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Article *in* Sustainability Science · February 2019

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ORIGINAL ARTICLE

Sustainability assessment of a community open space vision

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Received: 20 August 2018 / Accepted: 14 January 2019

Abstract

Urban sustainability visions must address diverse challenges spanning social and ecological issues yet urban visions are often weak in sustainability, demonstrating a need for a strong and holistic assessment of visioning processes, their outputs, and outcomes. Through a case study of a community visioning process for an urban neighborhood-scale open space in South Carolina, United States, this paper presents key insights from a novel approach for assessing the sustainability of visioning projects, framed around a program evaluation logic model. It describes a mixed-methods assessment of the case including: (1) a qualitative analysis of the visioning process that inspects the quality of the participatory process that generated the vision; (2) a content analysis of the vision report—the process output—that analyzes the sustainability content of the stakeholders' ideas; and (3) a quantitative natural capital assessment that compares the vision against alternative plausible scenarios proposed by stakeholders to the visioning process' outcomes and evaluates the ecological integrity of the vision. The research finds that the vision was crafted through a fair participatory process that created stakeholder satisfaction, that the vision emphasizes social capital and equity and justice over other sustainability ends, and that the neighborhood vision may generate stronger ecosystem services than other proposed options suggesting opportunity for positive feedbacks. Despite a positive assessment, the assessment used here showed there was room to co-create a stronger vision of a sustainable future that strives to achieve multiple sustainability principles across human and natural systems. Contributing to the literature on urban sustainability assessment, this paper demonstrates a novel and holistic approach to assessing sustainability of local urban planning processes and their outcomes and concludes with recommendations for streamlining such assessments to better inform policy decisions before they are made.

Keywords Sustainability visioning · Sustainable urban development · Sustainability principles · Urban planning · Urban sustainability assessment · Program evaluation

Introduction

Human society is experiencing the joint outcomes of exceeding biophysical limits and underachieving on social foundations, resulting in pressures on social, human, and natural systems from global to local scales (Newman and Jennings 2008; Raworth 2012; Wu 2014; Brown and Quinn 2018). This is particularly true in urban areas, where globally more people now live in cities than rural settings (United Nations 2014). As such, there is growing interest in sustainable urban development (Tang et al. 2010; Georgescu et al. 2015; Forman and Wu 2016).

As homes to large concentrations of people, cities and urban centers must cope with diverse sustainability challenges. These include addressing socio-economic disparities between populations living in proximity with one another as well as lifestyles whose ecological impacts extend beyond

Handled By: Peter John Marcotullio, Hunter College, United States.

Electronic supplementary material The online version of this article (https://doi.org/10.1007/s11625-019-00659-y) contains supplementary material, which is available to authorized users.

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Published online: 04 February 2019

the vurban footprint with effects reaching around the world (Keivani 2010; McDonald et al. 2016). Given the complexity of cities and the wide-ranging and interconnected challenges urban communities face, sustainability scholars and practitioners require tools for assessing and articulating sustainabilities that are just, ecologically sound, and resilient, among other critical outcomes (Agyeman and Evans 2003; Newman and Jennings 2008; United Nations 2017).

Visioning is one such tool for establishing a shared conceptualization of desirable future outcomes to guide sustainable urban development. Sustainability visioning provides a structured approach to defining a desirable future(s), steps for transitioning, and mechanisms for assessing potential outcomes (Wiek and Iwaniec 2014). Visions are helpful because they articulate sustainability values (Bennett et al. 2016), set goals for the future (Bai et al. 2016), and provide a structured framing for understanding systems interactions and pathways towards stated goals (Kim and Oki 2011). Sustainability visioning may be used to articulate desirable development in terms of social justice, natural capital, and other outcomes (Agyeman and Evans 2003; Daily et al. 2009; Brown and Quinn 2018).

But perhaps as importantly, we must ask how we can ensure that the processes we use and futures we describe are actually sustainable (Guerry et al. 2015; Berg et al. 2016). This question is particularly pertinent as urban visioning processes often engage participants with low sustainability literacy (Cohen et al. 2015), meaning that scholars and practitioners engaging with diverse communities cannot assume that the outputs and outcomes of these processes are aligned with pathways to sustainability. Recent research has found that the content of urban visions isoften weak in regard to sustainability (John et al. 2015).

How then might we ensure the process of constructing visions yields results that reflect, articulate, and achieve sustainability outcomes? Sustainability assessment is a family of methods that can answer this question. Sustainability assessment is a structured tool for evaluating the sustainability of different processes, sectors, systems, and policies, among other objectives (Ness et al. 2007). Sustainability assessment can be an important element of sustainability visioning scholarship when applied pre-, during, and post-project to frame and evaluate visioning initiatives. In the case described below, an assessment framed around a basic program evaluation logic model (McLaughlin and Jordan 2010) offers a way to organize an assessment that answers this question.

To demonstrate the value of assessment as part of a visioning processes, this paper reviews a case study of a community-based participatory visioning process in a neighborhood in South Carolina, United States. We analyze the case through a principle-based urban sustainability assessment to evaluate the sustainability of the desirable urban outcome and the process and outputs that created it. Specifically, we frame this analysis around a program evaluation model to evaluate the visioning process (a participatory deliberation), its immediate output (a vision report), and projected (natural capital and ecosystem services) outcomes. The research and reflection are driven by the guiding concern of generating futures that are just and preferred by traditionally disempowered communities but that also achieve a truly holistic conceptualization of sustainability. Consequently, our purpose is not to determine through a replicable finding whether or not fair processes generate fair outcomes that are also holistically sustainable. Instead, we provide, describe, examine, and test a novel method for answering this question for case-specific contexts.

In this manuscript, we describe background on sustainability visioning and assessment, our specific case study visioning project, the methods for analyzing the case, and discussion of this analysis. Following a program evaluation framing, we organize each section by process, output, and outcomes. We should note here, that the term visioning can apply to a broad field of disciplines, and throughout this paper, "visioning" and "visions" refer specifically to sustainability visioning.

Sustainability visioning

Sustainability visions are scenarios that specifically define desirable future states. Whereas scenario construction anticipates an array of plausible future changes, the generation of a vision applies a normative frame to a scenario to identify the goals for a specific and desired sustainability transition (Wiek and Iwaniec 2014). Given that there are numerous pathways from a current state to any number of plausible futures, visioning provides a roadmap for a sustainable transition to one future. As such, visions define goals, frame necessary steps, and identify the end point for a sustainability transition while an accompanying suite of scenarios anticipate an array of future changes that might occur if different pathways are taken (Innes and Booher 2004; Iwaniec et al. 2014; Miller et al. 2014).

Visioning is a particularly suitable contribution within sustainability science because much research is focused on problem analysis and reflects on the past while anticipating future challenges. While such descriptive–analytical scholarship is instrumental to framing the challenges society faces, we must also conduct research that sets future goals and establishes strategies for driving transformations that achieve these goals (Miller et al. 2014; Bai et al. 2016; Wiek and Lang 2016).

