

# **Leveraging Landscape for Human Health:**

**Retooling the SITES Rating System to Promote Built Landscapes as Health Assets**

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**Abstract**

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Our health is sustained, in part, by the built landscapes in which we live our lives. These landscapes—from bus stops to national park systems—influence human health by enabling some activities and discouraging others, by inviting some users while excluding others, and by supporting, or antagonizing, our physiological and mental processes. By designing, constructing, and managing built landscapes with the consideration that they are health assets, we can better enlist their full potential in our efforts to combat health crises and promote well-being. The Sustainable SITES Initiative (SITES), North America’s only widely available sustainability rating system for built landscapes, is uniquely positioned to promote such an elevated awareness of the health value of built landscapes. This thesis examines the SITES Initiative and reconsiders its approach to promoting human health through built landscapes, offering several recommendations for improvement. Although SITES incorporates many important health factors into its rating system, as it is currently structured it is possible for a landscape to achieve SITES’ highest level of certification without earning any of its health-focused credits. The recommendations in this thesis aim to increase the significance and visibility of health factors in SITES’ assessment. One key recommendation is that SITES incorporate the concepts of affordances and enabling landscapes so as to encompass a more holistic and empowering approach to health.

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## **Chapter 1: Assessing Healthy Landscapes**

Our health is rooted in the places in which we live our lives. Built landscapes—from bus stops to national park systems—influence health outcomes by enabling some activities and discouraging others, by inviting some users while excluding others, and by supporting, or antagonizing, our physiological and mental processes. By planning, designing, constructing, and managing built landscapes as health assets we can enlist their full potential in our efforts to combat health crises and promote well-being.

This thesis critiques the way that The Sustainable SITES Initiative (SITES), North America's only widely available sustainability rating system for built landscapes, incorporates human health concerns into its assessment of landscape sustainability, and offers recommendations for improving the SITES system's engagement with the health dimensions of built landscapes. Though SITES incorporates many important health factors into its rating system, as it is currently structured it is possible for a landscape to achieve SITES' highest level of certification without earning any of its health-focused credits. The recommendations in this thesis aim to increase the significance and visibility of health factors in SITES' assessment. One key recommendation is that SITES incorporate the concepts of affordances and enabling landscapes so as to encompass a more holistic and empowering approach to health. A greater consideration of the health dimensions of the landscape could enable the SITES initiative to be even more impactful in promoting holistic sustainability through landscape.

Health is an integral component of a sustainable vision for human life on this planet. In 1987, the Brundtland Report (Brundtland Commission) argued convincingly that a sustainable future for humanity requires well-functioning economic and social systems in addition to environmental vitality. Health is foundational to these systems and accessible, resource-efficient opportunities for sustaining health are necessary components of a complete vision for a sustainable future. Though SITES promotes many sustainable practices in landscape design and management, the majority of these practices relate to environmental sustainability. SITES touches on the human health potential of built

landscapes but does not bring the same level of rigor and degree of consideration to the health dimension of landscape that it brings to the ecological dimension. This thesis offers ways to balance that focus and bring the health dimension into greater consideration.

As a rating system, SITES aggregates and promotes best practices in sustainable landscape development and management and holds considerable promise as a way to promote the creation of ecologically and socially sound landscapes. SITES brings to landscape what LEED and similar rating systems bring to buildings—an accessible, comprehensive, and applicable understanding of the practical components of sustainability. With its influence on public policy and on market performance, SITES impacts which aspects of landscape are recognized and developed. Currently, SITES promotes a perspective of landscape as primarily an ecological asset. While it is important to monitor and assess this aspect of landscapes, this framing obscures landscape’s direct role in the social and cultural processes that substantially determine health and well-being. Fully understanding landscape’s role in human health and in sustainability requires a broader conception of landscape that acknowledges its social and cultural aspects along with its ecological ones. It requires attending to the many ways landscapes facilitate human health such as mediating toxic exposures, supporting human togetherness, and providing opportunities for active lifestyles. By considering a broader concept of landscape, SITES could more coherently address and communicate landscape’s full potential for promoting human health.

## **Research Questions**

In this thesis, I ask several questions around health and how it can be more fully incorporated into the SITES initiative.

### **What is health?**

A critical first step in advocating for a fuller treatment of health within the SITES initiative is to better understand health and its multiple dimensions. SITES’ guidelines and supplemental literature do not explore this question, but I believe that developing a clear and holistic definition of health provides a necessary context for my critique.

Health, though a commonplace idea, is conceptually elusive and complex. In part, this is because concepts of health are culturally relative and only valid for a particular group of people at a particular time. Considering various conceptualizations of health, I quickly learned that popular American concepts of health have evolved over the last century to acknowledge that individual health is determined within larger socio-cultural and spatial contexts. Of course, as the idea of health changes so too does landscape's role in promoting it. In this thesis, I review various conceptualizations of health (see especially Chapter 2) in order to approach my critique of SITES from a relevant perspective.

### **How do built landscapes influence health?**

With this question, I review the relevant literature on landscape and health, in order to develop an understanding of this connection and to build a platform for advocacy for greater consideration of health in the SITES initiative. SITES already incorporates an extensive set of landscape factors that measurably impact human health, factors like toxic exposures, artificial nighttime lighting, and accessibility of walking trails. However, SITES incorporates these factors in a disjointed, and at times, superficial way. Structural and conceptual issues within SITES minimize the legibility and significance of these factors in SITES' assessment and certification of sustainable landscapes. My critique focuses on unifying and deepening SITES' approach to human health through developing a cohesive structural and conceptual health framework within its system. A more thorough understanding of the theoretical dynamics connecting landscape and health will inform this critique.

SITES does offer cohesive conceptualizations of some of its other primary topics of concern. For example, SITES provides a diagram that shows how its credits that attend to issues related to soils and vegetation can be considered in relation to the lifecycle of plants (Figure 1). SITES offers similar diagrams for its credits related to water and to materials. In the soils and plants diagram the labels P2.3, C8.4, etc. refer to SITES credits that could be granted to a project. These credits are grouped together according to which phase of the plant lifecycle they influence, and they are further grouped according to thematic headings such as

“restore vegetation and soil.” This diagram communicates an understanding of SITES’ plant- and soil-related credits showing how they work together to promote the soil and vegetation lifecycle. In addition to offering vital clarity on how a site can gain credits for restoring vegetation and soil, such a framework supports design thinking, communication among stakeholders, and the understanding of built landscapes as integral components of soil/plant systems. However, no such framework (or diagram) exists for how SITES’ credits relate to human health (for more on what SITES does address regarding health, see Chapter 3). To develop a similar diagram that demonstrates the alignments among SITES’ health credits would require understanding the underlying relationships between these credits and health. In this thesis, I explore the literature on how landscape influences health to advocate for, and help point the way toward, a more developed and detailed consideration of health in the SITES credit system and supplemental literature.

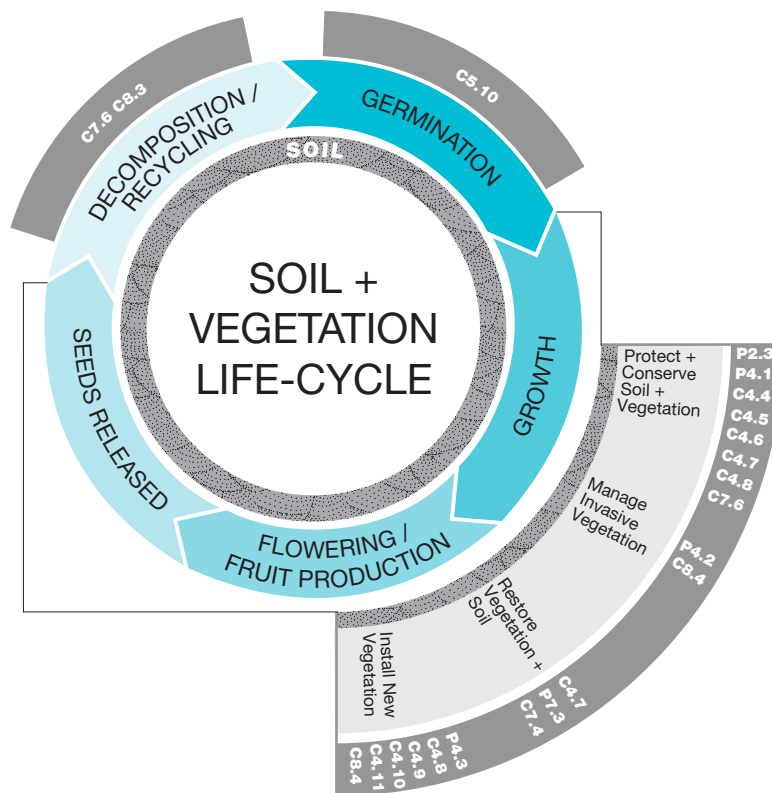


Figure 1: SITES’ diagram framing its approach to soil and vegetation (Sustainable Sites Initiative 2014, xvi).

## **How could SITES more effectively promote health?**

The previous two research questions enabled me to develop a conceptual understanding that supports my investigation into my primary question: How can SITES improve its promotion of human health through sustainable landscapes? This larger question encompasses many smaller questions, including: How can SITES thoroughly address the contextual, mental, and physical factors that influence health? How can SITES communicate a holistic awareness of health to people involved in creating the built landscapes? How can SITES inspire stakeholders to promote health through landscape? I ask these questions to identify the strengths and weaknesses of SITES' incorporation of health topics in its greater ambition to promote sustainable landscapes. After identifying any weaknesses within SITES in this regard, I will use my analysis of landscape and health to recommend improvements to the SITES initiative's approach to promoting health.

## **Thesis Outline**

My research questions drive the scope and structure of this thesis. In the second chapter, I present and critique recent conceptualizations of health proposed in Western academic journals. I show that, over the last few decades, a new approach to health has developed that focuses on contextual drivers of health as much as personal ones. This perspective on health implicitly acknowledges landscape's influence on health and can be an excellent resource for enriching the SITES initiative. To better see how this concept of health relates to landscape, I examine several contemporary health crises through its lens. Using the vocabulary of this contextual understanding of health, I trace landscape's relationship to each of these crises.

In the second part of Chapter 2, I summarize and critique Western theories that try to explain landscape's role in health. The most popular of these theories trace the connection between landscape and health by first reducing the idea of landscape to that of a natural setting and then arguing that landscape offers the (well-documented) healing qualities of nature. Though this link between landscape, nature, and health exists, these theories

account for only a portion of landscape's influence on health. Built landscapes vary in their incorporation of living systems. Whether we're considering a wetland restoration project or the roof deck of a skyscraper, built landscapes influence human health because they are the places in which we live our lives. They touch the air we breathe, form the ground upon which we walk, and are the settings in which we socialize. I introduce the ideas of enabling landscapes and affordances in the landscape to begin to account for landscape's broad influence on health.

In the third chapter, I introduce SITES and discuss the ways it incorporates health topics into its assessment of landscape sustainability. SITES is the only broadly available sustainability rating system designed specifically to assess built landscapes. It aims to elevate the value of built landscapes by recognizing exemplary landscape projects and guiding their creation. Its assessment methodology covers an extensive array of landscape health factors and makes an important and unique contribution toward promoting healthy landscapes. However, its incorporation of health is limited by a disjointed conceptualization of landscape's role in health and the limited influence its health credits have on the certification process.

In the fourth chapter, I make four recommendations for improving SITES' incorporation and promotion of health topics to address the limitations I discuss in chapter three. These recommendations are aimed at improving SITES' communication of the health value of landscapes and the significance and legibility of SITES' credits for promoting health.

In the fifth chapter I summarize the basis for my recommendations for how SITES can more effectively promote built landscapes that support human health. Here, I suggest that discussions among design teams, stakeholders, and clients about health and landscape need to be deepened and prioritized. In addition to assessing appropriate indicators of healthy landscapes, SITES must also communicate a legible, meaningful, and thoughtful understanding of landscape's potential value for human health.

## Chapter 2: Health and Landscape

In this chapter, I explore the connections between health and landscape from two angles. Starting with a review and critique of theories of health, I show how Western concepts of health have evolved from a narrow focus on individual people's physical and mental capacities, to a broader recognition of how these capacities are embedded in the context of people's lives. An awareness of the importance of both the physical and social context as determinants of health arose partly from the inability of an individual approach to health to address many contemporary health crises. Health crises such as climate change, health inequity, and chronic disease are symptoms of the unhealthy and disabling environments in which many people live. Contemporary concepts of health acknowledge that landscapes, and the other social and environmental contexts in which we live, can enable health even as we lose our personal capacities (think of the way accessible landscapes enable those who rely on wheelchairs), or disable our health even when we are in good physical condition (think of unsafe intersections where vehicle collisions are frequent). This understanding of health encourages us to leverage landscapes for the greater health of communities.

