Chapter 11: Culture and Relationships with Nature in the US

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Chapter Contents

Summary

This chapter explores the relationships between culture and nature in the United States, with a focus on how experiences in and with nature meaningfully shape and fulfill peoples' lives. The chapter explores five framings of human–nature relationships as representations of multiple and diverse worldviews through which people can experience nature, and how those experiences, mediated by characteristics of nature and access to nature, contribute to an evolving culture-–nature relationship. Culture–nature relationships have changed dramatically over the course of US history through processes of Indigenous sovereignty, colonization, slavery, capitalism, immigration, conservation, co-management, and other large-scale phenomena. In addition, culture–nature relationships are associated with many meanings and values for many people, but these relationships, meanings, and values differ across diverse sociodemographics. Overall increases in some nature-based activities contribute to strengthened relationships with nature, but decreases in both exposure to nature overall and the quality of nature contribute to weakened relationships. Further, access to nature interacts with framings of human–nature relationships to mediate between the attributes of nature and nature's meanings and values. The crucial role of access leads to great diversity in how relationships can develop and manifest and to many inequities (e.g., who can access nature, when, and for what purposes). Nine dimensions of access reveal equity implications for relationships with nature. Each dimension of access also suggests ways managers can strengthen or weaken people's relationships with nature. Because attributes of nature and access intertwine to support relationships with nature, managers often face tensions between facilitating access to allow for meaningful, nondestructive consumptive activities and restricting access to limit damaging activities. Despite these findings, research and monitoring related to relationships with nature leave many gaps in available data; future data collection can help managers to account for diverse human-nature relationships and seek harmony between them.

Background

Although culture and nature are separate concepts in the English language, they are inherently intertwined, both conceptually and in everyday life. Nature has been central to humans' life experiences throughout history (1). People's diverse relationships with the rest of the natural world are part and parcel to the development and thriving of human culture. In many communities and societies, nature and culture constantly influence one another, and participating in that mutual influence through the enactment of one's culture is central to a meaningful, fulfilling life.

Culture is an interconnected system of factors and traits (e.g., worldviews, knowledges, beliefs, values, norms, practices, institutions) that structure human life (2). Culture is learned and shared through people's upbringing, educations, and livelihoods, and also constantly changes in response to new challenges and circumstances (1).

As part of a shared human history, culture in America cannot be understood without reference to nature, and nature in America cannot be understood without reference to culture. Culture–nature relationships have changed dramatically over the course of US history through Indigenous sovereignty, colonization, slavery, capitalism, immigration, sustainability, and co-management, and culture–nature relationships differ across the diverse sociodemographics found in the US. Across this time horizon, the quality and characteristics of nature have changed and evolved as have the diverse ways people interact with nature. Combined with diverse worldviews, or ways through which people conceive and interact with the world, these experiences shape how a person or group of people understand the meanings of their interactions with nature and will affect how they experience culture. This diversity of experiences gives rise to a US culture influenced by nature that enriches people's lives in many ways.

Different Relationships with Nature

The human–nature relationships framework (3) provides an organizing schema for exploring insights on an important set of human–nature worldviews (Figure 11.1) (4). By relationships with nature, we refer to associations between people and nature that involve people interacting with nature physically, cognitively, or emotionally. Relationships with nature are inherently social and collective; though they can be experienced individually, they draw meaning from shared histories, practices, norms, and cultural contexts.

The meanings associated with these worldviews and values can be so deeply ingrained and assumed that they subconsciously guide what feels right about interactions with nature. Different worldviews and meanings can drive conflicts between people about how nature should be managed (5), for example when wolves are viewed as predators or kin, fire is viewed as destructive or restorative for forests (5), Hawaiian monk seals are seen as an endangered species in need of protection or a competitor for fish (6), or outdoor cats are seen as pests or pets (7,8). Further, multiple sets of meanings may be overlaid on the same landscape, for example when places preserved as National Parks for outstanding scenic beauty and recreational opportunities restrict Indigenous practices, such as access to sacred sites, collecting animal feathers or bones for regalia, or harvesting cultural foods, and industrial practices such as limiting the exploration of minerals (9–11).

Assessing Culture and Relationships with Nature

Assessments of human–nature relationships have historically emphasized readily observable, measurable outcomes, such as economic values of nature's resources, physical health benefits from time in nature, or ecosystems' roles as physical buffers to environmental risks. Many of these important considerations are addressed in other chapters of this Assessment (see Chs. 12, 13, 14). In contrast, this chapter foregrounds relational, meaning-based dimensions of human–nature relationships and dimensions that are central to what many people consider a meaningful and fulfilling life, yet are less consistently captured in assessments or the literature.

These relational dimensions are intertwined with material practices, ecological conditions, and physical interactions with nature. Those interactions can be understood as more unidirectional (i.e., nature provides benefits or gifts to people) or more reciprocal (i.e., people care for nature and imbue it with cultural meaning and nature provides gifts or contributions to people). These culturally grounded relationships—how they are formed, why they matter, and how they are changing—form this chapter's focus (12,13).

Such relationships with nature are some of the most important parts of Americans' lives, both historically and today, yet they are often taken for granted or inadequately represented in ecosystem management and governance. One reason is that these relationships involve meanings, values, identities, access, and responsibilities that are not easily reduced to standardized or purely biophysical or economic metrics (Ch. 12: Economy); in contexts that prioritize what is physical, quantifiable, and comparable, relational dimensions of human–nature interactions are frequently rendered less visible (14).

This focus on physical and measurable phenomena reflects the historical influence of worldviews that emphasize separation between people and nature, which have shaped management institutions, research priorities, and the types of data most commonly collected (15). Available evidence is thus biased toward particular ways of understanding human–nature relationships. Efforts to broaden valuation and assessment through concepts such as cultural ecosystem services, good quality of life, relational values, and nature's contributions to people represent important attempts to address these limitations, but their definitions, boundaries, and policy implications continue to be debated, reflecting deeper differences among worldviews and knowledge systems (15). Though keepers of Indigenous and local knowledges hold relevant information about relationships with nature that may also be reflected in oral traditions and other aspects of culture (e.g., spiritual protocols, ceremonial foods, songs, myths, and legends), this assessment's sources are limited to summaries in the written literature, primarily peer-reviewed and from government documents. Within this pluralistic context, and noting these meaningful omissions, this chapter synthesizes evidence on relationships with nature, why those relationships matter to people (e.g., through spirituality, identity, belonging, fulfillment), and how changes in the state of nature and access to nature shape those relationships over time. It then proposes more inclusive ways to track relationships with nature and factors that influence them, to better understand how culture–nature relationships in the US are evolving.