Such research demands rigorous methods and outcome visions that are high in quality (Wiek and Iwaniec 2014), necessitating a sustainability assessment agenda to validate the work. In terms of visioning research streams to

evaluate, there are a number of approaches for generating visions from modeling based (for instance: (Iwaniec et al. 2014) to participatory (for instance: (Hara et al. 2016) endeavors. In this paper, we are particularly interested in the assessment of participatory, stakeholder-driven processes, and we further explore this approach as a mechanism for developing and improving urban sustainability assessment research framing and methods. The key elements of this contribution, to urban sustainability assessment, are discussed below.

Urban sustainability assessment

Sustainability assessment is a broad field within sustainability science. While sustainability assessment is a well-developed body of research, and generic assessment frameworks have been integrated into sustainability science (for example: (Gibson 2006), urban sustainability assessment is a younger sub-discipline with room to mature.

As a developing sub-field, urban sustainability assessment (USA) literature has been shown to be grounded in weak theoretical framing that does not adequately inform indicator selection and monitoring. Indeed, USA often features large indicator sets that are established based on convenience and data availability, potentially measuring the wrong outcomes or telling incomplete stories (Davidson et al. 2012; Chesson 2013; Ding et al. 2015; Cohen 2017). Consequently, there have been recent calls to ground USA in sustainability principles that provide a holistic framing around which to build indicator sets and guide assessment methods (Ciegis et al. 2009; Davidson et al. 2012; Cohen 2017).

Conducting a holistic sustainability assessment then requires mixed-methods research, of which there are many examples. (Cohen 2017) conducted a systematic review of urban sustainability assessment literature and found that the general body of USA literature reinforced the expressed concerns for more mixed-methods research grounded in guiding principles.

Of relevant value, sustainability visioning literature in general (including the urban context) includes a breadth of research around the role of sustainability principles in informing the construction of normative visions, and such principles have been identified as the benchmark for tracking progress on sustainability transition pathways (Iwaniec et al. 2014; Wiek and Iwaniec 2014; John et al. 2015; Gliedt and Larson 2018). Given visioning literature's well-developed integration of sustainability principles into research and practice—an expressed area of weakness of USA—urban visioning provides an excellent space for driving sophistication in the research around urban sustainability assessment.

Conceptual framework: urban sustainability assessment through program evaluation

As established above, the framing of sustainability visioning can inform the evolution of urban sustainability assessment methods. Basic methods of program evaluation, including logic models (McLaughlin and Jordan 2010), also map quite nicely onto participatory visioning projects. Given, that a visioning process can (and should) involve diverse stakeholders, that it yields immediate outputs (the vision), and it produces implications for long-term outcomes (transition pathways), an urban sustainability assessment of a community visioning project might be best built around a logic model. Such an analysis may be based around the process (i.e., resources and activities), its immediate outputs, and its longer-term outcomes. In the context of sustainability visioning, an assessment might then consider (1) the process of generating the vision in terms of governance and participation, (2) the articulated vision itself as an immediate output, and (3) modeling future outcomes in terms of whether the vision or alternative scenarios are realized in a sustainable way.

Assessing visioning processes

Just as good governance is often deemed important for sustainability, participation and deliberation are common qualities of sustainability science research in general and visioning research specifically (Lang et al. 2012; Miller et al. 2014; Wiek and Iwaniec 2014; Hara et al. 2016). Good governance is emphasized as a critical element of sustainability governance, recognizing the need to include diverse stakeholders in decision making (Kemp et al. 2005; Evans et al. 2006; Leal Filho et al. 2016). Further, equity and justice are central norms of sustainability science (Wiek et al. 2011), and the literature on public decision making often recommends fair and just processes, guided by the theoretical assumption that fair and just processes might yield fair and just outcomes (Bailey et al. 2012).

However, there are numerous obstacles to achieving high quality participation. For example, based on past efforts, it is clear that it is not enough to assume that theory will generate positive outcomes. For instance, public participation in local decision making has a history of manipulation and cooptation (Arnstein 1969; Cooke and Kothari 2001). Further, misalignments between the public participation and local context range from weak top–down buy-in from policy makers to community conditions that inhibit stakeholder attendance at visioning workshops to conditions that limit individuals' abilities to engage, including low civic competence, collaborative capacity, and sustainability literacy, among others (Cohen and Wiek 2017).

At this point, we raise a concern around participatory visioning procedures that assume a sustainable future, particularly in the absence of formal and well-planned assessment. When designing processes to engage stakeholders to envision a sustainable future, is the process truly fair, and does it meet the ideals that the theory assumes? Given these concerns, we assert that an urban sustainability assessment of visioning projects must include consideration of the quality of the processes that generate the visions.

Assessing visioning outputs and outcomes

To assess the sustainability of a vision, the process of its development, and its long-term outcomes, one must establish a working definition of sustainability, as the term has been used by diverse constituents for myriad purposes, confounding its meaning (Farley and Smith 2013). Here, we understand sustainability as meeting the basic needs of all people without surpassing biophysical limits and thresholds of the planet (Raworth 2012).

Evaluations based on such lofty goals can be challenging to organize. In urban sustainability assessment in particular, methods have been predominantly grounded in indicator selection with little theoretical backing, which presents threats and challenges such as cherry picking data, measuring the wrong things, and telling incomplete stories, among other shortcomings (Davidson 2011; Davidson et al. 2012; Chesson 2013; Cohen 2017). Calls for principle-based assessments align with similar assertions that local sustainability policy itself should be derived from core sustainability principles. Such a framing is driven towards achieving sustainability objectives (Pope et al. 2004; Keen and Mahanty 2006), making it particularly suitable for assessing sustainability visions and their resulting policy outputs because sustainability visioning is aspirational in nature and typically grounded in sustainability principles (Wiek and Iwaniec 2014).

Gibson (2006) presents a coherent principle-based framing around eight core criteria for a generic sustainability assessment, though other research has shown that when organizing an enterprise around guiding values, it is strategic to limit oneself to no more than five (Nevens et al. 2008; Cohen 2017). For the purpose of this study, we, therefore, refined the list of principles offered by Gibson into five core values (Table 1).

One way to reach these principles is to invest in diverse capital assets. For example, (Matson et al. 2016) argue that sustainable futures can best be attained when aligning societal conditions around five capital asset categories (Table 2). In USA, we use these principles and measures of capital to frame assessment across a logic model (Fig. 1).

Table 1 Guiding sustainability principles (adapted from Gibson 2006)

Principle	Definition
Social–ecological systems integrity	"… establish and maintain the long-term integrity of socio-biophysical systems and protect the irreplaceable life support functions upon which humans as well as ecological well-being depends (270)."
Resource maintenance	"… reducing extractive damage, avoiding waste and cutting overall material and energy use per unit of benefit (271)."
Equity and justice (intra- and intergenerational)	"…reduce dangerous gaps in sufficiency and opportunity…between the rich and poor" and "favour present options and actions that are most likely to preserve or enhance the opportunities and capabilities of future generations (270)."
Stable and meaningful livelihoods	"Ensure that everyone…has enough for a decent life and…has opportunities to seek improvements in ways that do not compromise future generations' possibilities for sufficiency and opportunity (270)."
Good governance	"…apply sustainability requirements through more open and better informed deliberations…fostering reciprocal awareness and collective responsibility, and more integrated use of…decision-making practices (271)."