Next, I look at the many theories that conceptualize landscape's role in health and identify two primary lines of thought. The more popular approach to theorizing landscape's role in health is to associate landscape with nature and the well documented health value of nature exposure. These theories point to various mechanisms by which nature exposure restores our physiological and cognitive capacities. The other approach to understanding landscape's role in health is to conceptualize landscape as a setting of potential health activities. In line with this way of thinking, theories like the concept of affordances and the concept of enabling landscapes consider nature exposure as just one of many potential health benefits found in landscapes. This approach to landscape emphasizes the way landscape's healing potential must be unlocked by the activity of people.

Theories of health define health as the ability to engage in the important activities of one's life. Landscapes, as the settings of our lives, can support or hinder our ability to engage in these activities.

## What is Health?

Over the last century, American concepts of health have transitioned from those focused solely on personal physiological health, to ones that emphasize environmental and social factors as central components of health. This transition was inspired, in part, by a growing recognition of the host of health issues that were inadequately addressed by a focus on personal health. These new ideas of health recognize the significant role that social and physical environments, such as landscapes, play in our health.

### Personal Health

Until recently, Christopher Boorse's (1977) biostatistical theory of health and Lennart Nordenfelt's (2007) normative theory of health have provided the terrain for both popular and academic understandings of health in the Western world. These theories are conceptualized and discussed in the literature as being in opposition to each other, though they share a common focus on personal health relative to recent theories.

The biostatistical theory of health (Boorse 1997) provides an objective definition of health. In this theory, health is defined as the absence of disease and disease is defined as "deviations from the species biological design" (Boorse 1977, 543). This definition makes no reference to subjective values but critics argue that health is indeed a value-laden, cultural idea. They point out that some statistical "deviations from the species biological design" go unnoticed in some cultures or are even considered healthy in others (Noordenfelt 2007). Though the biostatistical theory of health doesn't specifically classify non-heterosexual orientations as diseases, the clear implication that these are diseases is one area where the biostatistical theory of health has drawn such criticism (Noordenfelt 2007).

In response to the shortcomings of the biostatistical theory of health, Noordenfelt (2007) developed a theory that showed the connections between health and values. His normative theory of health takes illness, not disease, to be the opposite of health, and defines illness as a perceived problem with the functioning of a person's mind or body (Nordenfelt 2007). In this theory, a person is healthy if they have "the ability, given standard circumstances, to

reach all his or her vital goals” (Nordenfelt 2007, 7). Though Nordenfelt’s theory accounts for the place of values in understandings of health, it does not offer any analysis of the contextual determinants of health.

Both the biostatistical and the normative theories of health focus on individuals. These theories neutralize the dynamic connection between context and individual experience with terms like “standard circumstances” and “typical occasions.” Because they focus solely on personal abilities, they do not help in identifying the influence of landscape or other contextual factors in health. This was not an obvious problem at the time these theories were developed because health interventions primarily focused on healing diseases through treatment of individual people. However, health advocates today deal with issues that cannot be fully addressed at the personal level and therefore advocate for a more holistic approach.

### **Contemporary Health Issues**

Contemporary health issues such as chronic illness, stress, and health inequity are intimately connected to contextual health factors. Growing awareness of these issues revealed the inadequacy of individual-focused definitions of health and inspired the development of definitions that account for contextual factors (Huber et al 2011). The influence of built landscapes on human health is apparent in these contemporary health issues.

The growing burden of chronic illness, for example, has shifted the emphasis in healthcare toward contextual health factors, such as the landscape. Though chronic illness is not a well-defined term, it generally refers to conditions that cause physical and mental health complications over extensive periods of life (Bernell and Howard 2016). Unlike acute infections, chronic illnesses have no cure, impact people’s lives for months or years, and have complex causes. Instead of focusing on medical cures for chronic illness, health systems focus on both promoting healthy management of chronic illness and on preventing incidence of chronic illness (Barr et al. 2003). Both management and prevention are accomplished by providing social and environmental resources known to positively

influence chronic illness. Built landscapes can provide many of these resources including opportunities for physical activity, for social interaction, and healthy eating.

Severe and chronic stress is one of the more significant risk factors of chronic illnesses that built landscapes can mediate (Anisman 2015, Chao et al. 2015). Severe and chronic stress cause a “structural remodeling of neural architecture” which can decrease resilience against future stressors, diminish social skills, and increase susceptibility to physical and mental diseases (McEwen et al. 2015, 1). Most people have traumatic, stressful experiences at some point in their lives (Benjet et al. 2016). Activities such as exercise, positive social interaction, appropriate amounts of sleep, time in nature, and healthy eating are all associated with reducing stress and the impacts of stress (Anisman 2015, Cacioppo and Cacioppo 2014, Puterman et al. 2010). Built landscapes can facilitate and support each of these activities.

Health inequity is a major health issue that only becomes visible at the scale of societies. The disproportionate impact of illness on socially disadvantaged groups cannot be addressed on the individual level (Jones, Podolsky, and Greene 2012). It requires attending to the distribution of social and environmental resources, and because of this, it can be partially ameliorated by landscape interventions. Built landscapes are social investments in the environments of people’s lives. By investing in healthy landscapes that protect against illness and enable healthy activities, we can redistribute social resources in an effort to improve health equity.

Chronic disease, stress, and health inequity are some of the most significant health issues of our time. These health concerns are best addressed at the scale of societies, not the scale of individuals, by leveraging social and environmental resources such as built landscapes. To understand the way that these resources influence health requires a concept of health that articulates the role of context in health (Huber et al. 2011).

### **Health in Context**

As early as 1948 the World Health Organization (WHO) defined health as “a state of complete physical, mental, and social well-being, and not merely the absence of disease or

infirmity” (Huber et al. 2011, 1). At that time, the definition was radical for going beyond physical and mental abilities and including social well-being as a component of health. However, like other theories at the time, it provided an “either or” view of health: A person is either healthy or unhealthy. In 2011 a group of scientists criticized the WHO definition as “no longer fit for its purpose given the rise of chronic disease” (Huber et al. 2011, 1) and the consequent need to support the health of people living with chronic, disabling conditions.

Of the many definitions put forward in response to Huber and colleague’s critique, the Meikirch Model of Health stands out for its rich integration of contextual factors and personal attributes. This model defines health as, “a state of well-being emergent from conducive interactions between individuals’ potentials, life’s demands, and social and environmental determinants” (Bircher and Kuruvillea 2014, 368). The Meikirch Model inherits and enriches aspects of Nordenfelt’s and WHO’s definitions by reinterpreting them through the concept of emergence. From this perspective, health is not a property of

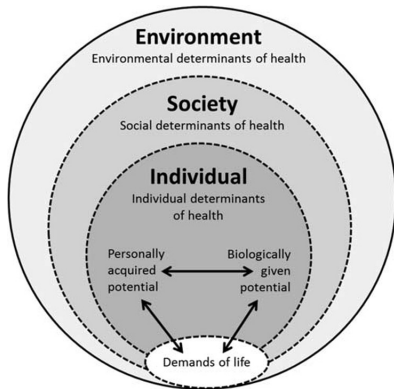


Figure 2: Diagram of the Meikirch Model of Health (Bircher and Kuruvillea 2014).

properly functioning organs, nor is it a state of complete balance between individual and context, instead it is a dynamic sense of well-being that emerges from a successful combination of personal qualities, situational demands, and contextual factors. From this perspective, it would make more sense to describe someone’s life as healthy than to ascribe health to their body. Thus, a blind person with diabetes could lead a healthy life if they acquired the skills to use resources from their

environmental and social context to move about safely, work productively, form friendships, and manage their insulin. If their environment or social context did not make these resources available to them, or if they were unable to learn the skills to use them, then their life would be unhealthy. Built landscapes are social and environmental resources. The Meikirch model can be used to show that built landscapes can support health by positively mediating between life’s demands and people’s resources.

## **The Role of Landscape**

In this section, I critique Western theories of landscape's role as a health resource. Most of these theories rely on landscape's association with nature and the healing benefits of nature. A few, however, look at the way landscapes can enable human agency, a critical element of health. These theories conceptualize landscapes as opportunities for health promoting activity. They show that landscape can gather and distribute many types of social and environmental health resources that people can activate for their personal health benefit.

### **Early Associations between Landscape and Health**

Landscapes have been associated with health since the beginnings of recorded history. Ancient cultural traditions associate gardens with sacred, healing space. From the Garden of Eden to the Elysian Fields, these idyllic places are sites of complete health and well-being where the perfect presence of natural features provide for their inhabitants' bliss (Ward Thompson 2011, 188). Terrestrial landscapes were also recognized for their healthful impact. Built landscapes as diverse as monastic gardens and Roman countryside villas were known to support mental and physical health and to aid in the healing of the sick (Ward Thompson 2011). Early associations between landscape and human health conceptualize a rich and complex integration of human well-being with elements of the natural world.

The public parks movement of the 19th century conceived of landscapes role in much the same way. In Europe and the United States, grand public parks were considered "the lungs of the city" (Ward Thompson 2011). Advocates explicitly invoked their healing properties to lobby for the parks construction. Olmsted wrote eloquently of the health benefits of these parks and emphasized their role as an antidote to urban conditions:

"city life involves a continual strain of the nerves, through the need of avoiding dangers of the factory and street and owing to the multitudinous harsh noises and the vivid and eye-tiring sights and through having to give attention to so many things and to talk to so many people. Even to the well, this is tiring to

the nerves, but to those who are delicate, it often becomes a torture. After all, it is to those whose nerves are tired—and they are a large proportion of the dwellers in a city—that the parks are most immediately beneficial” (Olmsted 2007, 3).

Before a tradition of scientific evidence gathering about the health effects of nature, landscape, as a place of nature, was known to be important for human flourishing.

### **Empirical Insights**

In the late 20th century, researchers began using modern empirical science to confirm and elucidate earlier associations between engagement with nature and human well-being. Roger Ulrich’s (1984) seminal study of post-surgery recovery found that patients whose hospital room had a window with a view of trees recovered more quickly than those whose window looked out on a brick wall. In later studies, by measuring changes in blood pressure, skin conductivity, and other physiological states, Ulrich showed that exposure to natural environments helped stressed people recover while exposure to urban environments was unhelpful (Ulrich et al. 1991). He hypothesized that this impact on stress is the mechanism through which nature exposure positively impacts human health and that this mechanism is evolutionarily derived:

“It follows that as a remnant of evolution, modern humans might have a biologically prepared readiness to learn and persistently retain certain positive responses to nature but reveal no such preparedness for urban or modern elements and configurations” (Roger S. Ulrich 1995, 88).

Rachel and Stephen Kaplan provided an alternative, cognitive explanation for the health impacts of nature known as attention restoration theory (ART). Their work studied the impact of the visual environment on directed attention fatigue. Directed attention is the ability to focus one’s attention and inhibit distractions and it is necessary for effective cognitive functioning. Central to their work is the idea that directed attention creates fatigue

from continued exertion and requires rest to be restored. The Kaplans found that certain places were more restorative than others and that these places had four primary characteristics: the sense of being away, extent, fascination, and compatibility. They found that spending time in natural settings that people experienced as being away in a different and fascinating world that was compatible with their needs and desires effectively restored cognitive functioning in fatigued individuals (Kaplan and Kaplan 1989). In their writing being away refers to a sense of being outside of one's usual place. Extent refers to the sense that a place has spaciousness and contains elements beyond immediate apprehension. Fascination refers to automatic interest of a space to attract one's attention. Compatibility means that a place fits a person's needs and goals. Natural settings with these characteristics, "filled with intriguing stimuli, modestly [grab] attention in a bottom-up fashion, allowing top-down directed-attention abilities a chance to replenish" (Berman, Jonides, and Kaplan 2008, 1). The Kaplans called these places restorative environments.

These early empirical studies gave credibility to intuitive observations that made connections between nature and health and they allowed for a greater understanding of some of the dynamics of this relationship. Researchers have continued to accumulate evidence for the physiological and psychological benefits of nature exposure and today the significance of nature for human health is incontrovertible. Newer work has also added to the pioneering research by Ulrich and the Kaplans and has added to the list of mechanisms by which nature influences our health. One line of research looks at nature exposure's beneficial impact on our immune system (Kuo 2015). Other work examines the way natural areas facilitate social connection and physical activity and mitigate air pollutants (de Vries 2010).

### **Therapeutic Gardens**

The therapeutic garden movement applied early empirical knowledge about the health effects of nature exposure to hospital design. In the early 90's, healthcare facilities in the US began to focus on the role the physical environment takes in the healing process (Marcus and Sachs 2013). This emphasis included a special focus on landscapes that were variously

called healing, restorative, or therapeutic gardens. Design guidelines for these gardens invariably cite Ulrich's theory of supportive design (Ulrich 2001) and Kaplan and Kaplan's theory of restorative environments. Because these theories associate explicit spatial and programmatic recommendations with empirically tested health benefits, they appeal to the professional sensibilities of both designers and medical professionals. This work came to be known as evidence-based design (Ulrich et al. 2010).

