comes first and people then decide what they can do to achieve it. Termorshuizen and Opdam (2009) proposed the structure–function-value chain as a basis for organizing the knowledge base of landscape services. Simple dose-impact curves based on quantitative studies will improve the capacity of actors engaged in landscape planning processes to decide for evidence-based interventions. Constructing structure–function-value knowledge chains is an interdisciplinary challenge for scholars from landscape science, environmental psychology and economy and health sciences (Sandifer et al., 2015; Chen et al., 2019).

6.4. Investigating the bridging role of positive health and landscape naturalness in collaborative landscape adaptation

A basic assumption in this essay is that health connects people in collaborative landscape approaches. The concept of human health unites individual and common interests. Human health is valued by individuals, by the society as a whole, by governmental bodies, organizations and businesses. While in collaborative landscape processes actors will easily agree that human health is an important common interest, actors with different attitudes and values may have diverging conceptions of the landscape-health relationship (Klain, Olmsted, Chan, & Satterfield, 2017). Because the concept of positive health is built on subjectivity, it allows that actors with different values and attitudes interpret the importance of health in a flexible way, which helps in bridging between different opinions. Concepts that are flexible enough to have different meanings in different social worlds but yet robust enough to maintain a common understanding, are called boundary concept (Star & Griesemer, 1989); these have been found to foster collaboration in landscape processes (Opdam, Westerink, Vos, & de Vries, 2015). Landscape services have been found to function as boundary objects, which facilitated actor groups deliberating about landscape benefits, negotiating about which measures to take, and organizing collaborative implementation of solutions (Opdam et al., 2015; Westerink et al., 2017; Vos et al., 2018). I propose that the potential role of positive health as a boundary concept is investigated, for example in surveys (Klain et al., 2017) or by observing collaborative planning processes (Vos et al., 2018).

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