Box 11.1. Biocultural Diversity

Another way to assess this pluralistic human–nature context and how it has changed over time is with the concept of biocultural diversity— the intertwined and coevolving intersections between biological diversity (e.g., species, ecosystems) and human cultural diversity (e.g., languages, traditions, livelihood practices) (16,17). Human languages offer excellent example of biocultural diversity: all languages, and especially place-based ones like Indigenous languages, are intertwined with biology and ecology. Many are nuanced and

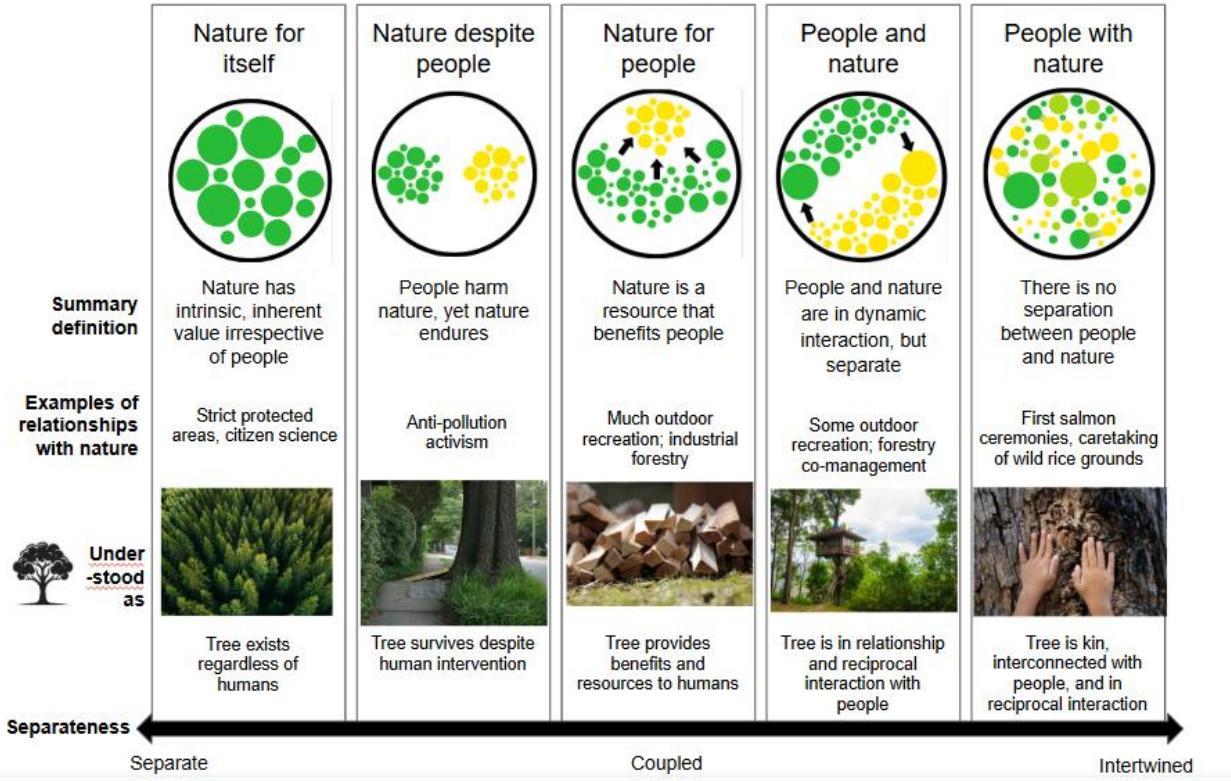
regionally specific for natural features like water on the land (wetland, slough), and Indigenous languages in particular include entire vocabularies built around natural ecosystem features and dynamics, such as types of snow in Alaska, or rainbows in Hawai‘i (16,18,19).

As with biodiversity, high levels of biocultural diversity support community resilience and multiculturalism. In the US, policy environments have prioritized or marginalized certain kinds of relationships over others, homogenizing and reducing biocultural diversity. For example, fisheries policies that prioritize recreation or commerce can create conflict with communities whose ability to practice spiritual and cultural-heritage-related relations with the ocean may be constrained (see KM 11.3) (16,17,20).

Thinking in terms of biocultural diversity is a part of moving away from the more dichotomized worldviews about nature (nature for itself, nature despite people, nature for people) toward more inclusive and relational worldviews where people and nature coexist together (21). Any assessment of relationships with nature must therefore explicitly recognize that the aspects of nature that matter to people, and how they matter, depends on what people bring to their relationships with nature (5). There is no single set of relationships with nature in the US; rather, relationships with nature are as diverse as the country’s communities and places. Similarly, appropriate ways to assess these relationships will vary depending on the related worldviews and ways of knowing.

[END BOX 11.1 HERE]

Figure 11.1. Different Framings of Relationships Between Humans and Nature



People understand and frame the relationship between people and nature in various ways, and these framings loosely correspond to different types of relationships with nature.

Five common ways to understand the relationship between people and nature: ***nature for itself*** *highlights nature as an independent entity whose natural processes have inherent moral worth (i.e., a tree has value just for being a tree, independent of a human valuer).* ***Nature despite people*** *highlights how nature survives despite humans (i.e., a tree survives despite peoples' effort to pave over its habitat).* ***Nature for people*** *highlights peoples' use of nature's products—both physical and intangible (i.e., a tree provides lumber and shade).* ***People and nature*** *highlights two-way, constant interactions between people and nature (i.e., a tree as a beloved childhood play-place and treehouse site).* ***People with nature*** *does not see people and nature as fully separate entities but rather as parts of one whole (i.e. a tree as kin or a member of the family). This perspective reflects, for instance, the fact that many languages (including many Indigenous American languages) do not have a word for "nature" as conceived in English. Adapted from Reyers and Bennett 2025* (3).

Discussions of culture and nature must recognize that worldviews play an important role in creating, maintaining, and changing nature. The very concept of nature, and related concepts like wilderness, are shaped by worldviews and histories. People interact with

nature in many ways and expect different outcomes from those interactions. These differences directly impact how society makes decisions about how to manage, care for, or control nature. The degree and type of influence people have over natural processes varies greatly: people modify nature to various extents and in many ways, to facilitate the types of relationships they prefer. Different perspectives on human–nature relationships, which are often associated with different perspectives on how to modify, work with, or work against nature, often create tension and conflict. Indeed, some of these tensions are core to US history and have led to many different forms of, and ways we experience, nature today.