Therapeutic gardens initially focused on improving health outcomes for sick individuals in hospital settings. As our cultural concept of health services matured to include the prevention of disease and attending to environmental and social determinants of health, the role of therapeutic landscapes has evolved too. In the context of urban design, the term 'salutogenic design' refers to the use of nature to offer restoration and to promote healthy opportunities for social and physical activities (Souter-Brown 2015). Salutogenic design expands the scope of therapeutic gardens by applying the same nature-based principles on a broader scale for a fuller consideration of health.

Therapeutic garden principles, including restorative and salutogenic design, dominate popular understanding of landscape's role in health. This approach to landscape and health focuses on landscape as a place of nature, or a "green space." However, landscape is more than green space and it relates to human health in more ways.

### **More than Greenscapes**

In both popular and professional contexts, landscape is often equated with nature or with the artificial arrangement of natural elements. However, by the late 20th century, the concept, discipline, and profession of landscape have firmly established a scope that encompasses much more than gardens, parks, and natural settings (Doherty and Waldheim 2015).

Part of landscape's changing scope is due to new understandings of nature. The word "ecosystem," originally the object of study for the science of ecology, has become a common synonym for natural environments. "Ecological" and "ecosystem" have since become

metaphors that highlight complex dynamic relationships while sometimes retaining only vague associations with nonhuman environments. Terms like “human ecology,” “industrial ecology,” and “the healthcare ecosystem” signal the conceptualization of a subject through the lens of complex relational systems. Landscape architects and academics use ecology in both its original and metaphoric senses. This duality affirms landscape’s association with natural settings while also setting it free to apply ecological thinking to constructed contexts (Lister 2015, 120).

Landscape architects and academics have also claimed new ground of their own. Frederick Steiner (2015) defines landscape as “the composite features, natural and cultural, that distinguish one part of the earth from another” (138), a composite that includes buildings and metropolises as well as national parks. Pierre Bélanger (2015) writes about human infrastructure—pipes, bridges, highways, power lines, and dammed rivers—as landscapes. Charles Waldheim (2015) claims “the landscape architect as the urbanist of our age” (187), citing the profession’s potential to eclipse urban planning in the role of coordinating forces and processes of urban development. Uniting these different concepts of landscape is a focus on topographic connections. Landscape is not an object like a building or a bridge, nor is it necessarily evocative of nature like a garden or park; rather it is the space of relation of these objects. In a professional and theoretical sense, landscape does not refer to natural or artificial settings, but to the matrix of any given setting.

### **Theorizing Landscape’s Expanded Role**

Concepts like attention restoration theory and stress reduction theory are not adequate to the task of theorizing an expanded landscape’s role in human health. These nature-oriented theories hypothesize that, through evolution, humans developed an affinity for natural settings that underlies the health benefits of nature exposure. These theories do not account for the potential health benefits found in landscapes such as treeless plazas, walkable neighborhoods, and playgrounds made of rubber, plastic, and metal. These theories are more useful for their description of mechanisms that connect human health to specifically naturalized landscapes than to serve as overarching theories of landscape’s health potential.

Within the paradigm of health predicated on the concept of emergence, any theory linking landscape and health needs to conceptualize the way landscape supports people's ability to meet life's demands and engage in the important activities of their lives. This guiding theory does not focus on mechanisms of support; rather, it provides a framework for describing the relationship between mechanisms, landscape, and people. Two approaches—the theory of affordances and the concept of enabling places based on actor network theory (ANT)—have developed this relational framework for considering landscape as a health resource.

The concept of affordances comes from a psychological theory that reconceives perception—vision, specifically—as an active relationship with the environment rather than a passive reception of stimuli (Gibson 1983). The passive receiver version of perception is evident in experiments where researchers measure participants' reactions to photographs. In these experiments, the photograph is a scene to be experienced from a distance. Gibson's theory, however, posits that “perceiving most fundamentally is a process that supports action and exploration” (Heft 2010, 29). Environments are “arenas for action” and perception is an active process of seeking out the possible and preferable actions (Heft 2010, 28). To find desirable actions people move through places, turn their heads to look, touch, and listen. This active engagement is mostly impossible with the setting caught in a photograph.

Affordances are what we see when we perceive in this active way. “Affordances are perceptible properties of the environment that have functional significance for an individual” (Heft 2010, 18), that is, they are the things in an environment that enable you to do something.

“Consider, for example, a ledge approximately 6 inches high, located in a public area. It may function as an edge marker for adults, delineating one region of the landscape from another, and it may be liable to be tripped over if an adult is not paying attention to where she is walking. Other than those two functions, it has few other apparent uses for an adult. However,

for a young child such a ledge is typically a very salient functional feature: it can function as a place to sit, as a structure to climb on and to leap over, and as a challenging edge on which to walk” (Heft 2010, 18).

The above example demonstrates that affordances emerge through a relationship between individuals and environmental features. The affordances that a place offers will differ for individuals depending on the person’s size, skillset, cultural background, and other factors that influence their interpretation of the environment and their ability to act. Like health, affordances do not reside in a place or in an individual but in the possibilities that emerge from their relationship.

Applying the concept of affordances to an exploration of landscape’s role in human health shifts the focus from landscape as setting to landscape as participant. For example, from an affordances perspective, a garden does not have inherent therapeutic properties that heal anyone who enters it. Instead, a garden could afford opportunities for prepared and able individuals to engage in healing activities such as meditating, walking in quiet, and sitting with a friend.

Like affordances, the concept of “enabling places” focuses on healing activities that emerge through relationships between people and places. Cameron Duff (2011) introduced the term to gather, critique, and extend the discourses on therapeutic landscapes, restorative places, and enabling environments. Duff critiques these discourses for implying that therapeutic properties are qualities of a place when they are in fact healing occurs through place-based practices and activities. He proposes the use of actor network theory as a “relational logic that starts with the interaction of person and place in determining how particular places promote or enable health and well-being” (Duff 2011, 151).

Actor network theory conceives of individuals as actors within networks of relationships. Since all actions occur in relation to something, relationships enable actions. An individual’s network is the sum of their relationships and of their available actions. These relationships, Duff writes, “should be regarded as distinctive resources that facilitate the realization of

particular actions,” and place “is a mechanism or medium for the generation and distribution of these resources” (Duff 2011, 152). Enabling places are relational resources that enable people to enact their health. They connect people to the resources—playgrounds, walking trails, stages—that enable them to engage in healthy behavior.

Duff’s concept of enabling places and Gibson’s concept of affordances draw from different intellectual traditions to offer similar accounts of the role of landscape in human health. Both conceive of landscape as a resource for activity that is dependent on people’s active relationship with landscape. In both, healing emerges through healthy activities enabled by the relationship between person and place where the person has the capacity to activate potentials in the landscape.

The concepts of enabling landscapes and affordances do not articulate the mechanisms that connect specific activities to health. Instead, these concepts provide a framework that reminds us to look for these mechanisms within relationships between people and places and to design for these relationships. To do so “requires a ‘second empiricism,’ an empiricism not of identities, structures and essences, but of events, processes and relations” (Duff 2011, 155). Landscapes can be designed with regards to these events, processes and relations that they facilitate. Several of SITES’ health criteria tap into the enabling capacities of built landscapes to promote health.

## **Summary**

Recent developments in our understanding of health and landscape have led to a much richer understanding of the connections between the two. Good health does not merely consist of a well-functioning body and mind, and landscape is not merely a setting of nature. Health is the emergent ability to engage in life and landscapes are places that can support or hinder this engagement.

Landscapes gather and distribute social and environmental resources that can enable human agency in enacting health. Landscapes can be designed to address the specific needs of people vulnerable to chronic disease, to mitigate the health impacts of climate change, to

promote health equity, and reduce chronic stress. To support health and healing, landscapes must afford legible, accessible, and desirable opportunities for people to engage in healthy and healing activities. Legibility, accessibility, and desirability are not inherent qualities of landscapes, they emerge, or do not, within the relationship between a landscape and a person. The use of landscapes to promote health must attend to these emergent qualities that support healthy activity. Only by working *with* people can landscapes enable their health agency.

## **Chapter 3: SITES and Health**

The Sustainable SITES Initiative is the only nationally available rating system for built landscapes. Because of its unique position, SITES is an important tool for leveraging landscape related health factors. In this chapter, I provide an overview of how the SITES rating system incorporates landscape's health potential into its assessment of landscape sustainability.

The chapter's first section places SITES within the context of other built environment rating systems, noting that no other rating system specifically addresses built landscapes. The next section describes SITES' history, purpose, and the value it provides before looking more deeply at its incorporation of health concerns. At the end of this section, I provide a preliminary analysis of limitations of SITES' current approach.

### **Assessing the Built Environment**

In 1990, the Building Research Establishment Environmental Assessment Method (BREEAM) was introduced in the UK as the first widely-available tool for evaluating the sustainability of buildings. Today, there are at least 70 similar tools available around the world, many of which have variants designed to assess different features of the built environment (Bernardi et al. 2017). Of these tools, SITES is the only one designed specifically to assess built landscapes.

Though most assessment tools were initially created to assess the sustainability of buildings, in the past decade many have developed variants that assess the sustainability of urban districts or neighborhoods. The Comprehensive Assessment System for Built Environment Efficiency (CASBEE), developed in Japan, added an urban design variant (CASBEE-UD) in 2007. Shortly thereafter, in 2009, both BREEAM and Leadership in Energy and Environmental Design (LEED) introduced neighborhood-level assessment tools known as BREEAM Com and LEED ND respectively. These tools assess the design, construction, and management of built environment projects that include multiple buildings and adjacent spaces. Because they assess buildings as well as their context, these tools can assess aspects

of built environments that building-only assessments miss, such as transportation systems and public space networks (Berardi 2013). While these tools include criteria for landscape's contribution to neighborhood sustainability, these criteria do not assess landscapes as comprehensively as SITES.

Part of the reason that assessment systems transitioned from focusing on distinct buildings to neighborhoods was due to a growing recognition that sustainability involves more than just built structures or resource efficiency (Castanheira and Bragança 2014). Early assessment systems sought to address the significant amount of energy consumed by buildings (Chung 2011) but this is just one dimension of sustainability. Sustainability assessment systems have grown more sophisticated in their incorporation of other dimensions of sustainability (including social, economic, cultural, and governance dimensions). However, the criteria utilized by sustainability assessment tools still predominantly focus on the environmental dimension of sustainability (Ameen, Mourshed, and Li 2015). SITES, with the preponderance of its assessment indicators related to aspects of environmental sustainability, follows this trend.

Recently, a handful of systems have emerged that aim to specifically assess the health impacts of buildings and communities. The International WELL Building Institute introduced the WELL Building Standard in 2014 and currently has a pilot program for testing the WELL Community Standard. This attention to the health impacts of the built environment reflects the significance of contemporary health problems as well as the important role the built environment plays in health (Jackson 2003). While most sustainability assessment systems give some attention to health impacts, WELL and other health-focused systems bring to their assessment of the health impacts of the built environment a level of rigor that the more generalized and environmentally focused sustainability assessment systems lack. However, none of these health focused assessment systems directly assess built landscapes.

## **The Sustainable SITES Initiative**

The Sustainable SITES Initiative’s rating system is the only widely available tool for assessing and certifying the sustainability of built landscapes. In focusing on landscapes, SITES fills a unique and important niche in the broad task of assessing built environment sustainability. Built landscapes significantly impact many aspects of sustainability including water management, transportation systems, social cohesion, ecological health, resilience, and public health. No other built environment sustainability assessment system has the mission or scope to address built landscapes’ full impact on sustainability.

SITES was collaboratively developed by the American Society for Landscape Architects, The Lady Bird Johnson Wildflower Center, the University of Texas at Austin, and the United States Botanic Garden (American Society of Landscape Architects 2009). It was first implemented in 2009 as a two-year pilot program of more than 160 projects. Data from this pilot program were used to improve the rating system and culminated in the publication of the updated SITES v2 in 2014. In 2015, the U.S. Green Building Council, which operates LEED, acquired SITES and continues to operate it alongside its building- and neighborhood-focused rating systems (Pieranunzi 2018).

The Sustainable SITES Initiative aims to “define sustainable sites, measure their performance, and ultimately elevate the value of landscapes” (Sustainable Sites Initiative 2014, vi). To accomplish this, the Initiative developed SITES as a “comprehensive set of guidelines and a rating system” (Sustainable Sites Initiative 2014, vi) for the design and management of built landscapes. SITES is more than a path toward certification and market recognition of sustainable built landscapes. It is also a collection of best practices, a framework for understanding and communicating landscape sustainability, and a platform for advocating for the significance of landscape.

### **Value of SITES**

SITES elevates the value of landscape in several ways, not all of which are immediately obvious. Most apparently, SITES incentivizes and guides development of sustainable

landscape through its certification process. SITES certification can hold value to individual developers of built landscapes who have sustainability objectives or who wish to use the certification for marketing purposes. It can also hold value to institutions and regulators who appreciate the efficiency of referencing SITES certification benchmarks rather than coming up with their own standards. For example, as of 2016 the United States General Services Administration (GSA), one of the largest developers of real estate in the world, requires all of its substantial landscape projects to qualify for SITES Silver certification (U. S. General Services Administration 2018). Through SITES' adoption by individual developers, institutions, and regulatory agencies SITES promotes and guides the development of sustainable landscapes.

