

Themes and trends in visual assessment research: Introduction to the *Landscape and Urban Planning* special collection on the visual assessment of landscapes[☆]



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ABSTRACT

This paper introduces a Special Collection of 18 previously published articles in *Landscape and Urban Planning* and its parent journals on the topic of visual landscape quality assessment. To characterize the field and select papers for the collection we used automated and manual searches of the literature and the entire back catalog of this journal (1974–2018). Our analysis identifies and describes six thematic categories: conceptual and theoretical foundations, visual quality assessments, visual impact assessments, extension of visual assessments beyond scenic concerns, integration of visual-aesthetic values in multi-resource assessments, and use of landscape visualizations in visual assessments. Individual paper selections include key papers published on these themes along with exceptional recent work reflecting the states of the art.

1. Introduction

Visual landscape quality assessment or “visual assessment” refers to the methods and tools employed to describe and evaluate the scenic beauty of landscapes (Daniel, 2001). At their core, visual assessments assign a value to scenic beauty (i.e., visual quality, but also visual impact) and identify the key aspects of landscapes that help predict changes in scenic beauty resulting from management activities at the landscape or project level. Visual assessment emerged as a field of practice and research in the late 1960s, growing out of the environmental movement and concerns that rapid land use change, resource use, and development activities were having adverse impacts on landscape quality. Scenic beauty, while its value is dependent upon the subjective perceptions of people, exists like other natural resources as a consequence of the particular physical characteristics present in the landscape. And like other more “objective” resource assessments, visual assessments provide the methods and tools to identify areas in the landscape of high value, vulnerability, or degradation in valid and reliable ways so that they can be preserved, restored, or protected in the context of conflicting land uses.

The literature on visual assessment brings together traditions of landscape architectural design, landscape planning, forest and outdoor recreation management, environmental psychology, and other social and environmental sciences. Rooted in these diverse perspectives and

informed by work in aesthetic and environmental philosophy, law, history and other branches of the arts and humanities, visual assessment covers as broad a range of literature of any field of resource management we are aware of. As a basic keyword search of the literature shows, *Landscape and Urban Planning* has been a top outlet for research related to visual assessment since the journal began publication as *Landscape Planning* in 1974 (Table 1, Appendix S1). By our own manual count, the journal has since its inception published nearly 300 articles with a dominant focus on the visual-aesthetic aspect of landscapes and about 450 more where it is part of a broader investigation of landscape perceptions, preferences or values (Appendix S2).

While it is impossible to adequately represent the depth and breadth of this work in a small selection of papers, we chose this Special Collection to highlight and make freely available what we felt were some of the most important and enduring articles the journal has published on this topic over the years, along with exceptional recent work reflecting the state of the art. A secondary aim was to provide a compendium of articles that, in keeping with the journal’s longstanding mission to better link research with practice, would introduce newer students and professionals to foundational conceptual and empirical work in visual assessment. In this latter respect, we three are part of a growing group of researchers and professionals involved in the Visual Resource Stewardship network that—through online discussion and conference activities—hope to renew and sustain interest in this field in

[☆] This article is the introduction to the online Special Collection on the Visual Assessment of Landscapes, curated by Paul H. Gobster, Robert G. Ribe and James F. Palmer

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Table 1
Ranking of top ten journals publishing articles in visual assessment and other landscape perception research, based on a July 2018 Scopus search.¹