Key Message 11.1: Nature supports a wide range of important human–nature relationships in the US; these relationships are shaped by diverse worldviews that have changed over time

Nature supports a wide range of relationships, which are shaped by, and shape, different worldviews (virtually certain). The relative dominance of those worldviews has changed through time (virtually certain). Today, a diversity of experiences and relationships with nature exist. A combination of recreation-related experiences (e.g., hiking, wildlife-watching, boating) and caretaking-related experiences (e.g., river restoration, supporting abundance of culturally important species, conserving sacred landscapes) are crucial to many of these relationships (virtually certain). These relationships make life enjoyable, meaningful, and fulfilling for many people (virtually certain).

State of Knowledge 11.1

Dominant Worldviews Have Changed Throughout Time

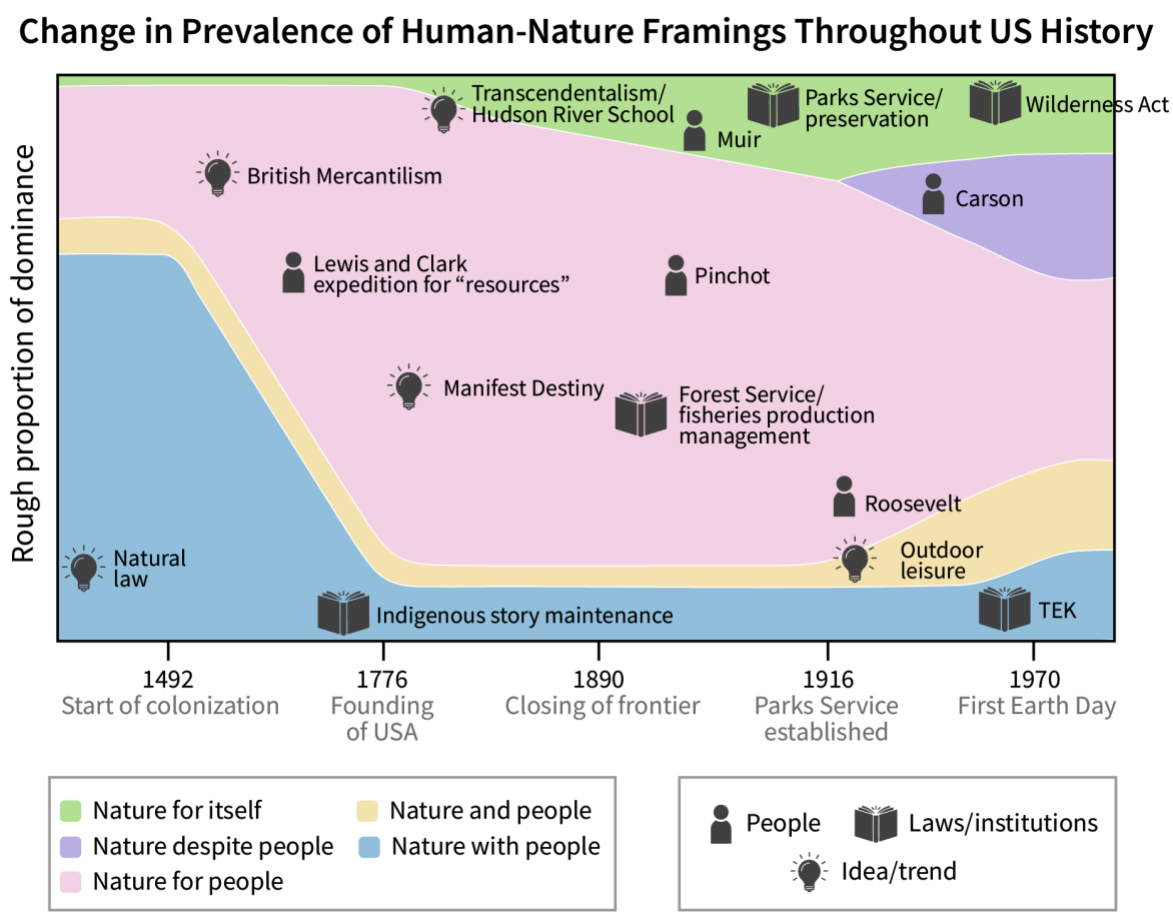
Worldviews that address human–nature connections are in dynamic interaction with both nature and humans' relationships with nature. That is, worldviews shape the kinds of relationships people desire and manifest, those relationships shape nature, and nature shapes those relationships and worldviews. In addition, the lines between worldviews are not firm, and the five categories presented in Figure 11.1 do not encompass all human–nature worldviews. However, they offer a helpful heuristic.

Various social and environmental factors have driven changes in worldviews (see Ch. 5: Connection and Ch. 9: Drivers) and altered the balance of power in human–nature relationships (Figure 11.2). Colonial settlement and the violent displacement of Indigenous Peoples from their lands and lifeways are the most notable driver, as it was an active project of the US government to disrupt and eliminate native practices, languages, and worldviews (22). Settlers also introduced the problematic human–nature binary that is common today in many understandings of nature, such as in the notion of pristine wilderness absent human interaction (23). Other shifts, such as toward the *nature-despite-people* perspective, were driven by recognition of the cumulative environmental burdens the mid-20th century industrial boom, especially in urban centers (24,25). Most recently, the voices of Indigenous Peoples, People of Color, and Queer environmentalists have

advanced a resurgence of more holistic and integrative ways of understanding the people's relationship with the natural word (e.g., *people and nature*, *people with nature*).

This chapter's discussion of changes in worldviews builds on the historical drivers outlined in Chapter 9 and complements the analysis of connection with nature in Chapter 5. Together, these three chapters offer related perspectives on how human–nature relationships have evolved over time. The chapters use closely related but not identical lenses; future iterations of the Assessment will further harmonize these frameworks.

Figure 11.2. Changes in Prevalence of Human–Nature Framings Throughout US History



Predominant worldviews of the relationship between humans and nature have changed throughout US history.