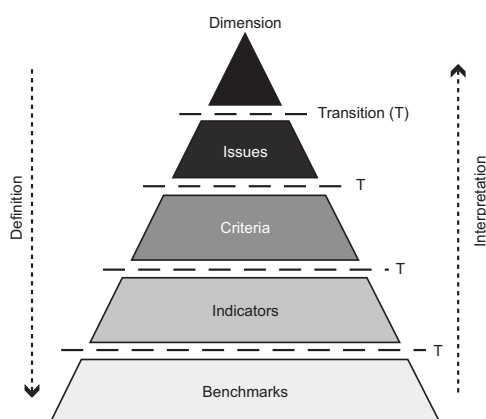
SITES elevates landscape by increasing the visibility of landscape's significant contributions to sustainability. Before SITES, there was no third-party rating system for landscape sustainability that was comparable to LEED and other popular systems. This meant that sustainable development projects could only use building- and neighborhood-focused rating systems to guide and market their efforts. The importance of landscape was obscured by the greater attention given to these other features of the built environment. SITES brings landscape into the picture. Now a project can be both LEED and SITES certified. Now projects can market the third-party verification of their landscapes, and landscape designers can push for their own benchmarks to be achieved.

SITES elevates built landscapes by providing a framework for understanding, discussing, and advocating for landscape sustainability. In addition to providing certification, SITES provides a comprehensive, practical, and accessible way of thinking about landscape sustainability. Anyone involved in a landscape project can use SITES as a reference point for advocating and communicating their sustainable vision. Project stakeholders can identify SITES criteria and best practices and advocate for them. Designers can use SITES as a comprehensive reference guide while they imagine and test ideas. By providing a framework for thinking about and advocating for sustainable landscapes, SITES supports collaboration and design thinking for sustainable landscapes.

## Structure of SITES

Before looking more closely at how SITES supports collaboration, design thinking, and the development of landscapes that promote health, it is important to understand how SITES is structured. SITES' structure impacts the way individual criteria, such as the criterion for providing restorative spaces, influence project certification. It also impacts the way SITES defines and frames landscape sustainability. Some of SITES' strengths and some of its weaknesses regarding health only make sense with adequate knowledge of its structure.

SITES is a multi-criterion rating system structured similarly to LEED. Multi-criterion systems assess a project by comparing the project's performance on a wide variety of discrete indicators against established benchmark values. The project can earn points on each indicator by meeting the benchmarks, and if it earns enough points, it will be certified. This approach to assessing sustainability has the merit of enabling a system to incorporate any aspect of sustainability for which an indicator can be defined and measured. However, since projects are not expected to meet every criterion (or even a majority of them), multi-criterion systems must finely tune the requirements for each criterion, the points assigned to them, and the relative weight of each aspect of sustainability in order to ensure that the system promotes all aspects of sustainability.



**Figure 3:** Diagram of the layered structure of multi-criterion rating systems (Gil and Duarte 2013).

Like other multi-criterion rating systems, SITES uses a layered system of categories to organize its requirements for sustainable landscapes. Gil and Duarte (2013) identify a generic structure for built environment multi-criterion rating systems that can be used to understand the different components of SITES (Figure 3). At the top of the pyramid are general goals. As you go down the pyramid the goals get more and more specific. For example, one of SITES general requirements for

sustainable landscapes is to promote human health and well-being. This is a broad category

which Gil and Duarte place in the *issues* layer. SITES has nine general goals at this issue layer (see Table 1). SITES has several *criteria* related to human health. These criteria define specific goals such as promoting equitable site use, reducing light pollution, and supporting physical activity, all of which contribute to human health and well-being. While these criteria define goals, they do not yet describe how to achieve them. It is the *indicators* within each criteria that define how success will be measured. For example, regarding the criteria of supporting social connection SITES will determine success by looking at the amount and type of seating provided, the climatic comfort of that seating, and the presence of other amenities for social activity.

SITES Issue	# Prerequisite Criteria	Point Weighting
Site Context	4	6.5%
Pre-design Assessment and Planning	3	1.5%
Site Design: Water	2	11.5%
Site Design: Soil and Vegetation	3	20%
Site Design: Materials Selection	1	20.5%
<b>Site Design: Human Health and Well-being</b>	<b>0</b>	<b>15%</b>
Construction	3	8.5%
Operations and Maintenance	2	11%
Education and Performance	0	5.5%

Table 1: Weighting of SITES Issues

*Benchmarks* are the final structural layer. Benchmarks define the minimum achievements that must be met for each indicator. In the social connection example, SITES sets the benchmark for the amount of seating required as enough to seat 10% of the anticipated site users at any time. By meeting the benchmarks projects can earn points toward certification.

Table 1 (above) shows the percentage of all points available for criteria within each issue category. Though SITES doesn't explain why the points are weighted in this way, this distribution becomes important when considering how projects get certified and what vision of sustainability is being promoted.

SITES' structural layering connects goals (issues and criteria) with defined and measurable attributes (indicators and benchmarks). To understand how SITES assesses built landscapes' human health impacts, it will be important to look at how SITES frames its goals) and the specific requirements for these goals.

### How SITES Addresses Health

SITES assesses a broad array of human health factors related to built landscapes. Human health and well-being is one of the nine primary issues addressed by SITES (Table 1). SITES has eleven criteria grouped within this issue that address a wide range of human health and well-being concerns. In Table 2 I have grouped these criteria by the topics they address.<sup>1</sup>

ISSUE	CRITERIA	TOPIC <sup>1</sup>	POINTS
Human health and well-being	Protect and maintain cultural and historic places	Equity	2-3
Human health and well-being	Provide optimum site accessibility, safety and wayfinding	Equity	2
Human health and well-being	Promote equitable site use	Equity	2
Human health and well-being	Support mental restoration	Nature Exposure	2
Human health and well-being	Support physical activity	Physical Activity	2
Human health and well-being	Support social connection	Social Health	2
Human health and well-being	Provide on-site food production	Nutrition	3-4

<sup>1</sup> This topical grouping is an aid for my analysis of SITES' structure and is not part of SITES organization.

Human health and well-being	Reduce light pollution	Env. Pollutant	4
Human health and well-being	Encourage fuel efficient and multi-modal transportation	Env. Pollutant	4
Human health and well-being	Support local economy		3
Human health and well-being	Minimize exposure to environmental tobacco smoke	Env. Pollutant	1-2

Table 2: SITES' human health and well-being criteria

SITES also has several criteria contained within its other issues that focus on topics with human health impacts (Table 3). Though SITES does not include these criteria in its human health and well-being category but rather in other categories to which they also relate, it is important to consider them when assessing SITES' overall approach to health. The criteria in the human health and well-being issue, along with the health-related criteria in other issues, constitute the health goals and the measurable factors that SITES examines when assessing the health-related component of a built landscape's contribution to sustainability.

ISSUE	CRITERIA	TOPIC	POINTS
Site context	Connect to multi-modal transit networks	Physical Activity	2-3
Pre-design A+P	Engage users and stakeholders	Equity	3
Soil and vegetation	Reduce urban heat island effects	Extreme Weather	4
Soil and vegetation	Reduce the risk of catastrophic wildfire	Extreme Weather	4
Construction	Protect air quality during construction	Env. Pollutant	2-4
Operations and maintenance	Minimize pesticide and fertilizer use	Env. Pollutant	4-5
Operations and maintenance	Protect air quality during landscape maintenance	Env. Pollutant	2-4

Table 3: Health related criteria grouped in other issues

Four criteria address health equity topics. Health inequity is one of the leading health issues in the United States today (Marmot et al. 2008). By designing landscapes that are accessible and relevant for all populations, and by distributing these landscapes more fairly across the socioeconomic fabric of our country, we can improve health equity. The criterion to “promote equitable site use” is SITES’ most significant contribution toward promoting health equity. This criterion considers a few indicators. First, the design team must fulfill the “engage users and stakeholders” criterion in such a way that they learn what health concerns the community has and how they would like to address these concerns. Then the team must achieve two other health-focused criteria that are identified as important issues by the community. Finally, the project must provide free public access to at least four permanent or temporary site elements that meet the expressed desires of the community. With this criterion, SITES recognizes design teams working directly with community-identified needs to design landscapes that promote health.

SITES has one criterion that addresses the topic healthy nature exposure. As discussed in Chapter 2, contact with nature has several health benefits including reducing stress and restoring mental capacity. The criterion to “support mental restoration” recognizes projects that include comfortable, outdoor areas with adequate seating and visual and physical access to plants. This criterion focuses on the important restorative qualities of nature exposure. However, natural elements have also been shown to have positive health impacts in more active spaces such as walking paths and running trails (Pretty et al. 2005). SITES’ single criterion addressing nature exposure is important but does not address the full scope of opportunities for promoting health in this way.

SITES has two criteria that concern the topic of physical activity. Physical activity is strongly linked to health and most Americans do not meet recommendations for activity (Tucker, Welk, and Beyler 2011). The criterion to “connect to multi-modal transit networks” recognizes projects that connect to existing active transportation infrastructure. This is an important consideration during the pre-design phase of a project. The criterion to “support physical activity” is the primary way that SITES promotes working toward this need in the design phase. This criterion rewards designers that incorporate into their project at least two

opportunities for physical activity that appeal to a project's primary user groups. By incentivizing designers to create opportunities for the specific populations that will use the site, SITES promotes design practices that address the real needs of the community. Another criterion that appears to promote physical activity, "encourage fuel efficient and multi-modal transportation," actually focuses almost exclusively on reducing emissions. Since multi-modal has a significant impact on increasing physical activity (Rissel et al. 2012) it has a more direct impact on human health than fuel efficiency does. This criterion doesn't adequately assess this health factor.

SITES' criterion to "provide onsite food production" is its only criterion that addresses the topic of nutrition. This criterion has multiple levels of achievement so that a project can earn points by providing space for food production (e.g. community gardens) and for food distribution (e.g. farmers' markets). While diet-related issues are among the most significant health concerns in the United States (Roberts and Barnard 2005), by promoting community gardens and farmers' markets, this criterion addresses the limited extent to which landscapes can influence Americans eating habits. The primary component missing from this criterion is a stronger connection to the criterion to "promote equitable site use." As discussed earlier, that criterion promotes projects that implement other health criteria that meet the needs of the community. However, providing onsite food production is not among the health criteria that it counts. Connecting these two criteria would support designers working with underprivileged communities that sought access to food gardens and fresh vegetables.

Two of SITES' criteria address the topic of the health impacts of extreme weather. The criterion to "reduce the risk of catastrophic wildfire" promotes best practices in landscape design and planting design in fire prone areas. The criterion to "reduce urban heat island effects" promotes the use of plants and reflective surfaces to cool urban air. These criteria address some of the important ways that landscape supports health by mitigating the impact of harmful climatic conditions. As climate change progresses it will aggravate these health concerns. Built landscapes such as green roofs or reflective roofs can help mitigate the impact of a warming climate on people's physical health.

The remaining six criteria on my list of SITES' health-related criteria all address the topic of exposure to environmental pollutants. The exposures addressed include light pollution, tobacco smoke, gas and diesel exhaust, and pesticides. These exposures each have significant health impacts such as the disruption of circadian rhythms and causing lung cancer.

In addition to developing criteria for built landscapes, SITES published a book, *The Sustainable Sites Handbook* (Calkins 2012), to educate and support project teams working with these criteria. This book highlights studies, theories, and strategies that frame the health value of nature exposure, social connection, and active lifestyles and argues for landscape's role in promoting these. This book is the primary way in which SITES provides context for, and communicates the value of, its health criteria.

Through its criteria and Handbook, SITES promotes and supports the development of built landscapes that leverage landscape's potential for supporting and improving health. The extensive breadth of the health factors addressed by SITES' criteria is a particularly valuable contribution toward promoting healthy landscapes throughout the United States.

### **Limitations to SITES' Approach to Health**

Though SITES' assessment of landscape's contribution to health is more comprehensive than any other rating system's, it could be improved. SITES' incorporation of health concerns could be more coherent, meaningful, and imaginative. SITES could more effectively promote the health value of landscape by incorporating a more robust conceptual approach to health, giving health criteria more weight in certification, clearly identifying health criteria, and providing more insight into the strategies for meeting criteria benchmarks. By improving its approach to health in these ways, SITES would more effectively promote both the development and the understanding of landscape's human health value.

SITES does not present a unified conceptual framing of landscape's role in health. Its health criteria address such a wide array of factors and are spread across several of SITES' issue

categories that their relationships to each other are difficult to see. SITES does not communicate a conceptual understanding of landscape's role in health that is capable of framing all of the health criteria as elements of a cohesive strategy for leveraging landscape in the support of health. SITES does develop this type of conceptual framing for some of the other topics it addresses (see Chapter 1 for an example). A cohesive framing of SITES' approach to health would improve the legibility of the value and potential for using SITES' health criteria and be a tool to aid stakeholders and design teams in designing and articulating health goals and strategies.