Journal (first year tracked, nbr of all articles to July 2018)	Visual Assessment (N = 537)			Other Landscape Perception (N = 1308)		
	N	%	Rank	N	%	Rank
Landscape and Urban Planning (1974, 4094)	64	12%	1	126	10%	1
Journal of Environmental Management (1970, 9399)	18	3%	2	33	3%	4
Environmental Management (1977, 4867)	16	3%	3	16	1%	6
Scandinavian Journal of Forest Research (1986, 2141)	11	2%	4	2	0%	
Urban Forestry and Urban Greening (2002, 1274)	11	2%	4	17	1%	5
Landscape Research (1970, 1440)	10	2%	6	64	5%	2
Forest Science (1970, 2238)	9	2%	7	–	–	–
Environmental Monitoring and Assessment (1981, 10,944)	8	1%	8	–	–	–
Hortscience (1977, 7644)	8	1%	8	–	–	–
Journal of Environmental Psychology (1981, 1,498)	8	1%	8	11	1%	
Journal of Forestry (1969, 2,356)	8	1%	8	–	–	–
Land Use Policy (1984, 4083)	–	–	–	37	3%	3
Landscape Ecology (1987, 2463)	–	–	–	16	1%	6
Acta Horticulturae (1996, 49,340)	–	–	–	16	1%	6
Environment and Behavior (1969, 1801)	–	–	–	15	1%	9
Applied Geography (1981, 2207)	–	–	–	14	1%	10

¹ Search strings: TITLE-ABS-KEY ((landscape* OR greenspace* OR “green space” OR forest* OR rural) AND (“visual quality” OR “visual resource” OR “scenic quality” OR “scenic resource” OR “scenic beauty” OR “aesthetic quality” OR “esthetic quality”) AND (management OR assessment)); TITLE-ABS-KEY (“landscape perception*” OR “landscape preference*” OR “landscape value*”). Overlapping Visual Assessment articles removed from Other Landscape Perception listings. See [Supplementary Appendix S1](#) for full spreadsheet.

productive ways.¹

In our review of the literature and our attempts to bring clarity to the range of topics covered, we have organized the Special Collection into six thematic categories:

- Conceptual and theoretical foundations
- Visual quality assessments
- Visual impact assessments
- Extension of visual assessments beyond scenic concerns
- Integration of visual-aesthetic values in multi-resource assessments
- Use of landscape visualizations in visual assessments

In the pages that follow we describe the broader literature and range of articles published in the journal under each category and introduce our selections for the Special Collection.

2. Conceptual and theoretical foundations

Assigning a numerical or rank value to something as subjective as beauty was seen as audacious and counterproductive by early critics of visual assessments (e.g., Gussow, 1979). Approaches have been criticized on both methodological grounds, such as the use of photographs in representing real landscapes (e.g., Kreimer, 1977) and on theoretical grounds, for misappropriating concepts or operating in the absence of any clear theory (Appleton, 1975a; Carlson, 1993). One key critique of theoretical issues (Carlson, 1977, 1984) and a defense of the field by one of this article’s authors (Ribe, 1982, 1986) took place in the pages of this journal. While we do not include the debate in our set of articles, it provides a good grounding for those interested in the broader conceptual and theoretical underpinnings of visual assessment.

¹ The Visual Resource Stewardship network or VRS is a Google Groups site established for researchers, practitioners, teachers, students and others interested in scenery management, visual impact assessment, and other topics relevant to visual resource stewardship. The site provides an online forum to discuss ideas, share information and ask questions. VRS was launched in April 2018 and at the time of this writing has 100 members from academia, government, and private for-profit and non-profit sectors based in the US and several other countries. To join the group, go to the Google Groups web page at: <https://groups.google.com> and at the top in the search box, enter “Visual Resource Stewardship.” Select VRS and on the next page, click “contact the owner” to send an email requesting membership.

As the field has matured over the years, multiple theories and conceptual frameworks of landscape preference have been proposed. These range from adaptations of classical theories of aesthetics (Lothian, 1999) to ecological (Gobster, 1999; Thorne & Huang, 1991), bioevolutionary (Appleton, 1975b; Balling & Falk, 1982), and psychological (Bourassa, 1988; Daniel & Boster, 1976; Kaplan & Kaplan, 1989; Ulrich, 1986) perspectives on landscape preference. While some of this work has been limited in scope, a few frameworks such as that developed by Kaplan and Kaplan (1982, 1989), have received extensive attention and been extended beyond issues of environmental preference to address broader issues of human well-being (e.g., Kaplan, 1984; Kaplan, 1995), landscape design and management (Kaplan, Kaplan, & Ryan, 1998), and environmental action (Kaplan & Basau, 2015).