Table 2 Capital assets for sustainability (Matson et al. 2016)

Capital asset	Description
Natural capital	"Land, water, biotic, mineral resources; climate and atmosphere; biodiversity, etc. (17)"
Human capital	"Human population (size, distribution, health, education, and other capabilities) (17)"
Manufactured capital	"Buildings (homes, factories and their products); infrastructure (transport, energy, information) (17)"
Social capital	"Laws, norms, rules, customs; institutions (political, judicial, economic); trust (17)"
Knowledge capital	"Codified knowledge (conceptual, factual, practical, and know-how) (17)"

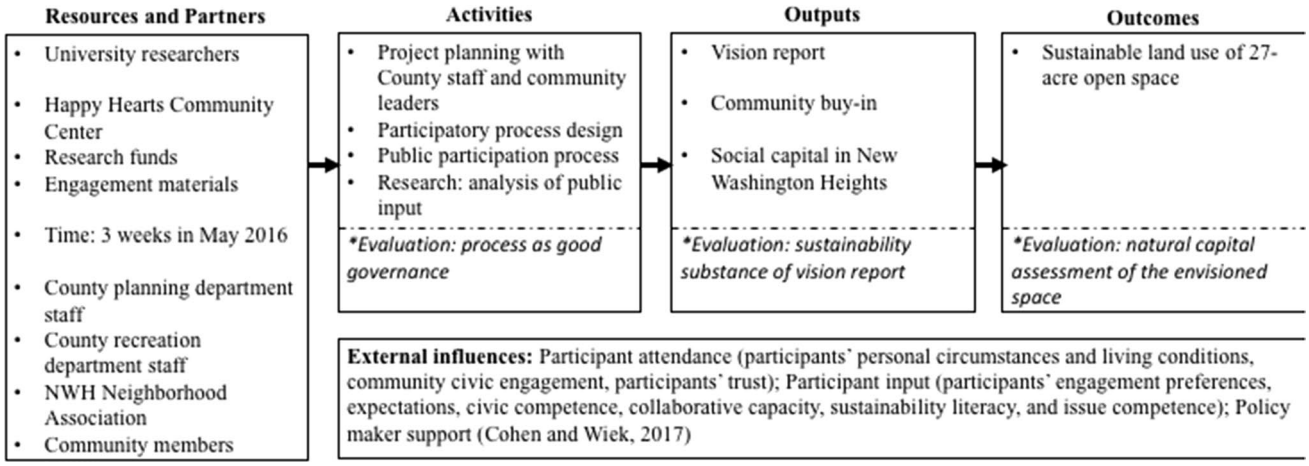

Fig. 1 Logic model frames the sustainability assessment as a program evaluation for the public participation process in New Washington Heights

Materials and methods

To evaluate the sustainability of the case study, we employ a mixed-methods urban sustainability assessment framework that we developed for this research. We propose this framing and methodology as an approach to determine the sustainability of urban visioning processes, their outputs, and outcomes. Figure 1 summarizes the case study, which we present below, and charts the assessment methods as the activities, outputs, and outcomes.

Process evaluation: methods for assessing the participatory process

The process evaluation assesses a case study in terms of the identified sustainability principle Good Governance (Cohen 2017). The analysis is based on qualitative data acquired through direct observations and interviews with stakeholders. The assessment is informed by the literature on evaluations of good governance in participatory planning (Table 3).

To assess the case study process, researchers interviewed 18 stakeholders involved in the process, including residents, public staff and elected officials, and members of the research team that facilitated the participation (Hassenforder et al. 2016). Participants who engaged in multiple events were chosen for interviews as they had the most exposure to the planning process and strongest context from which to respond.

We conducted a content analysis of the interviews through deductive coding using MAXQDA (Fereday and Muir-Cochrane 2006). Interview transcripts were coded using the nine evaluation criteria, tracking when respondents' comments related to these issues. We then recorded for each coded segment, whether the respondent spoke negatively, neutrally, or positively about the process.

Output evaluation: methods for assessing the vision report

A vision report that articulated community preferences was the immediate output of the visioning process. Given the previous findings in the literature that urban visions often lack sustainability substance (John et al. 2015), this aspect of the study inspects the inclusion of the sustainability principles and capital assets in the case study vision report.

We conducted a content analysis of the report, using deductive coding. Here, ten codes were applied, using the sustainability values listed in Table 1 as well as the capital assets listed in Table 2. These codes were selected to determine two things: (1) whether the report adequately articulates a vision grounded in sustainability principles and (2) whether the vision strategically calls for investment in social–ecological assets that might drive sustainability outcomes.

Every piece of the text that aligned with one of these stated values or capital assets was coded for its relevant value or capital asset, using MAXQDA12. The number of instances each value or capital asset appeared was then tallied to ascertain the quantity of references to potential sustainability outcomes. We coded the body of the vision as well as the implementation plan. We did not code the executive summary to avoid duplicating segments that reappear in the vision itself. We also chose to not code the methods section as it describes the participatory process, which was already assessed in terms of governance, as described above.

Table 3 Evaluation criteria for assessing the participatory process

Criterion	Description	References
Cost effectiveness	Procedure should in some sense be cost-effective	Rowe and Frewer (2000)
Opportunity to influence	Participants' opportunity to influence (enough time; involved early enough; access to policy makers and leaders; and organization structure)	Blackstock et al. (2007), Brown and Chin (2013) and Bryson et al. (2013)
Quality of participation	Quality of participants' interactions with one another and continued participation over time	Fung and Wright (2006) and Bryson et al. (2013)
Representation	Participants should constitute a broadly representative sample of the population of the affected public	Rowe and Frewer (2000), Fung and Wright (2006), Blackstock et al. (2007), Timotijevic and Raats (2007), Brown and Chin (2013), Bryson et al. (2013) and Wiek and Iwaniec (2014)
Satisfaction	Enjoyment of the process, and the participants' willingness to participate in another, similar event in the future	Timotijevic and Raats (2007) and Li et al. (2013) and Brown and Chin (2013)
Transparency	Extent to which the motives and the ways in which decisions are made throughout the process are made clear to participants	Rowe and Frewer (2000), Graham et al. (2003), Blackstock et al. (2007), Timotijevic and Raats (2007) and Brown and Chin (2013)
Accountability	Level of answerability and enforcement on decision makers	Graham et al. (2003), Ackerman (2004) and Blackstock et al. (2007)
Legitimacy	Whether the outcomes and process are accepted as authoritative and valid by participants and decision makers	Smith (1973), Graham et al. (2003), Blackstock et al. (2007), Timotijevic and Raats (2007), Brown and Chin (2013) and Bryson et al. (2013)
Trust	Public participation should build trust and lasting relationships	Timotijevic and Raats (2007), Brown and Chin (2013) and Bryson et al. (2013)

Outcome evaluation: methods for assessing land use and land cover change scenarios

A natural capital assessmentof how the case study site is developed under different scenarios provides one way to assess the outcomes of the visioning process. An uncertain development future was the impetus for the initial project. A subsequent community vision report articulated a community preference for a large public park. To assess the outcome of the vision, a baseline and four land use and land cover change scenarios were created using ESRI ArcMap (Figs. 2, 3). The land use and land cover classification process began with the spatial analysis of the study site using aerial imagery. The imagery was digitized in ESRI ArcMap based on the National Land Cover Database (NLCD) land use and land cover (LULC) classification types. Each scenario keeps existing built cover (e.g., homes and roads) in place. Each LULC classification type was mapped as spatially explicit polygons and then converted to one-meter square pixels for subsequent analysis.