Health-promoting strategies play less of a role in a project's SITES certification process than strategies related to SITES' other topic areas. This is because out of the nine issue categories addressed by SITES, only "health and well-being" and "education and monitoring" have no prerequisite criteria (see Table 1). Prerequisite criteria are criteria that, rather than providing points toward certification, are simply required for all projects attempting certification. Since projects only need to earn 35% of available points for certification most projects will only achieve a small fraction of criteria. Prerequisite criteria ensure that all projects will attend to a specific topic. Given the current structure of SITES, a project could earn SITES platinum certification without achieving any of the health criteria. This diminishes the meaningfulness of SITES' inclusion of health factors in its sustainability assessment.

SITES health criteria are not well balanced among different aspects of health. While air quality is addressed by three criteria that provide up to twelve points, other highly significant health risks that landscapes can mitigate, such as physical inactivity and social isolation, are only addressed by one criterion worth two points (see Tables 2 and 3). SITES' distribution of points among its health criteria prioritizes limiting exposures to environmental toxins over supporting the health enabling potential of landscape (for more on enabling landscapes refer to Chapter 2).

Finally, SITES companion literature could discuss design strategies related to health criteria in more inspiring and more easily assimilated ways. Though the Sustainable Sites Handbook discusses valuable strategies and considerations for many of SITES' health

criteria, they are presented as blocks of text. The density of these paragraphs is alleviated by topical photographs, however SITES could use more graphical communication tools to improve their utility for designers and stakeholders.

## **Summary**

The SITES rating system is in a critical position to influence the creation of built landscapes for the betterment of human health. As a uniquely positioned sustainability rating system, it can influence market practices, regulatory codes, and government policy to leverage landscape's role in health. Though SITES does include many provisions for supporting human health, its treatment of this topic could be more robust, cohesive, and meaningful. SITES could provide stronger support for human health by developing a more robust conceptual framework, updating its organization to make health more visible, and making health topics a more significant factor in certification via requirement of prerequisite criteria.

## Chapter 4: Retooling SITES

In this chapter, I recommend additions and amendments to SITES to help overcome its current limitations and improve its impact as a tool that encourages best practices in sustainable, healthy landscape design and management.

In particular, I make four types of recommendations for retooling SITES:

1. Adopt a theoretical framework of landscape's role in health to improve the conceptual legibility of SITES' approach to health;
2. Update SITES' organization of criteria and categories to improve the structural legibility of SITES' focus on human health;
3. Require certain health focused criteria for SITES certification to improve the relative significance of SITES' health criteria for achieving certification, and
4. More effectively communicate design strategies and considerations for achieving SITES' health criteria by supplementing the existing textual information with graphic media.

### Conceptual Legibility

SITES' supplemental literature (the Sustainable SITES Handbook and the Reference Guide) attend to each of SITES' health criteria separately and offer little discussion of SITES' approach to health as a whole. This leads to an emphasis on the differences among the problems addressed and the strategies employed by the various health criteria rather than an awareness of how they can work in concert. In this section, I propose a conceptual framework that would help to elevate a holistic understanding of landscape's health value that integrates each of SITES' diverse health criteria. I recommend that SITES use this holistic framework to articulate a coherent understanding of the ways we can leverage landscape's role in health. By providing a more cohesive statement of how to use landscape to promote health, such a framework would amplify the power of the message that landscape should and can be used for this purpose. Such an integrated framework would also be useful to project teams attempting to choose between potential criteria by making it easier to

compare the criteria's approaches and see synergies among them. The framework could also be used by project stakeholders to articulate and argue for their health goals.

I propose a framework that combines the perspective of *ecosystem services*, the understanding of *enabling landscapes* (see Chapter 2), and the utility of *regulating landscape* to clarify the ways built landscapes can promote health. The framework of *ecosystem services* highlights the way that ecological components of landscapes protect and support human life and well-being. The concept of *enabling landscapes* articulates the way that landscapes can support social, cultural, and personal activities that promote health. The practice of *regulating landscape* can promote health both by protecting people against toxins like tobacco smoke and air pollution, and by mandating key aspects of enabling landscapes such as accessibility and social connection. These three different ways that landscapes support health can account for all of the health factors addressed by SITES. Each of these three dimensions is addressed in greater detail below.

### **Ecosystem Services**

Ecosystem services is the primary conceptual framework SITES uses to articulate the value of landscape. Ecosystem services are “goods and services of direct or indirect benefit to humans that are produced by ecosystem processes that involve the interactions of living elements, such as vegetation and soil organisms, and non-living elements such as bedrock, water, and air” (Sustainable Sites Initiative 2014, x). However, few of SITES' health criteria relate to processes of landscape ecology. These criteria promote landscapes with vegetation that soothe physiological and cognitive stress, grow healthy food, reduce severe heat waves, and limit the impact of wildfires. Though ecosystem services are essential for the preservation of healthy human habitat on the global scale, they only account for the value of a few of SITES' criteria that focus on direct and immediate health benefits. Ecosystem services is an important conceptual framework, but it needs to be augmented with other frameworks in order to articulate the health value of built landscapes.

## **Enabling Landscapes**

Several of SITES' criteria promote the health enabling aspects of built landscapes by providing health affordances. These criteria are: (1) provide optimum site accessibility, safety, and wayfinding; (2) promote equitable site use; (3) support physical activity; (4) support social connection; (5) encourage fuel efficient and multi-modal transportation; (6) connect to multi-modal transit networks; (7) support mental restoration; and (8) provide on-site food production. Such criteria recognize the value of landscapes that enable potential health activities. Whereas most of SITES' criteria that promote ecosystem services use indicators of performance to assess landscapes, these "enabling" criteria use indicators that measure the provision of amenities or opportunities (e.g. the promote equitable site use criterion requires the provision of four free public amenities or events). Focusing on provision rather than performance makes sense for these criteria because their contribution to human health is based on enabling people to use landscape features for their own health benefit. The number of people who visit a mentally restorative landscape or attend public events is, in many ways, out of the control of design and management teams. The framework of enabling landscapes shows how these diverse, enabling criteria are similar to each other and helps to explain why and how these criteria are different than performance-based criteria.

## **Regulating Landscape**

Ecosystem services and enabling landscapes do not account for all of the landscape health factors measured by SITES' health criteria. Many of these criteria attend to the value of regulating landscape to promote human health. By "regulating landscape" I refer to the practice of using human institutions to control the composition of and the activities performed in landscapes. Of course, the Sustainable SITES Initiative is itself a human institution that regulates the conditions of certain landscapes, so all of SITES' criteria are involved in regulating the landscape. However, a few of SITES' health criteria are primarily concerned with the way regulation promotes human health and are not involved in enabling human agency or promoting ecosystem services.

In Figure 4, I show how each of SITES' health criteria operate through some combination of enabling landscapes, ecosystem services, and regulating landscape. In the Figure, the individual criteria are listed above their respective framework. Since all criteria are involved in regulating landscape, that category is located at the base of the diagram. The criteria named in the bottom center column, directly above regulating landscape, attend solely to this regulation and don't involve ecosystem services or enabling landscapes. In the row above the regulating landscape framework are the columns for enabling landscapes and ecosystem services. The criteria that utilize these frameworks also involve regulation, and so these columns are connected by a line to the regulating landscape column. Finally, The column in the middle, above the "+" label, lists criteria that operate through all three frameworks: enabling landscapes, ecosystem services, and regulating landscape.

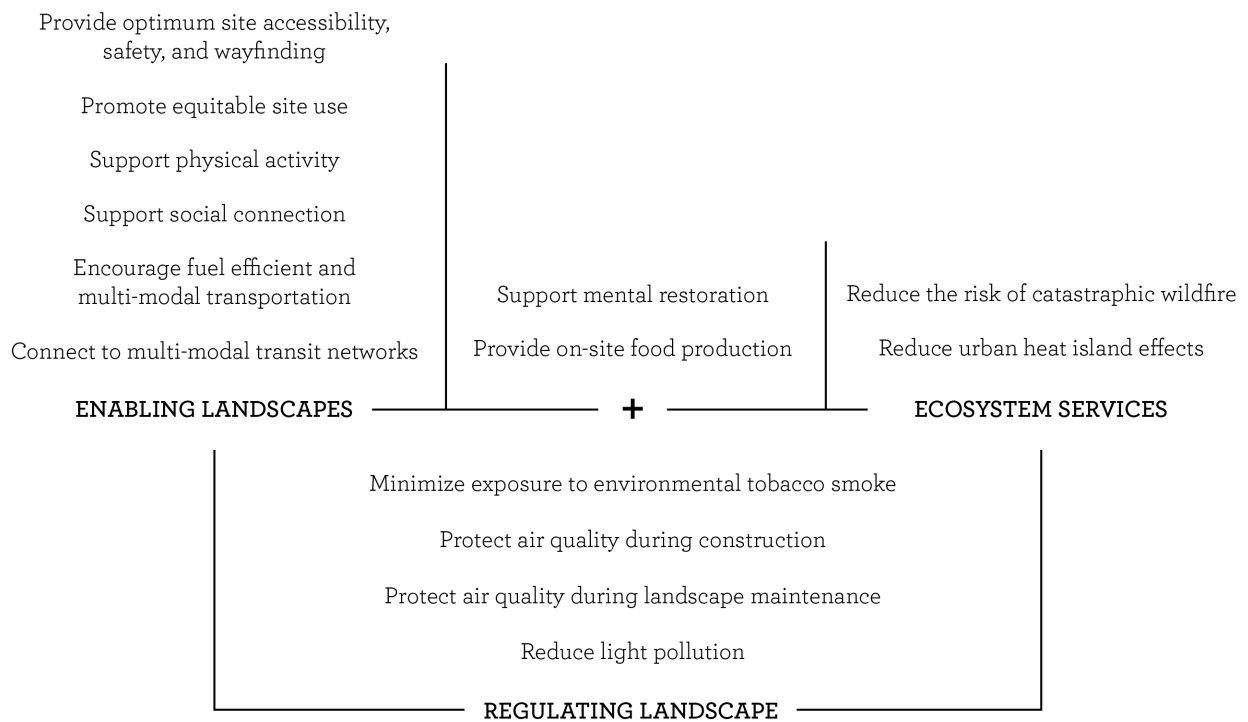


Figure 4: Conceptual mapping of SITES' health criteria

### Enabling and Protective Landscapes

The conceptual framework of SITES criteria that I offer in Figure 4 can be refined further. The criteria listed in the regulating landscape column and the ecosystem services column

have much in common. The criteria in these two columns each promote landscapes that do not have certain harmful elements such as air pollution, nighttime lighting, and extreme heat. These criteria promote *protective landscapes*. By combining the criteria listed within the frameworks of ecosystem services and regulating landscapes based on their common attention to protecting health through minimizing harmful environmental exposures, we can see that landscapes promote health both by enabling healthy activities and protecting against negative environmental exposures. Figure 5 lists SITES’ health criteria in columns according to whether they promote enabling or protective landscapes. The criteria in the “+” column promote landscapes that utilize both roles.

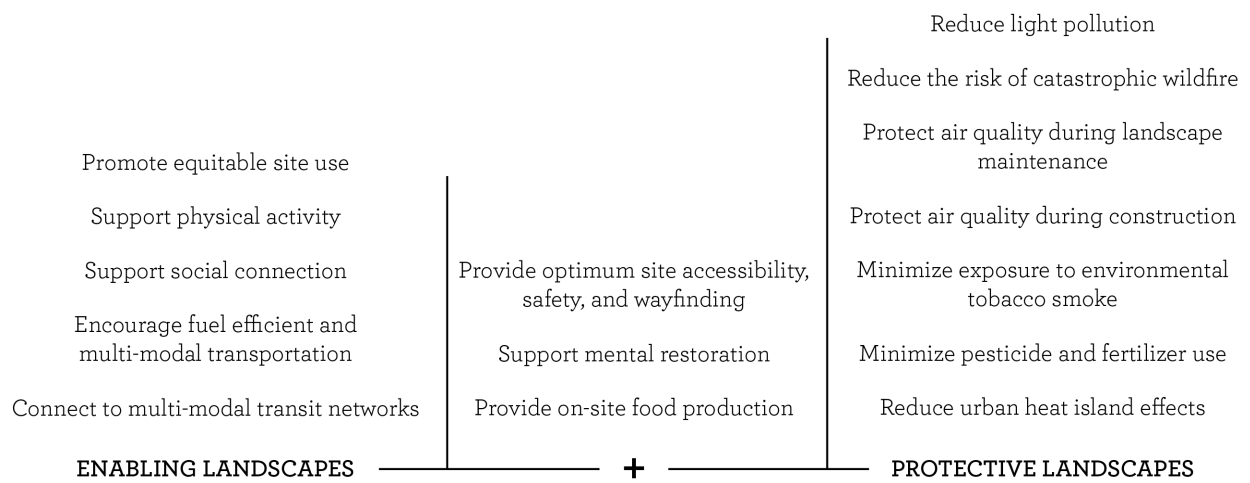


Figure 5: Simplified conceptual mapping of SITES’ health criteria

The framework of enabling and protective landscapes can help with understanding and strategically implementing SITES’ health criteria. As mentioned above, this framework helps make sense of why some health criteria, like “reduce light pollution,” measure performance while others, like “support physical activity,” measure provision of amenities. Understanding this difference helps to validate both types of criteria. It also helps teams decide which criteria to implement. For projects where reducing environmental exposures is a priority the protective criteria should be considered first. However, for projects where community empowerment is more of a priority, the enabling criteria will be more fitting.