In selecting papers to represent this theme we focused on those that have surveyed conceptual and theoretical aspects of the field and evaluated its state of development. Of these, Zube, Sell, and Taylor (1982) synthesis of the literature provides one of the most enduring conceptual treatments yet available. It identifies key expert, psychophysical, cognitive, and experiential research paradigms that continue to describe the breadth of contemporary visual assessments and provides a theoretical framework and agenda for future research that remains salient to landscape planners’ work. Daniel (2001) paper reflects upon the status of the field at the beginning of the new millennium and laments a straying away from what is perceived as the central focus of visual assessments on scenic landscape quality issues. One particular concern is that normative theories about ecological health and biodiversity are being conflated with theories and empirical research about how people actually perceive scenic quality in landscapes and that the two should remain separate considerations. In contrast, Jorgensen (2011) essay argues that the field needs to move beyond the scenic-ecological distinction and that there must be room for theoretical and conceptual pluralism to address important remaining questions. Together these three papers provide an essential primer on the past, current, and future foundations of the field.

3. Visual quality assessments

As a field of practice and research, visual quality assessments (VQAs) were initially developed using expert-based inventories based on principles of landscape architectural design, and public preference approaches that encompass Zube et al. (1982) psychophysical,

cognitive, and experiential research paradigms. Early expert systems grew out of landscape planning activities in the 1950s and '60s and include work by Crow (1964) and Crow and Miller (1966) in the UK, responding to the aesthetic impacts of afforestation and other intrusions on the rural landscape and Litton (1968) in the US, responding to clearcutting on national forests. Litton's approach led to development of the US Forest Service's Visual Management System (1974), which became part of that agency's standard practices for addressing scenic resources. This expert-based system was adapted for use by forestry agencies in British Columbia and Australia, and similar systems were subsequently developed by other US federal agencies and nations (Williamson & Calder, 1979). A key early example of public preference research methods that aimed to inform and improve evidence to support these agency systems is Daniel and Boster (1976) Scenic Beauty Estimation Method. It describes a psychophysical approach for validly and reliably measuring public preferences to develop statistical models for predicting and mapping the scenic beauty of forests and other landscapes.

Because of their breadth and depth, these and other foundational works (e.g., Craik, 1970; Penning-Rowsell, 1973; USDI Bureau of Land Management, 1980a; Zube, Pitt, & Anderson, 1974) were often published in the form of books and agency documents, but led the way for a plethora of case study applications more suited to journal publication. We include papers by Wright (1974) and Anderson and Schroeder (1983) as good examples of early work featuring expert and public preference approaches, respectively. Wright's work focuses on a diverse 4100 km² region of Southeastern Australia. It not only provides an excellent description and evaluation of a robust approach but also contextualizes it with a useful review of the available literature of its time and commentary on the divergence of views between experts and members of the public in evaluating visual landscape quality. Anderson and Schroeder apply Daniel and Boster (1976) Scenic Beauty Estimation Method to an urban landscape, and notably examine how different variable sets help predict preference and how preferences converge across different user and interest groups. Also noteworthy is that both studies examined rating reliability.

Contemporary VQAs in many ways continue to follow the approaches developed in the early work cited above, though technological advances now provide greater precision in analysis and display. There are now a greater variety of ways to measure visual quality and its indicators which help to strengthen the validity of findings. We include a recent paper by Schirpke, Tasser, and Tappeiner (2013) as an example of current states of the art in scenic beauty mapping and the use of landscape ecological metrics in predictive modeling of scenic beauty perceptions. Other notable recent contributions to the VQA literature published in this journal include papers by Jiang, Larsen, Deal, and Sullivan (2015) identifying a "dose response curve" between landscape preference and urban tree cover density, by Dunkel (2015) and Tieskens, Van Zanten, Schulp, and Verburg (2018) using social media and crowdsourced geodata to identify landscape preferences, and applications of phenomenological methods by Beza (2010) and Loder (2014) to understand aesthetic perceptions of iconic landscapes such as Mt. Everest and novel ones such as green roofs.