The spatial evaluation of current and future natural capital was done using InVEST 3.3.0 (Integrated Valuation of Ecosystem Services and Tradeoffs). We used InVEST models of carbon storage and sequestration, habitat quality, and nitrogen, phosphorus, and sediment delivery to waterways. As a modeling software InVEST uses raster inputs of land use and land cover and biophysical properties (e.g., slope, erosivity) that are linked with ecological production functions to create spatially explicit maps for the above ecosystem services. Land use and land cover inputs were classified by hand based on aerial imagery (as referenced above). These vector files were reclassified as InVEST input rasters at a 1-m resolution for each scenario. Data for required biophysical inputs (elevation, precipitation, erosivity, erodibility, carbon pools, and habitat sensitivity) were derived from primary and gray literature. For example, sensitivity inputs for habitat quality were taken from spatially explicit models at the county scale (Wood and Quinn 2016) and net primary productively in carbon pools from Andersen et al. (Andersen et al. 2015). Greater detail on the description, inputs, and outputs of each InVEST model are reported in Table 1 of Brown and Quinn (2018) and Kareiva et al. (2011).

Results

Here we first describe the case study visioning project. Following the case study, we present the results of the sustainability assessment of the visioning process, visioning output, and visioning outcomes.

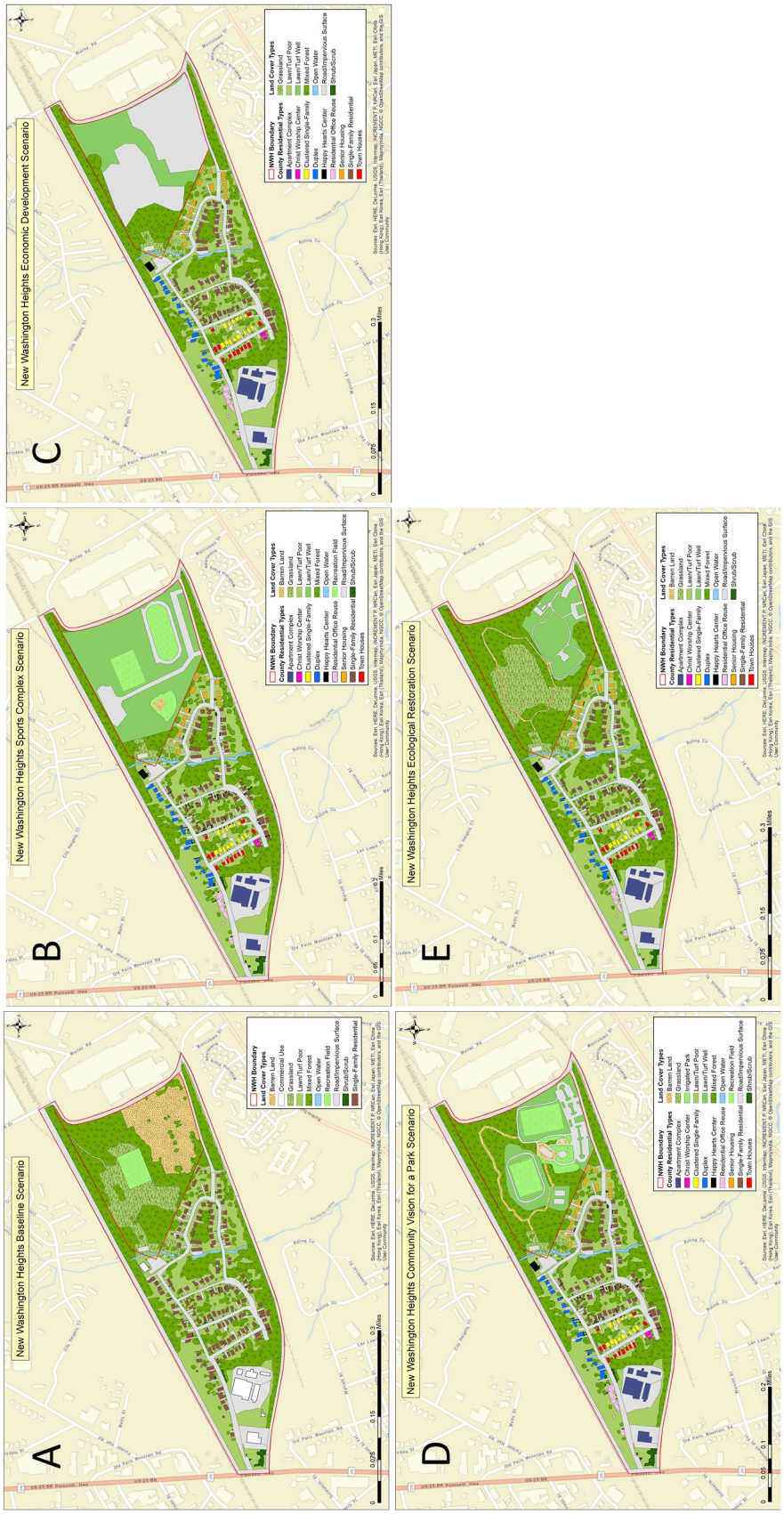

Fig. 2 Land use and land cover scenarios (baseline, sports complex, community vision, ecological restoration, and economic developments); that emerged from the planning processes for NWH