The enabling and protective framework also has the virtue of being evocative and more intuitive to apprehend. Simple graphics, such as the image in Figure 6, can succinctly and evocatively communicate the health value of landscape using this framework. Evocative and conceptually rich graphics of this sort are invaluable for communicating the value of landscape to broad audiences and for promoting understanding of landscape's roles in health.

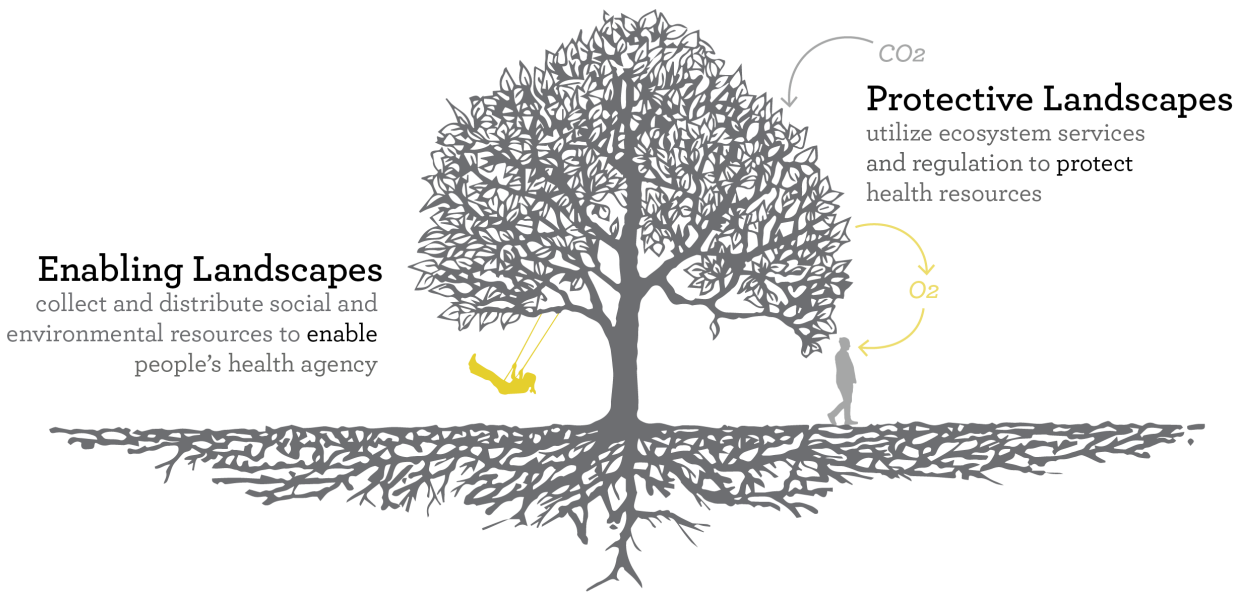


Figure 6: Communicating the framework intuitively and evocatively

## Framing Health

In addition to adopting and communicating a framework for understanding landscape's roles in health, I recommend that SITES more clearly communicate a richer understanding of health itself. Not all people think of health as a complex property emerging from interactions between personal, social, and environmental resources (see Chapter 2 for a detailed discussion of health) but thinking of health in this way helps clarify landscape's role in health. SITES' health criteria attend to the social and environmental conditions that protect and enable health outcomes. Built landscapes, as major components of the cultural and physical environment, operate on human health by influencing social and environmental health resources.

This framing of health should be communicated both textually (Chapter 2 provides an example of this) and graphically. Just as for the framework of enabling and protective landscapes, an emergent and contextual understanding of health can be succinctly and evocatively communicated graphically (see Figure 7). By communicating in this way SITES can compellingly reach a broader audience.



Figure 7: Framing health as the convergence of personal, social, and environmental resources.

This framing of health promotes an understanding of built landscapes as potential health resources that can operate socially and environmentally. SITES' criteria can explicitly connect to this framing of health by articulating their relationship to these health resources. For example, the criteria for supporting safety through the use of CPTED techniques could be described as marshaling environmental and social resources that discourage harmful behaviors, and thereby protect people's personal health resources.

Incorporating these conceptual frameworks of landscape and health into SITES will unify its health criteria into a coherent group. The conceptual frameworks offered in this thesis provide a way to show how each health criterion supports the same goal—the ability of people to engage in the vital activities of their lives—and operates under two primary mechanisms—enabling and protecting. Incorporating these frameworks will increase the

legibility of health as a topic of focus within SITES while also providing project stakeholders with conceptual tools for assessing and communicating about a project's approach to health.

## **Structural Legibility**

Further, I recommend that SITES reassess its organizational structure with an eye to improving the legibility of its health components. SITES' current container for health criteria, the "health and well-being" category, is too diverse a collection to clearly convey SITES' approach to human health. Further, many of SITES' health criteria are not placed in the health and well-being category or are named in ways that obscure their health focus. In this section, I recommend changes to the organization and naming of SITES' health criteria with the intent of improving the visibility of SITES' collective focus on health.

### **The Health and Well-Being Category**

The existing human health and well-being category for SITES contains a collection of criteria that focus on topics as diverse as fuel-efficient vehicles, historic preservation, food production, local economies, and wayfinding (see Table 4). All of these criteria influence health to some extent, but some are primarily focused on other important issues. The criteria to preserve historic buildings and landscapes, for example, primarily focuses on impacting sense of community and place. The collection of criteria within the human health and well-being category appear to focus on the human impacts of site design broadly, not on health specifically. Combining health criteria together with other social and cultural criteria obscures the legibility of health as a central topic of concern for SITES. To improve the legibility of SITES' approach to health, health focused criteria should be organized in a way that highlights their unity of intent. This could be done by reorganizing the health focused criteria into a more focused category.

<b>Human Health and Well-being Criteria</b>	<b>Points</b>
Protect and maintain cultural and historic places	2-3
Provide optimum site accessibility, safety and wayfinding	2
Promote equitable site use	2
Support mental restoration	2
Support physical activity	2
Support social connection	2
Provide on-site food production	3-4
Reduce light pollution	4
Encourage fuel efficient and multi-modal transportation	4
Support local economy	3
Minimize exposure to environmental tobacco smoke	1-2

**Table 4:** SITES' current human health and well-being criteria

I recommend splitting the existing human health and well-being category into two new categories: human health and community vitality. Table 5 (below) outlines this proposed grouping of criteria and reflects recommendations for changing the names of SITES' health criteria that I will discuss later in this chapter. Criteria labeled with an asterisk in the Table are those that I propose renaming or moving from other categories into the human health or community vitality categories. Two of these criteria I recommend making prerequisite criteria, which I will discuss in more detail in the "Relative Significance of Health Criteria" section later in this chapter. The naming and category grouping changes will be discussed in more detail in the next section, "Organization of Criteria." Table 5 shows that my proposed human health category will receive the majority of the criteria from the existing

health category while also incorporating some health criteria currently placed in other categories. The community category can then contain a collection of criteria that focus

CATEGORY	CRITERIA	NOTE
Human Health	* P Promote health equity	Rename existing criterion to shift focus to health
	* P Ensure accessibility	Divide existing criteria that lumps together accessibility, safety, and wayfinding into two separate criteria
	* Protect physical safety	
	Minimize exposure to environmental tobacco smoke	
	* Healthy lighting design	Rename existing criterion to shift focus to health
	* Reduce urban heat island effects	Move existing criterion from soils issue to health
	* Reduce the risk of catastrophic wildfire	Move existing criterion from vegetation issue to health
	Support mental restoration	
	Support social connection	
	Support physical activity	
	* Support active transportation	Separate existing criterion into two that focus on fuel efficiency and active transportation
* Encourage fuel efficient vehicles		
	Provide on-site food production	
Community Vitality	* Protect and maintain cultural and historic places	Move existing criteria from health and well-being issue to proposed community issue.
	* Support local economy	
	* Design functional stormwater features as amenities	Move existing criterion from water issue to community

*\* indicates proposed or altered criteria*  
*'P' indicates prerequisite criteria*

**Table 5:** Proposed reorganization of SITES' health focused criteria

on promoting local community. The limited number of criteria that fit the theme of community highlights another potential area of improvement for SITES. However, for the

purposes of this thesis, I will focus on resolving the cohesiveness and legibility of the health-focused topics, leaving the proposed community category for a future endeavor.

## **Organization of Criteria**

SITES has many criteria that either focus on human health or have direct impacts on human health. However, many of these criteria's connections to health are obscured by the categorization of the criteria into other categories or because they are named in a way that does not highlight the connection. Further, there are a couple of criteria within the health and well-being category that collapse several important and different health topics into one criterion, such as the "provide optimum site accessibility, safety, and wayfinding" criterion. With some small changes, SITES' focus on health could be strengthened and clarified. I recommend several alterations to the naming, categorization, and focus of existing criteria. These changes are all documented in Table 5 (above) and are described below.

Some criteria that focus on health should be clarified by renaming the criteria. For example, criteria such as "promote equitable site use" and "reduce light pollution" are named in ways that obscure the health significance of the topics they address. The "promote equitable site use" criterion touches on the key topic of health equity without directly acknowledging it. Renaming this criterion to "promote health equity" would highlight the health focus of this criterion while retaining its focus on equity. This criterion's indicators require that projects provide free public events related to health and identified as needs by the local community. These requirements already measure aspects of health equity and do not need to be modified to accurately reflect the new name but can be updated as more relevant strategies for promoting health equity through landscape are determined. Similarly, renaming the "reduce light pollution" criterion to "healthy lighting design" would foreground the health impacts of the assessed design strategies. The indicators and benchmarks for this criterion can also remain unchanged as they already focus on aspects of outdoor light design that impact human (and ecological) health.

There are two health criteria, "encourage fuel efficient and multi-modal transportation" and "provide optimum site accessibility, safety, and wayfinding" that cover too many topics and

should be separated into multiple criteria to give each topic adequate consideration. The indicators for the “encourage fuel efficient and multi-modal transportation” criterion primarily focus on fuel efficiency, not on multi-modal transportation. However, both of these topics are significant to health for different reasons. Fuel-efficient vehicles help reduce air pollution near roadways and multi-modal transportation (cycling, walking, public transit) encourage physical activity. Since these topics relate to health in quite different ways, I recommend giving each topic its own criteria. I also recommend naming the criteria that focuses on multi-modal transportation “support active transportation,” since it is the active element of these modes that is most beneficial to health.

The criterion to “provide optimum site accessibility, safety, and wayfinding” also collapses several important topics into one criterion and should be separated into multiple criteria to give each topic adequate attention. The issue of accessibility is fundamental to landscape’s enabling health benefits. Most of these benefits only accrue for those who can access the landscape. Safety is another important health concern and, though it is related to accessibility, is also a concern of its own. Wayfinding, while an important aspect of site design, does not relate strongly to health. Some aspects of wayfinding are necessary for accessibility and should be included in the indicators and benchmarks for an accessibility criterion. Should wayfinding topics beyond those necessary for accessibility be deemed important aspects of sustainable site design, these should be assessed by a criterion in another category.

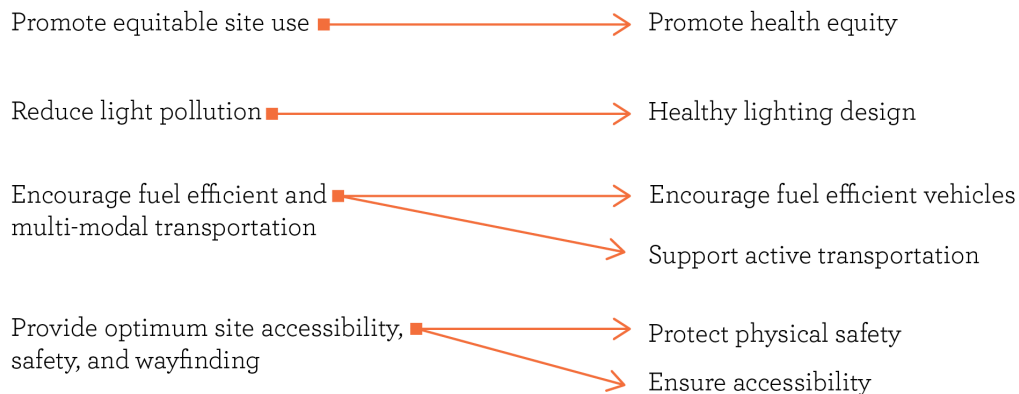


Figure 8: Diagram of my recommendations for changing criteria names and separating criteria that cover multiple topics.