4. Visual impact assessments

Visual impact and visual quality assessments are closely aligned, having emerged from the same era and set of concerns about the effects of land use change on the visual-aesthetic character of landscapes. But there are also important distinctions. For one, visual impact assessments (VIAs) tend to be more project-oriented and attentive to particular landscape changes produced by development proposals; while VQAs tend to focus on large-area, long-term planning, usually for public landscapes such as national forests and parks. Also, because VIAs are more often specifically mandated by regulatory policies, their methodological rigor is critical in order to withstand litigation that might

result in a project being rejected or requiring mitigation and higher development costs. Rigor is often also important in VQAs; but while the methodological focus of VIA research tends to be on tools and techniques to increase accuracy and precision for estimating visual impact effect sizes (e.g., Palmer 2015, 2019a,b), VQA research tends to be more concerned with methodological issues such as scale reliability (e.g., Palmer & Hoffman, 2001), consensus across stakeholder groups (e.g., Coeterier, 1996), and choice of indicators and model specification for theory and prediction (e.g., Tveit, Ode, & Fry, 2006) than most VIAs.

VIA research has covered a wide range of issues concerning landscape change. Topically-related work published in this journal is representative of the field and includes forest harvesting (Brush, Williamson, & Fabos, 1979; Store, Karjalainen, Haara, Leskinen, & Nivala, 2015) and afforestation efforts (Karjalainen & Komulainen, 1998; Saurin, 1980), the design and siting of buildings (Fitzsimmons, 1977; Qiang, Shen, & Chen, 2019; Rogge, Nevens, & Gulinck, 2008) and potentially offensive land uses (Moufliis, Gitas, Iliadou, & Mitri, 2008; Simsek, Elci, & Gunduz, 2014), and energy development (Luken, Hinton, & Baker, 1991; Tempesta, Vecchiato, & Girardi, 2014). Technical and methodological issues include assessment of visibility and magnitude of impacts of facilities, sites, and corridors (Domingo-Santos, de Villarán, Rapp-Arrarás, & de Provens, 2011; Oh, 1998), methods and tools to improve VIA estimates (Dupont, Ooms, Antrop, & Van Eetvelde, 2016; Hadrian, Bishop, & Mitcheltree, 1988), and means such as route location, vegetation management, and camouflaging or contrast reduction for lowering or mitigating impacts (Chamberlain & Meitner, 2013; Gouly, 1987).

An upsurge of research in energy-related VIAs has happened within the last decade in response to increased activity in renewable energy development, particularly wind power (e.g., Apostol et al., 2017; Palmer, 2015; Ribe et al., 2018). The clean, low-carbon nature of wind energy adds an interesting conceptual ambivalence that is often absent in typical VIAs that have focused on projects perceived to be purely negative, industrial-aesthetic intrusions in natural landscapes. This makes public perception surveys of wind energy projects especially important in understanding a range of issues. For this reason we selected three research papers dealing with VIA of wind energy projects that capture the breadth of concerns present. The paper by Thayer and Freeman (1987) is one of the earliest investigations of wind energy perceptions we are aware of. While visual impact is a central focus of the study, it is notable for its holistic framing that also considers the underlying meaning of the project, symbolically and otherwise. More recent work by Maehr, Watts, Hanratty, and Talmi (2015) and Yu, Behm, Bill, and Kang (2017) add to the depth of understanding and examine, respectively, the emotional responses people have toward wind turbines and the combined visual-acoustic effects on perceived impacts.