Rough estimation of the prevalence of five framings of human–nature relationships in the US across time. Prior to colonization, Indigenous communities largely existed within ***people with nature****, although traces of* ***nature for people****,* ***people and nature****, and* ***nature for itself*** *were present. The nature-for-people frame dominated colonizer and settler communities; thus, as these communities gained power within the US governance and cultural systems, associated separation and dominion worldviews increased in prevalence.*

People with nature, however, continued to exist, largely sustained by Indigenous Peoples. As settler society began to confront the negative consequences of nature for people–driven resource use, conservation (nature for people and people and nature) and preservation (nature for itself) began to develop and grow in prevalence. These conceptions were grounded in racist and eugenicist ideologies, whereby nature was preserved and conserved for the benefit of Whites at the continued expense and exclusion of Indigenous communities, Blacks and African Americans, and other people of color (26–29). *As industrialization took hold and urban populations increased, people realized the importance of exposure to nature for their health (people and nature); others argued for the preservation of "pristine" nature for its inherent worth (nature for itself). Decades later, as awareness of pollution became widespread,* ***nature despite people*** *increased in prevalence. More recently, people with nature has surged in prominence, especially with the revitalization of Indigenous cultures, and people and nature has also grown with increasing understanding of the dynamic interactions between people and natural systems. Figure original to The Nature Record.*

Relationships with Nature Differ for Different Groups of People

People have different values and worldviews that affect how they relate to, rely on, and interact with nature.

Peoples' activities are an important expression of these differences. One common way these differences manifest is via recreation-focused versus caretaking-focused activities. People participating in salmon ecosystem restoration, for instance, report that these activities are essential to their own personal and shared group identities, as well as part of a cultural responsibility to pass down healthy ecosystems to future generations, while other locals who interact with the river through other activities such as tourism and outdoor activities enjoy recreational benefits (30). People can also value and support certain activities; for example, people holding pro-agricultural values, often associated with a nature-for-people framing, favor the aesthetics of working agricultural landscapes more than others with different understandings of human-nature relations (31).

Differences in relationships also often relate to frequency and tenure: how often people visit a place, whether they own the land, or how long their family has lived in or visited the landscape. For example, Indigenous Peoples with millennia of ties to place often have dramatically different relationships with places than do people who have lived there for only a few years (32). As another example, sense of place for residents and visitors of the Rhode Island coast increases with the length of residency or frequency of visits (33).

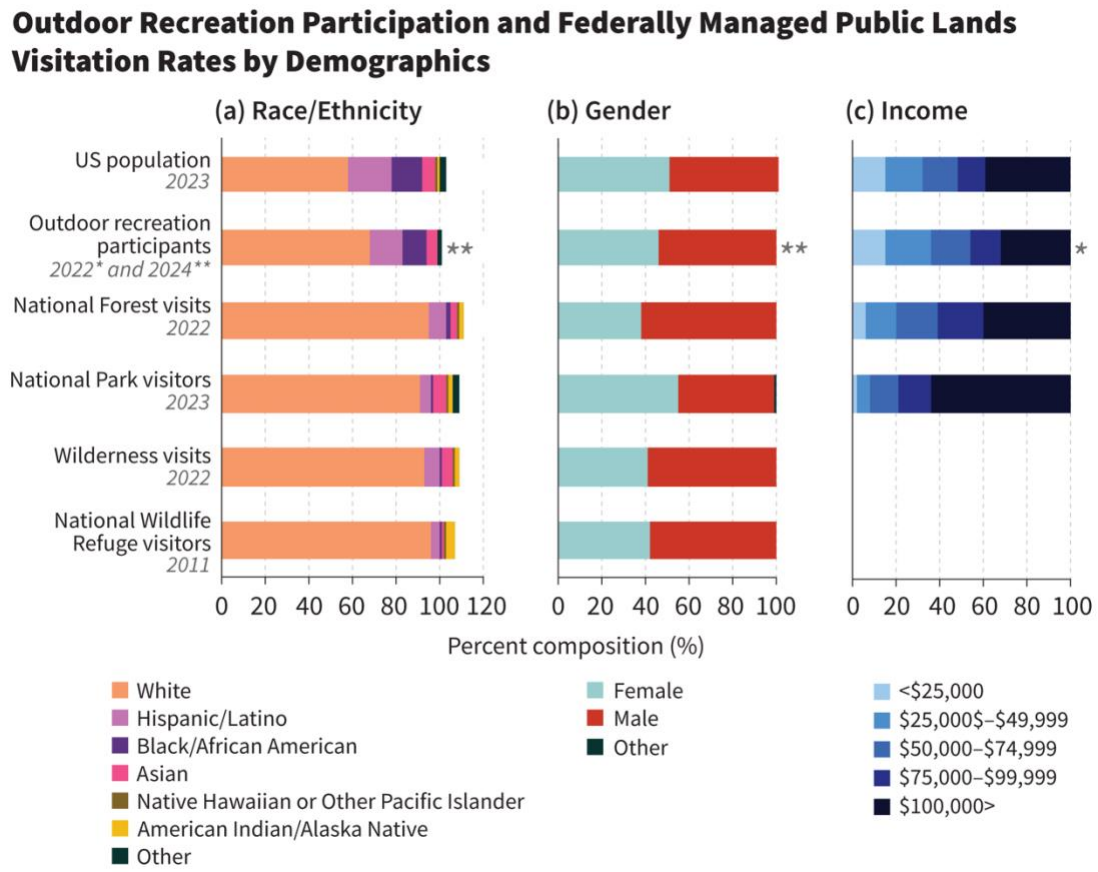
How people relate to nature is also often patterned along shared sociodemographic factors, such as age, income, race, or ethnic background. For example, Ukrainian immigrants to Oregon report distinct importance of the state's mountain vistas to their cultural identity as Ukrainian expatriates because they evoke a connection to the mountains in their Ukrainian homelands (34).

Historical context plays a strong role in differences in relationships with nature; in particular, racist policies have disrupted relationships with nature for centuries and have created patterns of difference associated with ethnic identity. For Indigenous Peoples, forced removal from ancestral homelands, destruction of traditional food systems, and the establishment of parks and wilderness areas that framed nature as separate from people restricted access to culturally important landscapes and practices (9–11,35). For Black communities, subsistence practices such as gardening, hunting, fishing, and foraging were essential during slavery, yet following emancipation, trespassing laws and related policies sharply curtailed access to land and wild foods, reinforcing exploitative labor systems (36). In the 20th century, redlining and Jim Crow laws further entrenched inequities by shaping residential segregation, neighborhood investment, and public funding, contributing to enduring disparities in access to green spaces and the quality and proximity of local parks (37–42).