Some criteria should be moved from their current grouping into the “Human Health” category. “Reduce urban heat island effects” and “reduce the risk of catastrophic wildfire” are categorized within the soils and vegetation category, presumably because their indicators assess strategic use of plants. However, the criteria primarily impact human health. Recategorizing these criteria in the human health category (see Figure 9) would improve legibility of SITES approach to health.



Figure 9: Diagram of my recommendations for moving health-focused criteria into the human health category.

Figure 10 shows the complete list of criteria I recommend for the human health category and how they map to the conceptual framework discussed in the previous section. A team working on built landscapes could use this list to facilitate internal and external communication about a project’s impacts on human health. Further, orienting an entire category within SITES’ toward human health elevates the topic’s apparent significance within the system.



Figure 10: Conceptual mapping of proposed criteria within the new human health category.

## **Relative Significance of Criteria**

Though SITES' allocates a significant portion of its certification points to criteria in my proposed human health category (16%), a project could achieve platinum certification without earning any of points in the human health category. This, to me, seems problematic. As shown in Chapter 3, to achieve platinum certification a project needs to fulfill all of SITES' prerequisite criteria and earn 67.5% of SITES' available points. Of the nine categories, only "human health" and "education and monitoring" contain no prerequisite criteria. Because of this, unlike the other sustainability topics covered by SITES, certification does not ensure that a project has done anything specifically to improve human health. To remedy this, I recommend that SITES require all certified projects to give some direct attention to human health. At minimum, this could be accomplished by making some of the human health credits prerequisites for certification (see Table 5).

### **Prerequisite Criteria**

In my reframing of health-oriented evaluation criteria, I recommend that those criteria for ensuring site accessibility and promoting health equity be made prerequisite criteria for achieving any level of SITES certification. Both of these criteria require projects to work toward ensuring that the potential health benefits of the project are available to as many people as possible. These two criteria amplify the positive impacts of other health criteria by ensuring that disadvantaged members of communities can participate in them. Further, these criteria focus directly on two of the more pressing health issues of our time, living with disability and pervasive health inequity (see Chapter 2 for more discussion of contemporary health concerns). Because these criteria support all other health criteria and because they address fundamental health issues, they are essential components of any landscape project attempting to promote holistic sustainability. Requiring certified projects to meet these criteria would ensure that SITES' certified projects are improving the health resources available to all potential users.

## **Communicating Design Strategies**

SITES' has literature that describes relevant strategies and background information for each of the health criteria, however, this information is presented in a fairly dry format that relies heavily on textual lists. Illustrating SITES' valuable textual resources with graphics would improve the accessibility, clarity, and relevance of the information. Designers are trained to think and communicate visually and most books for designers rely on graphic communication aids. Other project stakeholders may more readily learn relevant information from succinct, evocative graphics than a dense book like the Sustainable Sites Handbook (Calkins 2012). In this section, I propose graphic material that could be used to more fully engage project stakeholders in design decisions related to the criterion for supporting social connection. This collection of graphics illustrating one criterion serves as an example of how SITES could illustrate its other health criteria.

### **Illustrating Social Connection**

The SITES Reference Guide and the Sustainable SITES Handbook identify design, management, and maintenance strategies for supporting social connection. I propose supplementing the written description of these strategies with a series of illustrations and infographics.

An introductory infographic could be used to present the significance of social connection for health while also providing an evocative overview of the most important strategies for addressing social connection (Figure 11). The three graphics hovering near the top of the illustration convey poignant reasons for caring about the criterion. SITES' literature does not often make the case for healthy landscape interventions. Adding this information to the literature, and presenting it graphically, can support designers and stakeholders trying to persuade others of the value of these criteria.

The lower portion of the introductory graphic embeds some of The Handbook's key strategies for supporting social connection into an illustrated scene of people engaging in a typical landscape. Though still presenting information in list form, by connecting each item

to an aspect of a visual scene the illustration makes the items more memorable, provokes potential associations with viewers' personal experience of landscapes, and helps to engage an interested viewer's imagination.

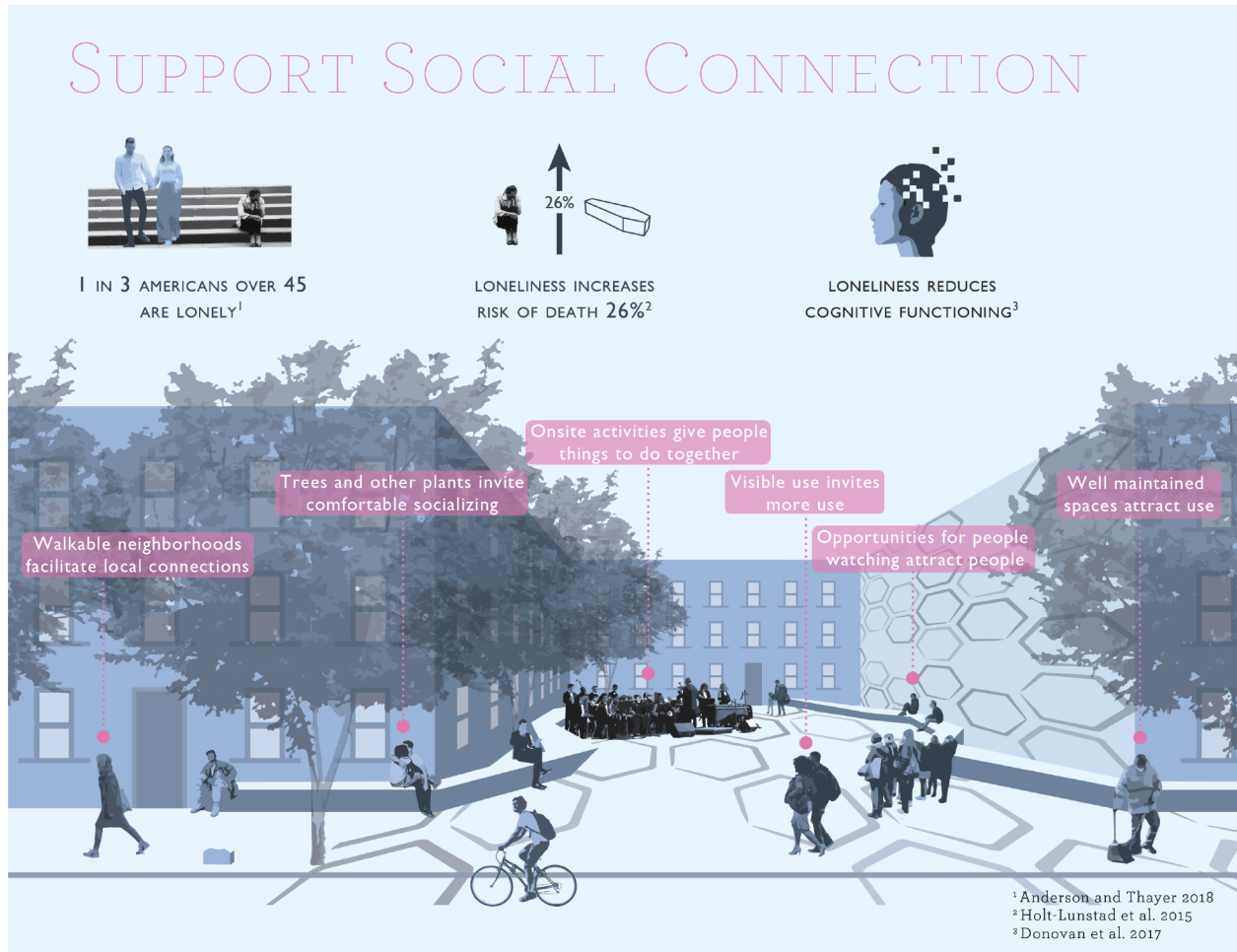


Figure 11: Introductory graphic for the Support Social Connection

After an introductory graphic, further graphics could be used to convey topical information related to thinking through how landscapes can facilitate social connection more generally. Figure 12 illustrates a way of thinking about social opportunities in landscapes. While the quantities in the graphic are contrived for illustration purposes, the diagram illustrates a technique for assessing social opportunities in the landscape by looking at how different user groups use the space and overlap over time. This graphic would complement a textual discussion of the strategy of measuring, and sensitively designing for, the use of landscapes by different user groups over time.

## OVERLAPPING USES OVER TIME

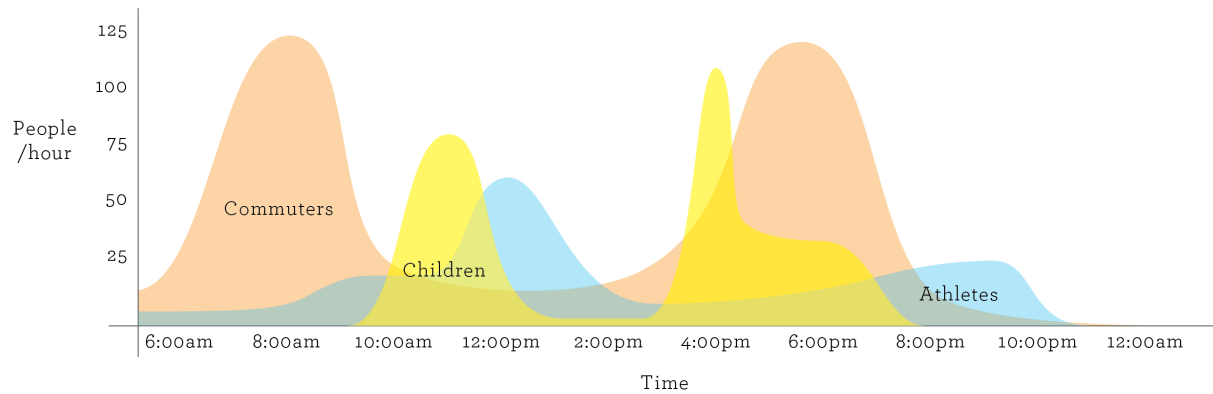
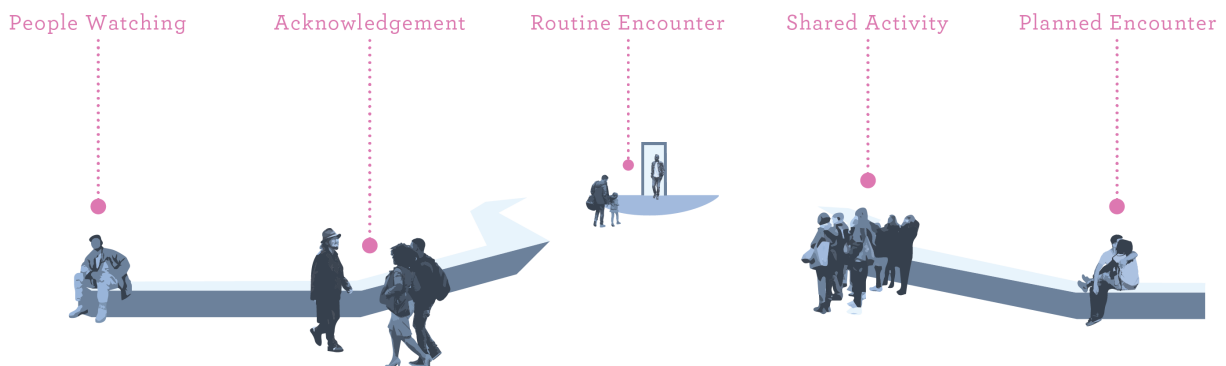


Figure 12: A topical infographic demonstrating a general approach to considering how landscapes might facilitate social connection

Figure 13 presents another version of this type of topical graphic, this time presenting illustrated vignettes of various types of public encounters that happen regularly in landscapes. People watching is a basic type of social interaction that happens every time we are in public places. Acknowledgment of strangers by saying hello or nodding is also a common public encounter. Routine encounters are those encounters with familiar strangers, such as another regular at a coffee shop or another resident of your apartment building. These also involve strangers but they are not as anonymous as the encounters in observing and acknowledging strangers. Shared activity can involve both strangers and

## TYPES OF PUBLIC ENCOUNTERS



Names of encounters adapted from Cattell et al. 2008

Figure 13: A topical graphic on types of public encounters

acquaintances. Shared activities include watching street performers, helping someone pick up belongings that fell out of their hands, and attending a rally. Planned encounters are when we intentionally meet up with acquaintances in public spaces. Each of these encounters involves varying levels of social connection and interaction with known and unknown people in different ways. Designers can consider the value of these encounters for their project and how the built landscape facilitates or hinders them.

The topical graphics (Figures 12 and 13) are meant both to educate and inspire. As such, they do not need to be comprehensive. By highlighting a few of the possible ways to think more deeply about social connection in the landscape these graphics accomplish several things. First, they pass on some knowledge to the viewer. Second, this brief exploration of social connection in the landscape helps the viewer to better perceive the complexity and nuance of the topic. Hopefully this helps people working with the criterion to more thoroughly appreciate its parameters and requirements. Third, ruminating on the graphics will potentially trigger further associations, musings, and design ideas in viewers. My proposed topical graphics are intended to engage the imagination while piquing interest.