5. Extension of visual assessments beyond scenic concerns

Scenic quality is thought to be a primary lens through which environments are perceived, particularly within the context of recreational use of wildland landscapes where many visual assessment approaches were developed (Hull, 1989). As just noted, however, in some situations the sonic qualities of the landscape also become of equal or greater importance in understanding landscape perceptions. As VQA and VIA methods further develop, it seems likely that we will see more studies that singly or jointly address a fuller range of sensory phenomena that add to and detract from people's perception and experience of landscapes. This has already become the case in recent years the rising interest in night sky protection (Turina, 2018) and the significant increase in soundscape research, including work on noise and tranquility mapping (Iglesias-Merchan, Diaz-Balteiro, & Soliño, 2014; Watts & Marafa, 2017). From this body of work we include the paper by Jiang and Kang (2016) as an example here. With the rise in international popularity of forest bathing (shinrin-yoku) and its emphasis on

multisensory landscape experience (Clifford, 2018; Hansen et al., 2017; Park, Tsunetsugu, Kasetani, Kagawa, & Miyazaki, 2010), the demand for research on smells and other sensory perceptions is likely to increase.

These landscape-related dimensions form one part of the theoretical framework and agenda for future research outlined in the paper by Zube et al. (1982) mentioned earlier. Another key part of their framework deals with human response dimensions or the outcomes of people's interactions with landscapes. Other response dimensions became evident as work in visual assessment expanded beyond the focus on wildland recreation. For example, the study by Anderson and Schroeder (1983) we selected as an example of visual quality assessments was followed by an investigation that applied the Scenic Beauty Estimation method to examine perceived attractiveness and personal safety in the design and management of urban recreation sites (Schroeder & Anderson, 1984). They showed that vegetation that many found attractive also contributed to increased apprehension because of safety concerns due to limitations in visibility. This divergence reveals the importance of understanding the fuller range of response dimensions. In using the same basic approaches common to many visual assessment studies, others have gone on to examine other key perceptual and behavioral response dimensions including: compatibility of development (Groat, 1988; Wohlwill & Harris, 1980), acceptability of forest management (Brunson & Shelby, 1992; Ribe, 2002), residential landscape condition and care (Gobster, Stewart, Rigolon, van Riper, & Williams, 2018; Nassauer, 1993), oppressiveness of tall buildings in highly urban environments (Asgarzadeh, Lusk, Koga, & Hirate, 2012), and greenspace accessibility (Van Herzele & Wiedemann, 2003; Wright-Wendel, Zarger, & Mihelcic, 2012). Among the set of response dimensions being studied, those relating to physical and mental health outcomes such as physical activity (Bamberg, Hitchings, & Latham, 2018; Pretty et al., 2005) and psychological restoration (Peschardt & Stigsdotter, 2013; Van den Berg, Jorgensen, & Wilson, 2014) have become prominent in recent years, and many such papers have been published in this and other journals across a number of disciplinary and interdisciplinary fields. We include the paper by Grahn and Stigsdotter (2010) as a good example of work that bridges concerns about the visual-aesthetic qualities of landscape with human health and well-being.

Finally, rising concern about ecological quality and issues of landscape health and biodiversity in wildland, rural and urban areas intersects directly with aesthetics and has implications for visual quality assessments. Issues raised in our paper selection by Daniel (2001) outline the concern, which has been expressed more fully by Parsons (1995) and Parsons and Daniel (2002) and debated by Gobster, Nassauer, Daniel, and Fry (2007). Despite Daniel's concern for keeping these areas conceptually separate, there has been a steady rise in investigations jointly looking at how perceptions of aesthetic and ecological quality dimensions converge or diverge in the context of many types of landscape (e.g., Egoz, Bowring, & Perkins, 2001; Fuller, Irvine, Devine-Wright, Warren, & Gaston, 2007; Gundersen, Stange, Kaltenborn, & Vistad, 2017; Junker & Buchecker, 2008; Lindemann-Matthies, Briegel, Schüpbach, & Junge, 2010; Nassauer, 1997). Here we include a recent paper by Hoyle, Hitchmough, and Jorgensen (2017).