While these examples reflect only a subset of the ways policies have undermined relationships with nature, the collective memory of racial violence and exclusion in natural spaces—including slavery, segregation, lynching, and other racially motivated acts—continues to shape how Black visitors experience parks and outdoor areas, especially amidst continued experiences of race-based discrimination and exclusion (43–46). At the same time, Black relationships with nature are rich and enduring, grounded in historical and cultural traditions that frame nature as a refuge from oppression, a site of resistance and self-determination, and a space for healing, kinship, and community connection (47–50). Indigenous relationships with nature likewise persisted through intergenerational knowledge systems, sovereign stewardship practices, and reciprocal relationships with land that emphasize responsibility and care, sustaining identity and belonging under enduring settler-colonial systems (22,51).

Although data are scarce, one way to understand differences in relationships with nature is visitation to natural areas. Figure 11.3 conveys discrepancies in visitation to areas for which data are prevalent: federally managed public lands.

Figure 11.3 Outdoor Recreation Participation and Federally Managed Public Lands Visitation Rates by Demographics



People's exposure to US public lands differs across demographics, with White people and men visiting at higher proportions and mixed results for income.

*Outdoor recreation participation and visitation to federally managed public lands, divided by (**a**) race/ethnicity, (**b**) gender, and (**c**) income level. In all cases, there are sociodemographic differences, with disparities especially pronounced for race/ethnicity. Although outdoor recreationists have become more racially and ethnically diverse over time, outdoor recreation participants remain much less diverse than the US population* (52). *National Park and National Wildlife Refuge visitors are much more likely to be White, and an overwhelming majority of visits to National Forests and Wilderness areas are from White individuals* (53–55). *Proportional to the US population, Blacks and African Americans, are especially underrepresented across these contexts, followed by Hispanics and Latinos. There are also notable patterns by sex and income* (52,53,55,56). *Males are responsible for a disproportionally large percentage of visits to National Forests and Wilderness areas and are also overrepresented among visitors to Wildlife Refuges* (53–55). *National Park Service visitors are more likely to have higher household incomes* (54). *These*

differences result from a complex combination of worldview differences, histories, preferences, and access. Figure original to The Nature Record.

Figure notes:
Percentages may not total 100% due to rounding or question format.
National Park Service Visitors reflects data from post trip survey respondents.

Multiple race/ethnicity categories are possible for US Population, National Forest Visits, Wilderness Visits, National Park Service Visitors, and National Wildlife Refuge Visitors.

For the Outdoor Recreation Participant data, Asian includes Pacific Islanders. There is no category provided for American Indian/Alaska Native in this data.
The Other category for US Population data includes those identifying with two or more races. No Other category is provided in the following data: National Forests Visits, Wilderness Visits, or National Wildlife Refuge Visitors.
There is no income data provided for Wilderness Visits, and income data for National Wildlife Refuge Visitors includes only a median range of $50,000 to $74,999.

What People Do Is Central to Relationships with Nature

Americans participate in a rich array of nature-related cultural activities that span diverse ecosystems and are crucial components of meaningful, fulfilling lives for many people. Many of these are intentional, specific activities (Figure 11.4). Yet two other types of interaction are crucial to many relationships with nature. First, everyday interactions with nature (57,58) (e.g., while traveling to work or playing with children). Second, thinking and learning about nature, even absent physical activities (e.g., learning about nature remotely (59); for instance, knowing about polar bears enriches many people's lives, even if they never visit the Arctic or see a live polar bear) (see Ch. 5: Connection).

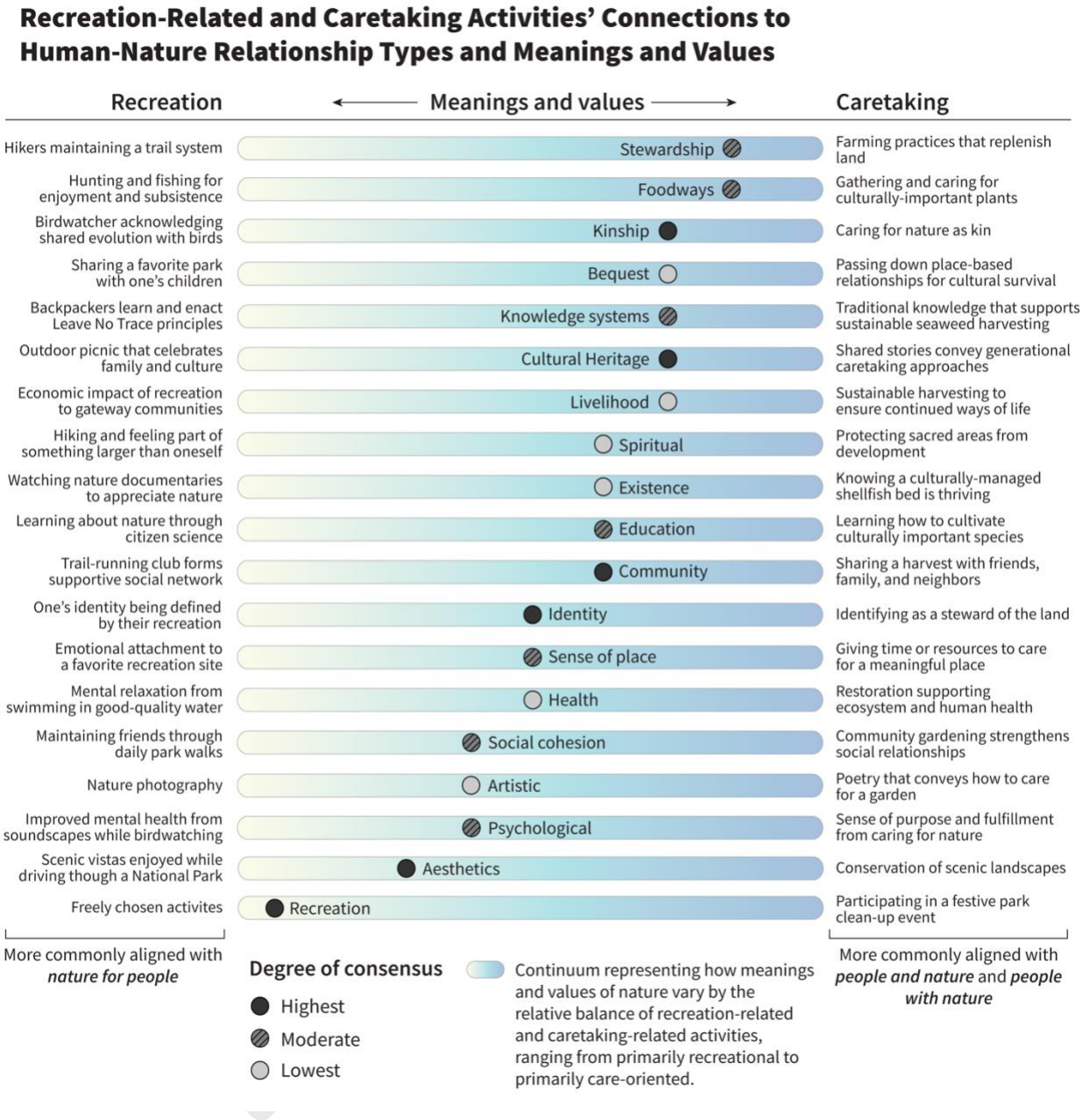
We focus on three currently dominant framings: *nature for people, people and nature,* and *people with nature* (Figure 11.2) as we discuss activities people do in nature. We omit the other two framings from our discussion, as *nature for itself* emphasizes the intrinsic value of nature rather than the ways in which people interact with or experience nature, and *nature despite people* emphasizes how humans harm nature, primarily through society-scale processes related to production and consumption (rather than people's activities in nature).