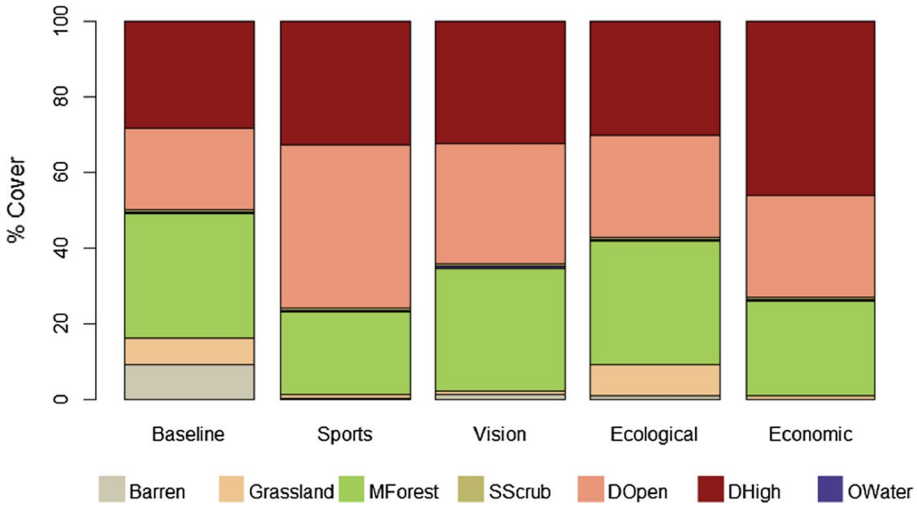

Fig. 3 Relative LULC percentages in baseline, sports complex, community vision, ecological restoration, and economic developments scenarios; LULC types include barren, grassland, mixed forest, shrub/scrub, developed, open space, developed, high intensity, and open water

Case study

Setting the stage

The case study presented in this paper reflects a visioning process and resulting sustainability assessment in New Washington Heights, a small community located just outside the city limits of Greenville, South Carolina, United States (Fig. 4). The neighborhood is predominantly African American (85.5%) with a minority but growing Hispanic population (11.4%). New Washington Heights is home to just 141 housing units, 76.6% of which are occupied, and 42.8% of households are below the poverty line (US Census 2015).

The community is adjacent to a 27-acre undeveloped open space (Fig. 4c). Once the location of a segregation-era black high school (Washington High School), the site is presently vacant, as Greenville County government demolished the empty building in 2015. The County drafted a plan to build a sports complex in the space, hoping to maximize revenues through renting fields to recreational sports leagues. Concerned that a 27-acre sports complex might not align with their interests, members of the New Washington Heights Neighborhood Association reached out to both County staff and researchers at a nearby university to find alternative development options.

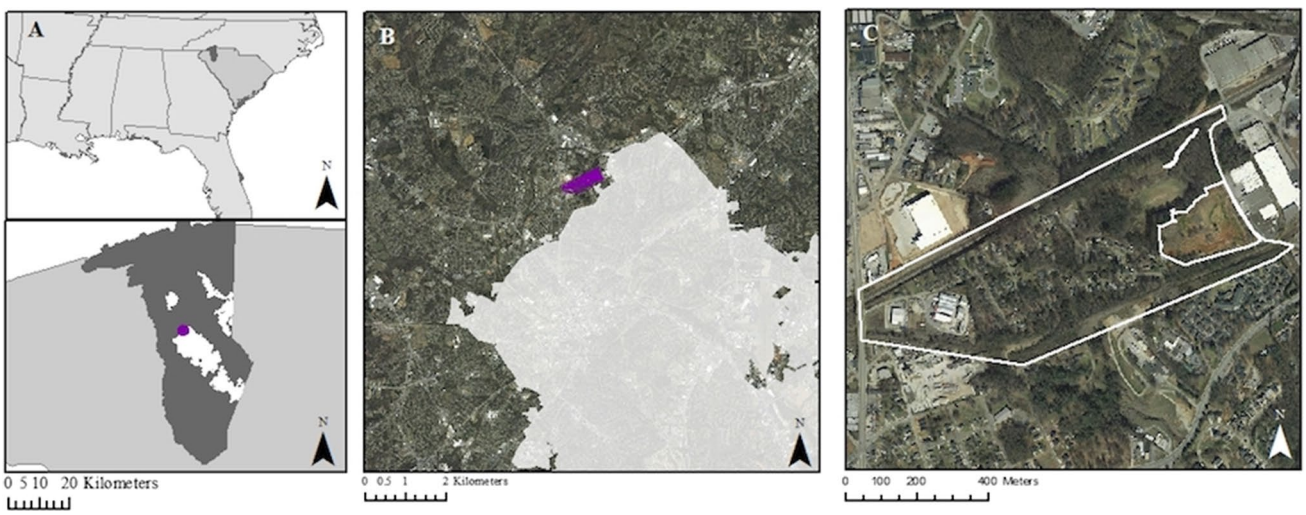

Fig. 4 Regional context (**a**, **b**) and local land cover map (**c**) of New Washington Heights neighborhood located in Greenville Co., SC (**a**) outside of the city of Greenville (**b**; white shading)

Case study process: participatory visioning in New Washington Heights

The process for engaging stakeholders was driven by concern over the external influences identified in the logic model, with the goal of achieving quality participation and avoiding common misalignments between public participation processes and local contexts (see Cohen and Wiek 2017 for a longer discussion).

In May 2016, a research team (from Furman University) designed and facilitated a three-week, participatory visioning process to draw out the community's vision for the 27-acre site and articulate their vision to the County government. During this process, 112 neighborhood stakeholders engaged through seven events (Table 4).

The visioning process began with a Saturday kickoff event and community party at the neighborhood's Community Center. Here, community members congregated, while children played. Researchers engaged community members via a mapping activity which prompted participants to identify locations in the site at which they would like to see specific amenities installed or themes of activities introduced. Participants identified locations with a numbered sticker and researchers wrote down ideas, tagging them to the corresponding numbers.

Recognizing the importance of Washington High School's legacy in the community, researchers met with members of the Washington High School Alumni Association to discuss opportunities for honoring the past in future developments. During this event, alumni discussed their experiences at the high school, the school's role in the surrounding community, and ideas for commemorating the school on site. Following a luncheon, participants took a walking audit of the project site and further explored ideas to include in the vision. After discussing the past with the Alumni Association, researchers met with current neighborhood leaders to discuss the current realities in New Washington Heights. The conversation explored ways in which changes implemented on the project site might be leveraged to compliment community assets and address challenges.

One late afternoon/early evening, two researchers facilitated an engagement in a neighboring community at the Brutontown Community Center. They led the same mapping activity that was conducted during the kickoff event. First, they engaged with parents picking up their children from an after-school program. Next, they moved the table to the gym to speak with young people playing basketball during open court. On another evening, small groups of researchers paired with members of the New Washington Heights Neighborhood Association to walk the community's streets and go door-to-door, meeting residents at their homes. Residents responded to a short questionnaire. Lastly, one evening, researchers met soccer players, who are members of nearby Latino communities, in the neighborhood parking lot as they arrived to use the field for pickup soccer games. A soccer field is one of the only spaces that is maintained on the 27-acre site. Researchers asked participants about how they use the space and solicited ideas for how to better meet recreation needs in the future.

Case study output: vision report

At the conclusion of the participatory process, researchers analyzed the input they collected from the community and organized participant ideas around emergent themes. Eight themes were identified, and researchers created a poster for each theme, featuring two to four options for operationalizing them, based on participant ideas. At a final visioning workshop, participants discussed the proposed themes and ideas, highlighting benefits and challenges for each option.