6. Integration of visual-aesthetic values in multi-resource assessments

Since the days of the hand-drawn overlay (Steinitz, Parker, & Jordan, 1976), visual quality has been paired with and measured against other values as part of a multi-resource assessment process for landscape planning applications. A good example is the Metropolitan Landscape Planning or METLAND model developed in the early 1970s by Fabos and colleagues at the University of Massachusetts. They relied on advancements in computer mapping to integrate a diverse set of resource values with information on hazards, development suitability, and ecological stability in a three-phase process of assessment, evaluation and implementation (Fabos, Careaga, Greene, & Wilson, 1973). Visual resource

information on landscape preference (complexity and compatibility) was incorporated as part of a visual-cultural submodel related to development suitability (Fabos, Hendrix, & Greene, 1975).

Over the years, multiple renditions of this same basic procedure have been developed, usually in concert with advancements in technology, methodology, and/or shifts in how resources are conceptualized. A survey of terms associated with multi-resource assessments found in the pages of this journal include but are not limited to: suitability analysis, cost-benefit analysis, scenario analysis, discrete choice modeling, multi-criteria analysis, Analytic Hierarchy Process, multifunctional landscape assessment, benefits-based management, indicator-based management, values mapping, natural capital benefits, and ecosystem services (See Appendix S2). The degree to which visual-aesthetic resources are included in these assessments can vary from superficial to central, and while some analyses rely solely on expert judgment to establish visual values (e.g., Arnot & Grant, 1981), others use information on visual landscape preferences as a means of incorporating public input into resource assessments that are otherwise largely expert-based (e.g., Alessa, Kliskey, & Brown, 2008), and yet others focus solely on the explication of subjective landscape values (e.g., Brown and Brabyn, 2012). Likewise, studies have used qualitative, quantitative, and/or mixed methods (e.g., Gobster & Westphal, 2004) in their assessments, and arrived at the set of values they consider through inductive/emergent and deductive/a-priori approaches.

Given this diversity of considerations, representing this theme by a few papers was difficult and we encourage readers to explore Supplemental Appendix 2 using a sort of the Main Keyword for additional papers using a "multi-value" approach. Our selection includes three papers demonstrating the range of ways in which researchers are incorporating visual-aesthetic values in multi-resource assessments. Meeus, Wijermans, and Vroom (1990) examine the transformation of agricultural landscapes across Europe and identify a typology of 13 landscape types, upon which they develop policy scenarios for alternative development futures based upon issues that include landscape amenity and preservation of cultural values. Alessa et al. (2008) use a values mapping approach to identify social-ecological "hotspots" in the Kenai Peninsula of Alaska where density clusters of aesthetic and 13 other perceived landscape values overlapped with physically measured ecological values. And Juntti and Lundy (2017) contrast a science-led assessment of ecosystem services and disservices with qualitative interviews and visual data to explore how landscape vistas and other amenity values contribute to liveability in a London, UK community.

7. Use of landscape visualizations in visual assessments

Landscape visualization has always been an integral part of visual quality and visual impact assessments, from early use of photomontage and model landscape simulators, to digital imaging, to more recent forays into 3-D modeling and augmented reality to envision landscape futures (Lange, 2011; Sheppard, 1982; USDI Bureau of Land Management, 1980b; Zube, Simcox, & Law, 1987). *Landscape and Urban Planning* has devoted three Special Issues to landscape visualization over the years (Foo, Gallagher, Bishop, & Kim, 2015; Lange & Bishop, 2001; Orland, 1992), and while earlier accounts of "new" technologies can often sound dated, when considered in the context of current work one quickly gains an appreciation for how much the accumulation of experience has impacted the development of the field. For example, the digital manipulation of photographs to evaluate landscape changes has become commonplace in landscape preference studies (Bishop, 1992, 2019a). Newer, user-friendly technology such as cellphone video capability and augmented reality apps (e.g., Lange, 2011) can allow research and planning for landscape futures to become broadly participatory in ways that complex and expensive earlier technology rarely did.