While there are many kinds of activities important to relationships with nature, research tends to focus on two broad types: activities more related to recreation, and activities more related to caretaking. Both recreation-related and caretaking-related activities, and the relationships to which they are connected, are foundational to many communities' abilities to live meaningful, fulfilling lives. While both types can occur together, they are often researched separately, often using different methodologies. Recreation-related activities are more commonly aligned with *nature for people*, as they often do not directly include reciprocal elements of people giving back to nature (although when people recreate, it can

lead them to want to take care of a place). Caretaking-related activities are more strongly aligned with *people and nature* and *people with nature*, as such activities emphasize reciprocity and relationality.

Interactions with nature are strongly associated with diverse meanings and values that have been studied as nature's services or benefits or contributions (60–62), nature's gifts (51,63,64), relational values (65), and intangible relationships with nature (Figure 11.4) (60,65,66). Many activities can hold different meanings for different people (e.g., two people may be boating but for different reasons and aligned with different worldviews).

Figure 11.4. Recreation-Related and Caretaking Activities' Connections to Human–Nature Relationship Types and Meanings and Values



Activities in nature, and the meanings and values associated with these activities, can be broadly understood as often more closely related to either recreation or caretaking.

*Nature's cultural meanings and values are supported through a mix of recreation-related activities (more commonly aligned with **nature for people**) and caretaking-related activities (more commonly aligned with **people and nature** and **people with nature**). Examples are listed on the left and right of the bars. The circles on each bar indicate relative*

association with recreation-related activities versus caretaking-related activities. Definitions are as follows. ***Stewardship****: sense that keeping ecosystem healthy is important, being accountable to an ecosystem;* ***foodways****: food procurement intertwined with nature in reciprocal ways;* ***kinship****: family-like relationships between humans and non-humans;* ***bequest****: passing down places or elements of nature to future generations;* ***knowledge systems****: dynamic suites of understanding of the ecological and social world;* ***cultural heritage****: connection to past generations; connection to valued practices and ways of being;* ***livelihoods****: ecosystems support life beyond foodways;* ***spiritual****: connection to something larger than oneself, connection with the sacred;* ***existence****: satisfaction and fulfillment from knowing that nature exists;* ***education****: learning, both by and about the world, enrichment of experience that allows growth;* ***community****: human community as understood, defined, or constituted with nature;* ***identity****: deeper understanding of who one is, the communities that one belongs to;* ***sense of place****: connection between people and places' bio-social aspects;* ***health****: health of human and non-human elements of ecosystems intertwined;* ***social cohesion****: links with other people; strengthening of social relationships;* ***artistic****: mental stimulation to be creative, inspiration to create;* ***psychological****: mental well-being, desired mental states like serenity or positive mood;* ***aesthetics****: a sense of beauty, appreciation of beauty;* ***recreation****: enjoyment and leisure. Figure original to The Nature Record.*

Recreation-related activities (e.g., hiking, wildlife-watching, camping) contribute most to a sense of enjoyment and leisure, aesthetics, psychological well-being, artistic inspiration, and social cohesion (67–73). In contrast, caretaking-related activities (e.g., sustainable use, care for culturally important species, ceremony, restoration) contribute most to stewardship, foodways, kinship, bequest, knowledge systems, cultural heritage, and livelihoods, while also contributing substantially to spiritual relationships, existence value, education, and community (70,74–89). Identity, sense of place, and health are associated with a more balanced mix of activity types (90–99).

The same category of nature's meanings and values may manifest differently for different activities. For example, sense of place can be associated with repeated recreational experiences at a particular place (e.g., park, trail, waterway); this sense of place might involve emotional identification with the place and dependence on the place for a particular recreation activity, such as walking or fishing (91,92,94,100). This attachment can encourage caretaking activities at the site, such as picking up litter or participating in a park cleanup event, reflecting reciprocity between people and nature. Leaning more heavily toward the caretaking side, sense of place can emerge from care, responsibility, and advocacy for the protection of ancestral and culturally significant places (101–103). These examples illustrate connections between activities and sense of place, albeit in different ways across diverse worldviews.

The importance of identity provides an additional illustration of how different activities can be associated with meanings and values expressed in different ways. When intertwined

with caretaking-related activities, especially among Indigenous Peoples, identity can manifest as a deep understanding of oneself and one's community as inseparable from the natural world (*people with nature*), such that loss of culturally important places and species is, or would be, devastating to both individual and collective identity (95,103–105). Conversely, identity can also be grounded in peoples' recreation-related activities and the places they do them, especially in ways that bring fulfillment, meaning, and passion—for instance, the rich contributions of continued participation in wilderness recreation to building and maintaining one's identity (106). Moreover, a singular activity, such as hunting, may be experienced as caretaking, recreation, or a mixture of both; this activity could span multiple worldviews, depending on the context. This further illustrates the nuanced ways that activities support relationships with nature (107–109).

Even within caretaking, activities can vary widely, ranging from those centered on cultivating abundance through sustainable practices to those aimed at preventing loss or restoring healthy ecosystem conditions. Indigenous relationships with nature, which often reflect *people with nature*, often emphasize thriving, reciprocity, and the creation of abundance (64,101,105,107,110–112); this is related to the fact that some extractive activities support sustainability of resources, thus ensuring access for the future. For instance, plant harvesting methods (e.g. for basket-making) can increase vigor and growth (113), yet improper harvest methods can harm the plants. Non-Indigenous caretaking approaches, on the other hand, often center on preventing loss, managing scarcity, and restoring conditions after degradation, for example by planting trees or restoring oyster beds (116). These different ways of viewing, interacting with, and caring for the natural world can influence nature's role in culture, including contributions to meaningful, fulfilling lives.