In this case study, a vision report is used as the process output that articulated the community's preferences, grouped around the eight guiding themes (Table 5). Ultimately, the public participation process resulted in a shared community vision for a large public park.

The vision presents a three-phased implementation plan beginning with (1) activating the neighborhood's community center and the immediately adjacent property, (2) improving an already utilized sports field, and (3) ultimately building a large, signature park. The researchers that drafted the final report presented the vision to County Council and received

Table 4 Participation by event

Event	Date	Event participants	New participants	Total participants
Mapping activity at kickoff event	5/14/2016	42	42	42
Washington High School Alumni Association lunch	5/17/2016	8	8	50
Current state meeting	5/17/2016	3	0	50
Mapping activity at Brutontown Community Center	5/17/2016	16	16	66
Door-to-door canvassing	5/18/2016	27	24	90
Interviews at pickup soccer game	5/19/2016	17	17	107
Visioning workshop	5/19/2016	10	5	112

Table 5 Guiding themes of the vision report

Theme	Description
A commemorative place	Honor the history of the community and Washington High School, specifically featuring a monument to the school
An active place	Include facilities for sports, recreation, physical fitness, and youth play
A refreshing place	Install water features to provide recreational opportunities during hot summer days
A leisurely place	Add infrastructure such as picnic pavilions, tables, walking paths, and benches to foster community and peace
A connected place	Provide improved accessibility to the space via road improvements and an extension of the Swamp Rabbit Trail
A safe place	Ensure safety via lighting, sidewalks, and other features
A creative place	Support the arts through both physical infrastructure and programming
A coordinated place	Establish and support programming to capitalize on the new amenities made available to the community, including after-school programs, events, and sports leagues, among others

verbal commitments from Council and County staff that the community's stated preferences would be used to guide future development of the site. At the time of writing this article, public funds had not yet been committed to implementing the project.

Case study outcome: future land use and land cover

A public park in the current open space was the most desirable land use change outcome to the residents of New Washington Heights; however, to what extent is a public park a desirable future from a broad and inclusive sustainability perspective? Past research has shown that access to quality open space benefits social capital outcomes in neighborhoods (Karuppannan and Sivam 2011), but we seek to determine whether we can assume that it will also deliver positive natural capital outcomes as well. To address this concern, we compared the community vision to other articulated land use scenarios that emerged via the planning processes. The non-baseline scenarios reflected alternative plausible future uses for the area, articulated by diverse stakeholders, including local community members, the County, and conservation advocates. For example, a Sports Complex scenario depicts Greenville County's initial plan for multipurpose sports fields; an Economic Development scenario describes a future state, where the space is developed for light industrial uses and stems from skepticism of neighborhood residents that distrust local government intentions; an Ecological Restoration scenario describes a small-scale nature preserve that conserves and restores the natural environment; the Community Vision scenario depicts the community's vision for a park; a Baseline scenario reflects the current state of the 27-acre plot of land.

Results of process evaluation

According to stakeholders from the visioning process, participation included both shortcomings and strengths. Table 6 tallies the total number of statements by respondents that we coded as pertaining to each assessment criterion. We then note, for each criterion, how many statements were negative, neutral, or positive. Neutral statements typically either demonstrated ambivalence on the part of the respondent, or their true meaning was difficult to interpret in this analysis.

Based on the number and classification of coded segments from the content analysis presented in Table 6, we

Table 6 Stakeholder assessment of public participation process

Criteria	Total-statements	Negative statements	Neutral statements	Positive statements
Cost effectiveness	7	5	1	1
Opportunity to influence	10	5	0	5
Quality of participation	8	1	2	5
Representation	4	3	0	1
Satisfaction	6	0	1	5
Transparency	10	6	1	3
Accountability	9	3	3	3
Legitimacy	10	2	1	7
Trust	8	2	2	4

Table 7 Results of the process evaluation

Criterion	Evaluation
Cost effectiveness	Low
Opportunity to influence	Moderate
Quality of participation	Moderate to high
Representation	Low
Satisfaction	High
Transparency	Moderate
Accountability	Moderate
Legitimacy	Moderate to high
Trust	Moderate

evaluated the process against the assessment criteria on a scale of low, moderate, and high (Table 7). The criteria rated as low received predominantly negative statements, whereas the criteria rated as high received mostly positive statements. The moderate criteria received a balanced mix of negative, neutral, and positive statements.

A significant concern revolved around the County's ability to replicate such a visioning process without the presence of a University research team playing the role of organizer and facilitator. One member of the research team noted, "[The county government] probably wouldn't have time, people, and resources [to hold a participatory planning process]. I think 8 was a decent class size, but as far as the county was doing it they would need one or two people and they wouldn't have as many events." From the perspective of a University researcher, the visioning process did not tax the research team's resources, but this respondent did recognize that without the collaboration between the County and University, the public agencies would never have been able to afford the financial and primarily the human resources to conduct such intensive engagements.

Respondents were divided on the opportunity for participants to influence decision making. On the one hand, a respondent stated, "Stuff like the visioning worship at the end was just like. We advertise it, we advertise it, we advertise it then don't get anyone to show up. 10 people come, that's great. That's only 10 people whose voice is included at the very end." This highlights the tension that certain events had lower attendance, and in many cases, the most engaged members of the community were the most likely to attend every event, and as a result have a larger voice. On the other hand, another participant argued that, "We had an array of engagements … which I think is good because you need to mix it up and give people different ways to engage, different times they could come in." This speaks to the process design, which offered diverse forms of engagements offered at diverse days and times.

Participants were overwhelmingly satisfied with the process. Much of the satisfaction was tied to a feeling that the vision presented back to the community articulated precisely what the community felt it had said. For instance, one respondent said, "I think it really represented everything that we talked about when we told about the things that we did," and another exclaimed, "I am more than satisfied. We're just happy to have the help happy to have you all helping us here with this. I don't know what we would have done. I don't think we would have been this far."

Despite satisfaction with the process and its output, some participants were concerned with the legitimacy of the decision in terms of weak accountability of the local government. Furthermore, residents did not see a clear continuation of the visioning process into formal policy making, as one community member noted, "I don't know who is holding the baton … I don't have any sense of whose responsibility it is even to take the next step." Much of this sentiment can be attributed to a perceived lack of downward accountability from the County to the community, as one resident claimed, "If Greenville County does not do anything, then nothing is going to happen. I think it would have been more effective and more, empowering … if they had willing to be more a part of that process."

Much of the critique of the process is tied to the community's long-standing distrust of the local government. For instance, the legacy of underrepresentation in decision making as well dissatisfaction with past planning experiences reduce government accountability in the eyes of residents and weakens the legitimacy of officials and agency staff. While there was some distrust of local government, community members had greater faith in the researchers, with one saying, "I feel that you all, even though we may not be there on every level,my trust is enough in you all to know that we will hold you accountable." These are important considerations when attempting to co-create sustainability outcomes in community settings.