While the stream of technology in visualization will continue to flow and change the ways visual assessments are conducted, broader issues of realism, cost vs realism tradeoffs, and the need for standards and

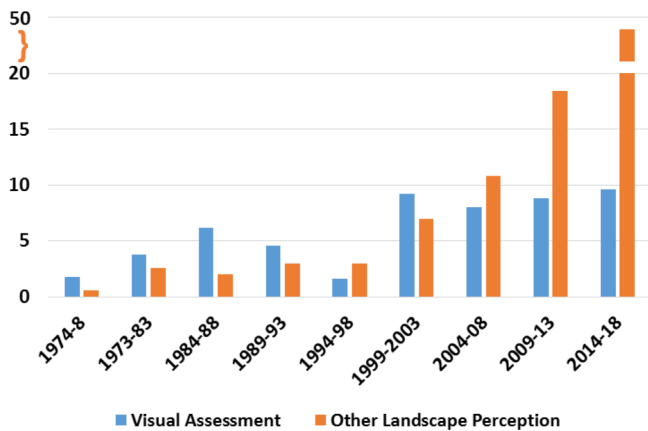


Fig. 1. Average number of Visual Assessment and Other Landscape Perception articles published per year in *Landscape and Urban Planning* and its parent journals *Landscape Planning* and *Urban Ecology*, 1974–2018 (See Supplementary Appendix 2 for data).

ethics in the use of procedures remain important across all areas of development. For these issues we include earlier papers by Sheppard (2001) and Appleton and Lovett (2003), which maintain their relevancy for work today. To this we add Orland (2015) editorial from the most recent “Critical Visualization” Special Issue, which summarizes papers related to the use of visualization tools in enhancing civic participation in landscape planning and design. Orland interprets recent advances within the framework of Arnstein (1969) ladder of participation, providing important guidance for how we should proceed in future development of tools for visual assessment.

8. Conclusions and implications

The field of visual assessment rose to prominence in the 1970s to address emerging planning needs, in the words of the US National Environmental Policy Act of 1969 [42 USC § 4321-4347] to “assure...safe, healthful, productive, and aesthetically and culturally pleasing surroundings (Sec 101 (b) 1),” “utilize a systematic, interdisciplinary approach which will insure the integrated use of the natural and social sciences and the environmental design arts in planning and in decision-making (Sec 102 A),” and “identify and develop methods and procedures...which will insure that presently unquantified environmental amenities and values may be given appropriate consideration in decision-making.” Scenic beauty was in many ways the ideal candidate for such study, and visual assessors met the challenges of NEPA and other legislation with a wave of activity captured in books (Zube et al., 1975), articles (Fabos, 1974), and conferences such as Our National Landscape in the US (Elsner & Smardon, 1979).

By the late 1980s however, this level of activity appeared to slow, leading some to feel that the field had stagnated due to a lack of theory and difficulties in integrating methods and findings with other resource management goals (Hull, 1989; Smardon, 2016). Indeed, our database of papers on visual assessment published in *Landscape and Urban Planning* does show a downturn of work near the end of the 1980s, but also shows an increase near the start of the 21st century (Fig. 1). While some of this reversal is no doubt due to a general rise in the overall number of articles published per year, trends such as renewable resource energy development have also spurred the need for new research and interest by related communities of practice such as the Visual Resource Stewardship network (Sullivan et al., 2018).

But our thematic analysis also describes an expansion of the ways in which visual quality is being conceived of and how visual assessments are being implemented in addressing the problems of the new millennium. This is especially the case with work that falls more broadly within the scope of landscape perception, where increased publication activity identified by our analysis has been impressive (Fig. 1).

Skeptics might interpret these observed trends as a function of how we are defining the field and the research that comprises it, and in response to this we welcome others to undertake their own review of the field. While a number of focused efforts at reviewing this literature have been published in recent years (e.g., Bishop, 2019b; Bubalo, van Zanten, & Verburg, 2019; Churchward et al., 2013), comprehensive, systematic reviews have been limited (e.g., Lothian, 2017). Given our initial look here, additional work could be very useful. There are many ways to examine the field, and in coming together to think about how we would approach this essay introducing our Special Collection we made a number of different attempts at identifying trends and grouping themes, each potentially valid and worthy of further pursuit. We hope our essay and article selection encourage further investigation and research pursuits.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.landurbplan.2019.103635>.

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