Relationships with Nature Lead to Meaningful, Fulfilling Lives for Many

Overall, Americans rank "being in nature" second only to "being with family" as what makes life meaningful (117); for many Americans, relationships with nature are intertwined with living meaningful, fulfilling lives (Figure 11.5). This happens in myriad ways, with diverse worldviews and activities intertwined with diverse understandings of what makes life meaningful and fulfilling.

Nature's importance to meaningful, fulfilling lives is especially apparent when lands, waters, and species are deeply entwined with who people are, how they live, and what sustains their well-being. Sacred and ancestral landscapes (which are often, though not exclusively, rooted in Indigenous relationships with nature) and nature-dependent ways of life deepen identity, belonging, and attachment to place (51,118–121). Diverse activities such as ranching, oyster harvesting, salmon fishing, and Indigenous cultivation and harvesting practices (e.g., taro cultivation, wild rice harvesting, and breadfruit cultivation) are more than physical activities—with meanings tied deeply to worldviews, they can represent ways of life that transmit knowledge; sustain foodways, livelihoods, and culture; and root people in place, community, and ancestry (79,80,98,110,122–124). Exemplified

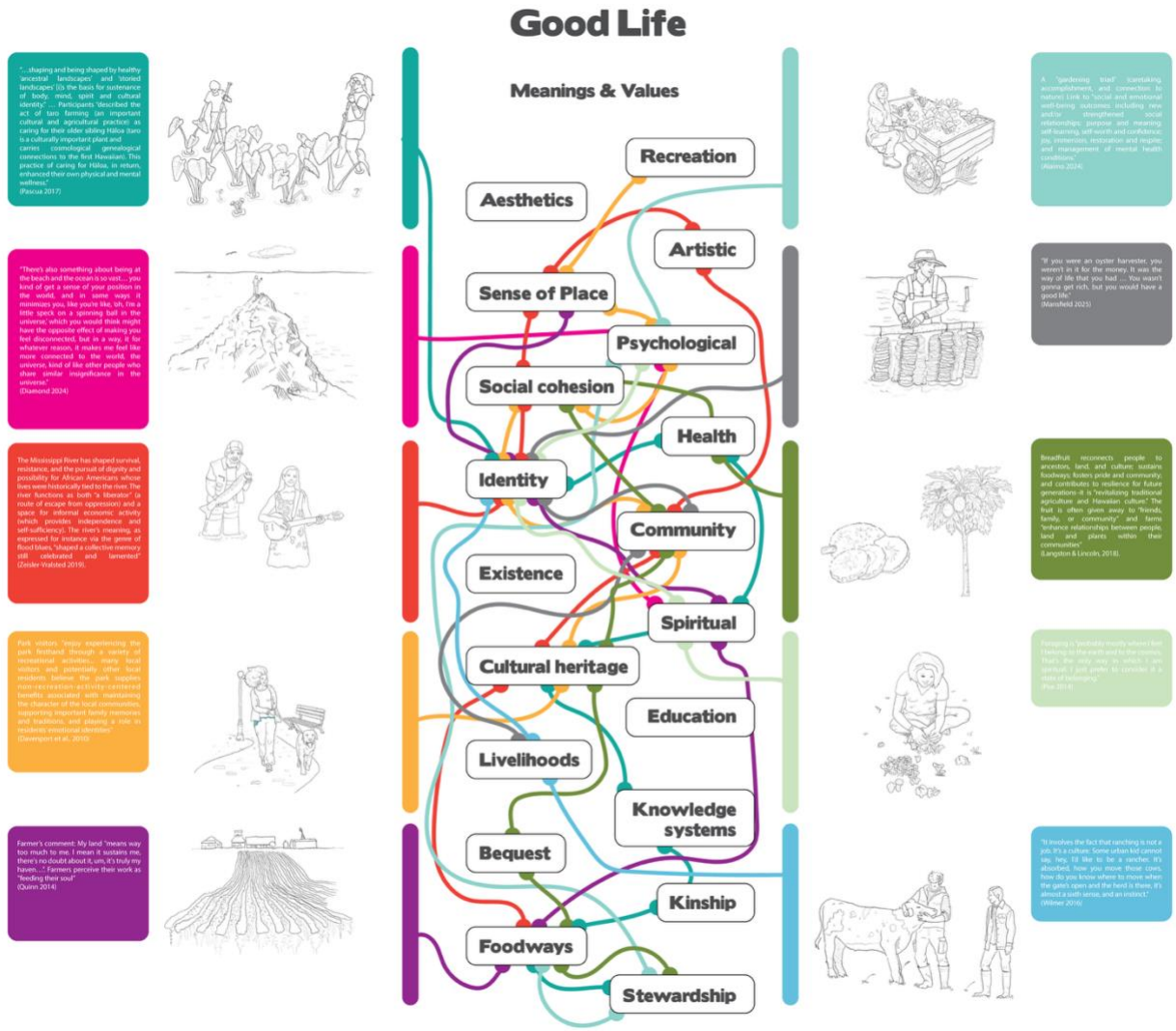
most strongly in *people with nature*, through these connections, people emphasize belonging and oneness with nature that leads, often through reciprocal relationships, to a feeling of being part of a community (comprised of both human and non-human members). This community membership is central to meaning and fulfillment for many, because meaningful, fulfilling lives are not typically individual pursuits, but rather relational states epitomized by interconnectedness of nature and human communities.

Relatedly, nature supports meaningful, fulfilling lives through both caretaking- and recreation-related activities. For example, agroforestry, rewilding, and river restoration illustrate how care and stewardship restore balance and responsibility, enabling both people and ecosystems to thrive (96,105,125). Various landscapes and activities, like sacred mountains or long-distance hiking, provide, albeit in different ways, perspective and transcendence, while others, like foraging or engagement with particular food systems, contribute to resilience and food sovereignty (126–129). Especially for Indigenous Peoples, reciprocal relationships between humans and nature reinforce identity, stewardship, and cultural continuity, such as caring for a species as kin or cultivating crops such as breadfruit as a link to ancestors (110,124).