Another series of graphics could provide analysis for specific strategies that The Handbook suggests for the criterion. For example, the provision of seating is the primary benchmark for the social connection criteria. As written in the criterion, the requirement to provide enough seating for 10% of anticipated site users does not provide much for the imagination to run with. However, providing an infographic analyzing seating, like the one in Figure 14, could provide a more inspiring prompt for designers and other stakeholders. Like the topical

## SEATING CONFIGURATIONS

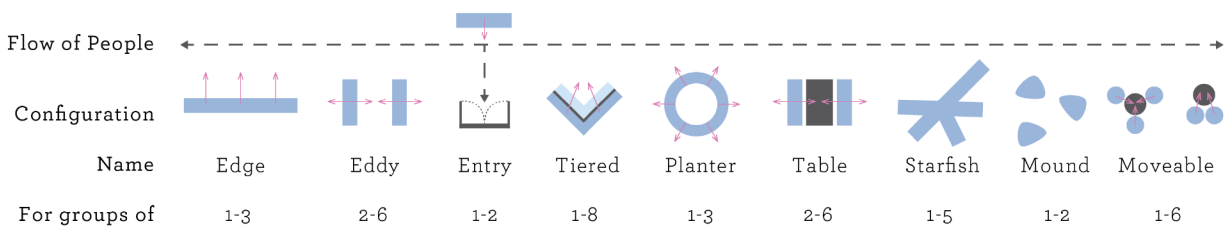


Figure 14: A strategic graphic analyzing seating typologies

graphics, strategic graphics of this sort are not meant to be comprehensive. Their purpose is to elevate the task of supporting social connection in the landscape.

Currently, the SITES Reference Guide's presentation of the support social connection criterion is fairly dry. It mostly indicates the need for providing an outside space with benches. The Handbook adds a little nuance to this, pointing toward research on topics such as how the presence of trees and people increase social interaction. My proposed social connection graphics encourage nuanced and inspiring consideration of how any given landscape project can best support social connection. Many stakeholders may never have thought about the importance of designing for use patterns that change throughout the day and year or thought about what types of social interaction are best supported by different seating configurations. However, while they do provide information, the graphic's primary intent is to inspire associative and imaginative thinking about the topic. At their best, these graphics could help elevate the level of discourse for all parties involved in built landscape projects.

The proposed graphics can be applied to each of SITES' health criteria. My recommendation is that SITES develop at least one diagram for every health criteria, using these proposed diagrams as a starting point. By supplementing the criterion with these graphics, SITES would demonstrate a commitment to the health criterion that would elevate the perceived significance of health in SITES ratings. The increased sense of significance and the evocative graphics would have the potential to inspire design teams and stakeholders to more deeply consider strategies for leveraging landscape for human health.

## **Summary**

Though SITES addresses many health topics, the way they are organized and presented obscures its overall approach to health. In this chapter, I made several recommendations to improve the coherence, legibility, and significance of SITES' approach to promoting health. First, I recommended that SITES communicate a cohesive conceptual understanding of health and of landscape's roles in promoting health. Second, I recommended that SITES

reorganize, rename, and, in cases, refocus health criteria to improve the visibility of the comprehensiveness of SITES' suite of health criteria. Third, to ensure that SITES certified projects attend to health issues, I recommended that two health criteria, "ensure accessibility" and "promote health equity," be made prerequisites to certification. Finally, I recommended that SITES complement its health criteria with illustrations that elevate the sense of significance and the associative qualities of the textual description of the criteria. By implementing my recommendations, SITES could elevate the perceived value of landscape generally, and the perceived role of landscape in health more specifically.

## **Conclusion: Leveraging Landscape for Human Health**

SITES has a unique opportunity to establish national priorities in landscape development. SITES' approach to creating sustainable landscapes will influence the coming generation of aspirational landscapes. Further, as SITES becomes more widely adopted by regulatory agencies, it will guide the development of more and more conventional landscapes. Because of SITES' large potential for impact, it is particularly important to refine and hone its approach to accurately reflect our knowledge, our interests, and our needs.

In general, as it is now, SITES sets an elevated standard for landscapes. However, its approach focuses on the ecological aspects of landscape sustainability such as water conservation and the use of low impact materials. While SITES does address social and economic aspects of landscape sustainability, including human health and well-being, these aspects of sustainability are relatively underdeveloped within its system. SITES' conceptual approach to health and well-being, its credits that respond to these issues, and the influence these credits have on the certification of landscape projects are less rigorously developed than SITES' approach to more ecologically focused issues. In this thesis, I proposed several changes to SITES' system that SITES could adopt to add depth and significance to its promotion of landscapes that support human health and well-being. If adopted, my recommendations would elevate SITES' approach to human health and its commitment to a holistic vision for sustainable landscapes that genuinely attends to both human and environmental aspects of sustainability.

### **Thesis Overview**

In Chapter Two, I showed that landscapes are essential health resources. Reviewing theories of health, I found that our health is less about the fitness of our bodies and minds and more about our ability to engage in the vital activities of our lives, including our social connections and our meaningful contributions to family, society, and the world. A physical health issue like asthma is not only a problem in itself, it is also a problem because of the ways it can restrict our ability to participate in physical and social activities and engage in

our chosen line of work. Our bodies are just one of the places where we encounter barriers and resources for participating in these essential aspects of our lives. The landscapes that we live in are also a significant source of these opportunities and barriers. Landscapes, as the places in which we work, learn, love, and play every day, are significant to our health because they can either enable or disable us to be fully engaged in our lives in a health-promoting way. Landscapes that are inclusive and accessible and that afford the opportunities and resources we need for healthy activities will promote health. These everyday, healthy landscapes are more pervasive and varied than they are commonly conceptualized to be. They are parks and they are also networks of sidewalks that mediate our movement, schoolyards that facilitate kids' play, and plazas that shape our festivals and demonstrations. In all of their incarnations, landscapes can promote human health by protecting us from harmful exposures and by enabling access to the important and healthful activities in our lives.

In Chapter Three, I showed that, while SITES makes a valuable contribution to promoting healthy landscapes, its approach could be improved. Though SITES' health credits promote a wide range of strategies for leveraging landscape to support human health, SITES does not deeply discuss the nuance and creativity involved in achieving these credits nor does it relate them to the greater picture of landscape's overall impact on health. In order to elevate the perceived health value of landscape in our society, SITES must not only communicate a more holistic understanding of landscape's role in health, one that unites its many specific strategies in a strong conceptual framework, but also identify the nuance and creativity involved in applying each individual strategy. Without this rigor, SITES' approach to health will continue to be overshadowed by its approach to environmentally focused issues.

SITES also undervalues health in its certification process. Though SITES has many possible health credits, they are generally worth fewer certification points than the average credit. Further, none of SITES' many prerequisite credits focus on health. By diminishing significance of health credits' for attaining certification, SITES implicitly renders them of secondary importance. In addition to communicating a clearer understanding of landscape's role in health, SITES needs to give more value to its own health credits.

In Chapter Four, I developed a series of recommendations for how SITES could better communicate and promote the health value of landscape. I recommended several minor modifications to SITES. Specifically, I recommended communicating a holistic conceptual understanding of landscape's role in health, reorganizing and renaming SITES' credits to clarify their focus on health, increasing the significance of health credits for attaining certification, and using graphics to communicate nuanced and inspiring strategic insights related to the health criteria. Together, these changes would help to elevate the understanding and significance of landscape's role in health.

My recommendations require many small tweaks to SITES. Implementing them would not involve any major reworking of SITES' systems, however, even my minor recommendations require further elaboration and study before being incorporated. My discussion of separating SITES' current "health and well-being" category into "human health" and a "community vitality" category didn't fully resolve the content of the community category. Before implementing this recommendation, more thought needs to be given to the nature and content of this new category. Additionally, my recommendation to make two of the health credits prerequisites for certification should be further analyzed. My recommendation identified the general need for prerequisite health credits and the conceptual appropriateness of these two credits, however, the practical implications this might have for different project types must be considered. Further questions need to be asked, such as: "What impact will these requirements have on projects?" and "Are there any specific types of landscape projects that will be particularly impacted by these requirements?" It is possible that requiring these credits is a valid burden to place on all landscape projects; however, it could be that for some types of projects these credits, as written, present undue burdens. Sorting this out is beyond the scope of this thesis but is an important next step for increasing the significance of health in SITES' certification. Finally, my recommendation to elaborate on each of SITES' health credits and the strategies for achieving them requires more work. For my recommendation, I created a template for this elaboration by developing more material for one health credit, promoting social connection. Further creative work is needed to use this template and develop material for each of the other health criteria.

## Reflection on My Process

My personal goal for this thesis was to prepare myself to support human well-being in my future career as a landscape architect. I wanted to learn what is known about landscape health factors and to creatively engage these factors in the context of design thinking. Focusing my thesis on improving SITES served as a way to both organize my exploration and overlay my personal interest with a project that could benefit the greater profession of landscape architecture. At times, these two projects, one inward and one outward, were easy to interweave, while at other times, they seemed to pull against each other. Overall, I prioritized my exploration of SITES above my personal interest in exploring ways to use landscape to promote well-being, though I did successfully manage to work toward both.

On reflection, the fourth chapter most moved toward my goal. In this chapter, I was able to use my thorough understanding of SITES as the framework for my own creative exploration of landscape's influence on health and well-being. By arguing for the importance of conceptually approaching landscape's role in health, I made room to explore this topic abstractly. The diagrams I made in this chapter that discuss the overall framing of landscape's role in health are, I think, the elements of this thesis that will most significantly inform my future work as a landscape architect. I look forward to continuing this diagrammatic and visual exploration of theory and landscape practice around understanding health and well-being. My other work in this chapter of refining SITES' health credits helped ground and inform the abstract diagramming that felt so successful. I continually tested my conceptual ideas and the health credits and strategies against each other, and through this process refined my understanding of both.

For this thesis, I had two large subjects, SITES and landscape's role in health, and I felt the need to thoroughly introduce both of them. These lengthy introductions, Chapters Two and Three, took significant amounts of time to research, write, and ground in the relevant literature. I think this time investment provided a personal grounding in the topics that was necessary for my creative exploration, however, more could be done to advance the recommendations of chapter 4.

## **Future Efforts**

I look forward to continuing my creative and practical exploration of leveraging landscape as a resource for health and well-being. For my next steps in this topic I will develop more diagrams that concisely and evocatively illustrate both the theoretical connections between landscape and health and the strategies for leveraging these connections. These diagrams will help me to design, to communicate the value and intent of my designs, and to develop relationships with others interested in designing landscapes to support human health.

Though this thesis presented several recommendations for improving SITES' approach to human health, there are potential areas of improvement that were not explored but merit further study. More work could be done to determine new health credits that SITES could include, such as credits that focus on the health needs of specific project types like schools or prisons. SITES' current health credits are broad enough that project teams can orient themselves toward many applications. However, their very breadth makes the criteria ill-suited to providing benchmarks for the health needs of specialized projects like schools and prisons. Another important area of study that I did not cover is a full reassessment of the indicators and benchmarks SITES uses for its health credits. I addressed SITES indicators by recommending the inclusion of more thoughtful exploration of strategies to achieve them; however, it is possible that the indicators themselves, or the benchmarks to which they are tied, could also be improved to provide more rigor and depth in SITES' system. This reassessment could be undertaken by future students in theses, or by SITES itself as it recognizes the value of improving its approach to supporting human health.

## **Closing Remarks**

Sustainable landscapes need to help us chart a path toward a healthy world where human societies and the earth's diverse ecosystems can thrive together. A vision of sustainability that does not account for the well-being of people is both impoverished and unrealistic. Impoverished because sustainability should be about a mutual flourishing: the capacity for all of earth's life, including us, to thrive. Unrealistic because powerful, unhealthy, and

chronically discontent societies cannot be expected to maintain a balance with the world around them. In this landscape architecture thesis, I focused on human health because I believe that health should be more of a priority in built landscapes. I focused on SITES because it has already made significant progress toward incorporating health and I believe it could be receptive to deepening its approach. My hope with this thesis, and in my future work as a landscape architect, is to make landscape's influence on human well-being a higher priority and to elevate the richness of our approach to this aspect of landscape.

Landscape architects know how built landscapes affect the natural environments around them more thoroughly than they know how these landscapes affect the people who live in them. Landscape architects need to research more about how landscapes influence human lives. We also need to utilize the valuable research that has already been done on this topic. Finally, we need to enrich our strategies, and our communication of our strategies, for leveraging landscape for human well-being. Though SITES is imperfect, it is also of great value and can serve as a central resource for this work. As it is now, SITES promotes health, sustainability, and landscape. By receiving and responding to the sort of critical attention I offered in this thesis, and by continuing to invite such attention, SITES can elevate the value it offers to landscape architects and our world. SITES can lead the way to a world in which landscapes support our most fundamental needs. My recommendations for improving SITES are a few of the many ways forward that will hopefully come as SITES leads us to that world.

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