Table 8 Number of instances of articulated sustainability principles

Sustainability principle	Number of instances included in vision
Social–ecological systems integrity	2
Resource maintenance	4
Equity and justice (intra- and inter-generational)	10
Stable and meaningful livelihoods	0
Good governance	0
Total	16

Table 9 Number of instances of articulated capital assets

Sustainability principle	Number of instances included in vision
Natural capital	3
Human capital	1
Manufactured capital	15
Social capital	16
Knowledge capital	1
Total	36

Results of output evaluation

The content analysis of the vision report yielded two summary reports: the vision's content as it relates to guiding sustainability principles (Table 8), and the presence of capital assets in the vision (Table 9). Equity and justice was the

most frequently articulated sustainability principle. Similarly, Social Capital was the most frequently mentioned capital asset for sustainability.

Livelihoods and governance are not addressed at all in the vision, and Resource Maintenance and Social–Ecological Systems Integrity receive little attention. Manufactured Capital is discussed frequently, often in terms of park infrastructure, including amenities like an amphitheater, picnic shelters, sidewalks, parking, bathrooms, and other installations one would typically expect to see at a neighborhood park. Natural Capital and Social–Ecological Systems Integrity are not discussed in much detail, and their references mostly address preserving existing trees and open space, though the narrative of a greenspace park does assume some level of natural capital investment.

Equity and Justice was a focus of the community, but participants' articulated vision revolved mostly around intergenerational equity within the neighborhood, with opportunities for children as well as park amenities that serve an aging population. Text segments coded for Equity and Justice include "an aging community", "creating multigenerational linkages at this recreational site", and "desire for children to have something to do when not in school". We interpret this through the lens of a low-income minority community seeking amenities that they have traditionally not had easy access to. For instance, the vision notes the need "to remember the historical roots of the community" which was a segregated African American community with a segregated school in the American South. The community vision also calls for recreational programming that addresses inequitable access to transportation: "neighborhood teams could also provide more opportunity for families with limited access to transportation".

Social Capital pairs logically with the principle of Equity and Justice, and this capital asset featured prominently in the vision. Examples of text segments coded as Social Capital include, "The people of NWH want a strengthened sense of community", "establishing programming that activates the entire space", and "Crime and safety are significant concerns among residents of the community".

Results of outcome evaluation

While the vision does not directly discuss aspects of natural capital, we approached this research asking whether a vision for an open space will inherently create some natural capital benefits via ecosystem services. Not one scenario maximized all ecosystem services (Table 10, Fig. 5). All scenarios reduced the total amount of sediment delivered to local water ways compared to the baseline. Within the scenarios, the Community Vision and Ecological scenarios had greater sediment delivery relative to Sports Complex and Economic Development. Three of the four scenarios increased carbon storage, contributing to climate change mitigation, with Economic Development the only scenario reducing carbon sequestration. There was a similar pattern in the total amount of carbon storage. Nutrient export patterns were similar, where the Sports scenario resulted in the greatest net export followed by the Community Vision. Last, Habitat Quality was highest in the Ecological and Sports scenarios. The lack of a clear best scenario reinforces the clear tradeoffs between different social outcomes.

Table 10 InVEST natural capital assessment indicator results by scenario

Indicator	Scenario				
	Baseline	Business	Restoration	Sports	Vision
Carbon sequestration	0.641	0.000	0.889	0.725	1.000
Habitat quality	0.536	0.000	0.993	1.000	0.813
Nitrogen export	0.011	0.027	0.000	1.000	0.291
Phosphorous export	0.049	0.000	0.190	1.000	0.414
Sediment retention	1.000	0.020	0.187	0.000	0.175

Estimates scaled between 0 and 1 to communicate relative difference

Discussion

Given the lack of clear theoretical framing in urban sustainability assessment literature, this paper demonstrates why organizing assessments around a theoretical framework is so vital. On face value, we might be happy that numerous stakeholders asked for a park, assuming a park to be socially desirable and to offer natural capital outcomes. Analyzing the case through the lens of sustainability principles and capital assets provides a broader, richer, and more complete understanding of both the strengths and weaknesses of the vision through social and natural science perspectives.

As an expression of sustainability principles, the visioning process (participatory deliberation), its output (vision report), and outcomes (modeled vision scenario) make strides towards sustainability, but there is room to better infuse sustainability throughout. From the perspective of inputs, in particular good governance, the participatory visioning process was mostly successful, but it could have been more empowering. Furthermore, respondents felt that local government accountability was low and they were mixed in terms of their trust in public officials to actually carryout their ideas. This resonates with the external factor of Policy Maker Support (Cohen and Wiek 2017) that we identified in the logic model. That being said, the vision itself overwhelmingly meets the wishes and interests of the

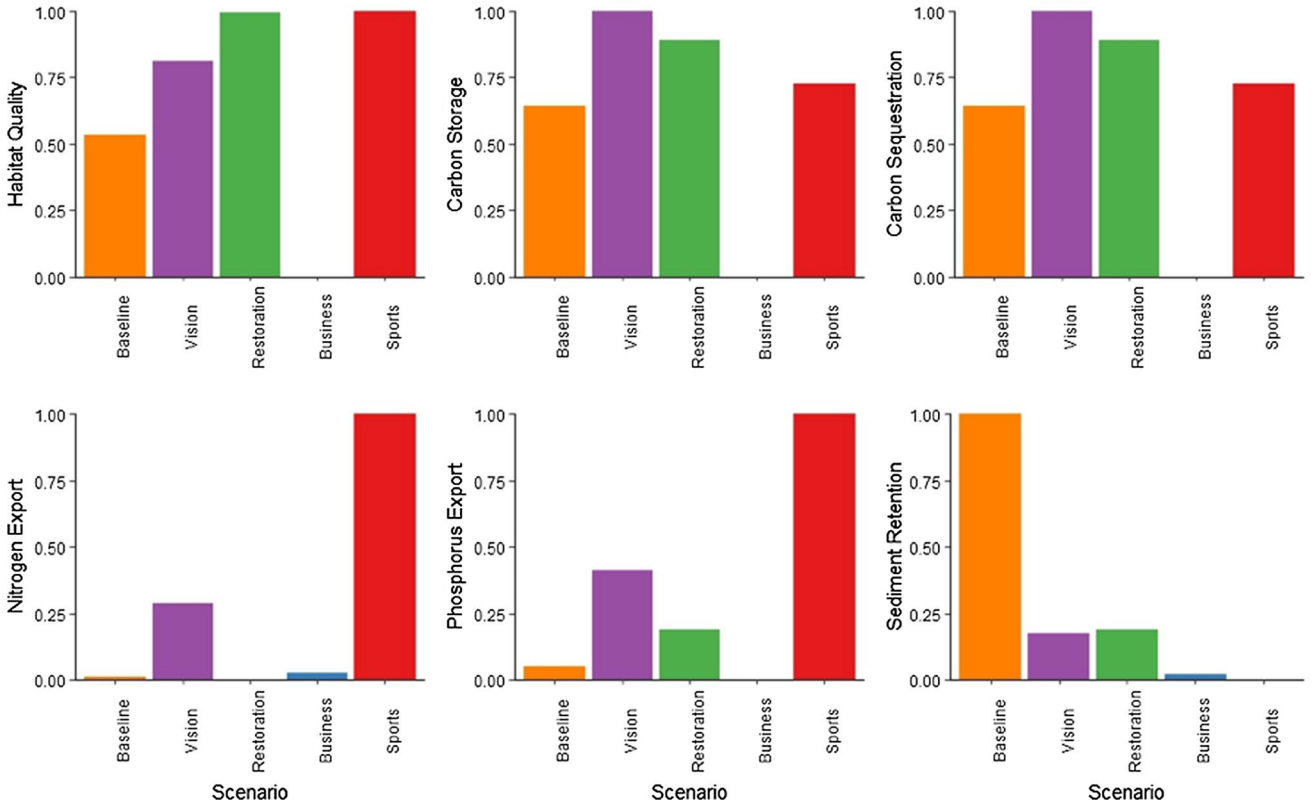

Fig. 5 Habitat quality, carbon storage, and carbon sequestration InVEST nutrient delivery (nitrogen and phosphorous export) and sediment delivery InVEST model output graphs

community, and respondents reported high overall satisfaction with how they were engaged.

The content of the vision report as an output describes a park. It can be considered to describe a desirable outcome from the community's perspective, but from a sustainability perspective, it may not go far enough. We have not set goal for the number of times a principle or capital asset is articulated, but the relative occurrence of the data codes provides insights. For instance, Social Capital and Justice and Equity appear to be priorities over other concerns. This is not surprising, given the demographics of the community and the socio-economic trends of the Southeastern United States. Manufactured Capital was also discussed frequently, focused on the physical infrastructure that would be included in a park as well as improvements to neighborhood roads. In most cases, Manufactured Capital included material and energy-intensive infrastructures that may not necessarily be considered sustainable (i.e., paving for a basketball court or parking lot). Natural Capital was not a priority of the vision, nor was Social–Ecological System Integrity and Resource Maintenance. Here, when Natural Capital did come up, it was typically oriented around the open space that would be associated with a traditional park.

Given the vision report's emphasis on Social Capital and Equity and Justice, from a holistic sustainability perspective, we had some concern that Natural Capital and Ecological Integrity were de-emphasized. Therefore, a Natural Capital assessment of the medium- to long-term outcomes was critical to determine whether a park with positive social outcomes might also present a tool for maximizing ecological goals. We found that habitat quality and carbon were greater and sediment export was lower in the community vision as compared to the baseline scenario, suggesting the community vision enhanced natural capital. However, and likely due to an increase in managed lawn, the vision increased nutrient export, which could decrease local water quality for human and natural systems. The sports complex, however, with its extensive managed fields, had the greatest increase in nutrient export with likely the greatest impact on water quality. The ecological restoration scenario was, not surprisingly, the most optimal for natural capital, but likely provides the least amount of recreation space for community members, though trails for hiking and natural exploration could provide unexpected restorative health benefits.

Throughout the sustainability assessment, we also noted multiple principles and capital assets that were either completely missing or only insignificantly included. For

instance, the vision provides no pathway to creating livelihood opportunities for residents of New Washington Heights, which is troubling considering the level of poverty in the neighborhood. Furthermore, while Equity and Justice are clearly valued, the vision does not do much to present options for investing in the Human and Knowledge Capital of the community, which has been marginalized in Greenville County for decades. Also, Resource Maintenance is not emphasized while the vision calls for an investment in resource and energy-intensive Manufactured Capital. Reading across all five sustainability principles and capital asset categories, it becomes clearer that the New Washington Heights visioning process created a shared vision, but the product was not necessarily a strong sustainability vision.

There are some limitations to the study. First, we framed this research as a mixed-methods analysis, but we could have selected additional methods. For instance, we used a Natural Capital assessment to model the vision, but we also could have conducted an urban metabolism analysis to better understand the ways Manufactured Capital and Resource Maintenance are impacted by material and energy flows through the park's lifecycle (Goldstein et al. 2013) and how meeting community needs drives community resource flows (Nagpure et al. 2018). Second, each individual analysis could have been better supported by additional data. We could have taken physical samples from the site to provide ground truth to the models, just as a larger sample size of respondents could have better substantiated the conclusions we drew from stakeholder interviews. The InVEST software itself has been used less frequently in urban settings. These issues highlight the realities often faced by stakeholders in public planning processes: time and other resource constraints (Cohen and Wiek 2017).

These limitations also substantiate the importance of an integrative study of this nature. For one, no single assessment method can adequately describe the sustainability of the project. However, building the sustainability assessment around a logic model of the project and treating it as a program evaluation allow us to take a step back and reflect across different analyses, in this case the participatory process (activities), its resulting vision report (outputs), and modeled vision scenario (outcomes). With diverse data types and analytical methods, we can generate a range of evidence to frame our insights more broadly about the overall picture. This paper describes an assessment that was conducted entirely after the fact, but future visioning assessments should attempt to incorporate elements of the methods reported here before, during, and after the visioning process. In this sense, sustainability assessment may then be leveraged as a visioning tool for both project planning and evaluation.

Conclusion

The research presents a novel way to organize urban sustainability assessment around a program evaluation framing, and grounding it in sustainability principles, an identified gap in previous urban sustainability assessment literature. Such a mixed-methods approach allows one to think integratively across all aspects of the project, applying a holistic perspective of sustainability to the assessment.

This particular urban sustainability assessment addresses another gap identified in past literature that urban visioning projects could better infuse sustainability in their outputs and outcomes by offering a methodological framework for assessing visioning projects. Here, we present a case study of a visioning process in which the facilitators sought community sustainability, but the vision they co-created with the community fell short of sustainability aspirations. Nevertheless, the vision was created through a fair and just process, and the vision included some elements that aligned with sustainability principles. The long-term outcome of a public park can benefit natural capital in the community, and if leveraged properly it can provide a space to grow social capital aswell.

The assessment framework presented and tested in this paper can be a useful tool for guiding visioning projects in other contexts. However, future visioning processes might consider implementing tools to pre-select sustainability strategies (for instance, see: (Cohen et al. 2015) to better strengthen the sustainability substance of the vision and its long-term outcomes. Other means for rapidly assessing the sustainability of participant ideas immediately following engagements might help participatory researchers better align participant-constructed visions with sustainability in mind. Such initiatives paired with the analytical approach presented in this paper may help to better infuse sustainability across urban visioning and development projects.

Acknowledgements We would like to thank the residents of New Washington Heights and specifically the board of the Neighborhood Association for welcoming us into their community. We would also like to thank Mike Winiski for co-leading the public engagement process and Melanie Brown for her consulting on research methods for the natural capital assessment. Demi Marshall and Tim Sharp were supported by the Furman Advantage Summer Research Fellowship program.

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