For many people, recreating outdoors is an important aspect of meaningful, fulfilling lives. Parks of many types and sizes foster community pride, cohesion, and quality of life (69,91,130–133). Nature-based recreation is highly studied, but academic research on this recreation often fails to dig more deeply into the other human–nature relationships associated with recreation activities (134). Though recreation is, on the surface, about enjoyment and leisure, many recreational activities are also linked to diverse other meanings and values, such as identity and spirituality, which often intertwined with meaningful, fulfilling lives (34,73,91,135–138).

Thus, the condition of nature, along with access to nature, can mediate the extent to which people can achieve meaningful, fulfilling lives. When relationships with nature are disrupted or lost, people describe cultural and personal devastation, underscoring the centrality of nature to meaningful, fulfilling lives (80,98,110).

Figure 11.5. Nature and Meaningful, Fulfilling Lives



Relationships with nature, and the values associated with those relationships, are central to living meaningful, fulfilling lives for many people.

(Figure under development.) Quotes from published literature make clear the links between these relationships and meaningful, fulfilling lives. In the diagram, meanings and values are depicted in the diagram's center. Quotes represent different ways that relationships with nature contribute to diverse forms of meaningful, fulfilling lives. Flowing lines connect quotes to meanings and values to which they relate. All of this "swims" in a sea of "meaningful, fulfilling lives." Figure original to The Nature Record.

Description of Evidence Base

It is inherently challenging to assess status and trends of relationships with nature at a national scale, because data often come from place-based and narrative-based work. This,

coupled with lack of standard measurement approaches, complicates comparisons across cultures and ecological contexts (139,140). Long-term data that measure cultural trends are not readily available, even in specific contexts.

Despite these challenges, extensive evidence that spans different methods, disciplines, and worldviews consistently illustrates that relationships with nature bring meaning and fulfillment to people's lives. This evidence makes it *virtually certain* that nature provides cultural meaning and value to people in the US. (34,73,91,135–138). Decades of research on human–nature worldviews demonstrates clearly that relationships with nature and worldviews shape one another, rendering this finding *virtually certain* (4,139). Like the *virtually certain* change in the relative dominance of different worldviews over time (evidenced by historical events, shifts in policy and practice, scholarship, etc.), there have also been variations in the relative emphasis of scholarly work on different types of human–nature relationships. The body of evidence in scientific journals examining recreation-related relationships with nature is considerably larger than that which investigates caretaking-related relationships with nature, reflecting dominance of certain worldviews—for example, those related to *nature for people*—over other worldviews emphasizing reciprocity and relationality (i.e., *people and nature, people with nature*). Yet both bodies of literature are strong both in terms of breadth of work and consensus about importance to human lives, and the importance of these two types of experience is thus assessed to be *virtually certain*.

Key Message 11.2: Relationships with nature depend both on interactions with nature and the state of nature, and recent changes in both strengthen some relationships and weaken many others

The number of people who participate in recreational activities is rising, which strengthens some human–nature relationships (very well established), but the frequency and length of interactions are decreasing, which weakens many relationships (well established). Similarly, improvements in nature (e.g., ecosystem restoration) are strengthening some relationships (well established), while a stronger overall increase in ecological distress (e.g., pollution, climate change impacts, loss of biodiversity) is weakening many relationships (very well established). US residents are thus experiencing an overall weakening of many relationships with nature, although some relationships are strengthening (established but incomplete).

State of Knowledge 11.2

Relationships with Nature and Associated Meanings and Values Depend on Distinct Characteristics of Nature

Relationships with nature are intertwined with the attributes of nature, so changes in nature such as pollution, conservation, or climate change also affect the meanings and values associated with relationships (Figure 11.7). Box 11.2 provides an example of how

these attributes in one ecosystem, the Mississippi River, connect to diverse relationships with nature.

First, and most generally, landscapes or seascapes overall are often central to nature's meanings and values. In the literature, this aspect of nature typically includes spaces with low levels of development, such as coasts, dunes, and salt marshes (33,141); streams, lakes, and rivers (34,142); forests and trees; mountain landscapes (127,147); and farmlands (148–150).

More specifically, **biodiversity** is often integral to nature's meanings and values. Stronger meanings and values are associated, for example, with backyards with more diverse species (151), with urban stormwater infrastructure that harbors diverse species (152), and crop diversity enabling drought adaptation (153); meanings and values are degraded, for instance, when declines in biodiversity impact species available to fish, hunt, and forage (35) or when the loss of foundational species, such as oysters, results in decline of ecosystem biodiversity and associated livelihoods (98).

In addition to biodiversity overall, certain species experienced or used by humans are often pivotal to meanings and values associated with relationships with nature. Examples include the importance of oysters for oyster farming lifestyles (98), mushroom species foraged in both urban and rural areas (99,126,154), and the importance of Hawaii's *Acacia koa* tree, who is considered an ancestor and whose wood is used to make canoes and ʻukulele (155,156).

Ecosystem functioning—for instance, ecosystem health, sustainable wildlife populations, and habitats that support multiple species—is often integral to nature's meanings and values (76,157–161). For instance, healthier coral reefs, with higher levels of ecosystem functioning, provide a richer and deeper suite of cultural values (161–163).

Due to the importance of biodiversity, certain species, and ecosystem functioning, ecological restoration (which often works to restore these) often supports richer cultural values (105,164–172). For instance, Indigenous-led restoration can facilitate assertion and deepening of Indigenous meanings and values related to spirituality, cultural heritage, community, and social cohesion (105).

Conversely, pollution or other anthropogenic degradation often debases nature's meanings and values. This includes how resource degradation, pollution, and the effects of climate change impact cultural values (99,157,173–183). Examples of pollution's negative impacts include the following: water pollution interrupts Indigenous relationships with water (184), people express greater preference for higher water quality by being willing to pay more for it (185), and the presence of pathogens in water leads to psychological concerns and decreased cultural value from nature (186,187).

Development also often impedes relationships with nature and degrades nature's meanings and values—but not always. Development can impede some relationships and

support others, leading to dramatic changes in nature's meanings and values. For instance, urban development, mining and natural gas extraction, or other simplification of landscapes can erode cultural values (112,155,188–196). Specific examples of landscape conversion with negative cultural impacts include decreased aesthetic value when high-rise buildings are visible (189), development toward a recreation-based coastal economy that degrades livelihoods and identities related to fishing (197), reduced psychological and aesthetic enjoyment because of sound from industry (198), and loss of farmland and conversion to low-density housing (192,199,200). Some conversions have impacts contingent on relationships and values. For example, conversion of farmland to solar arrays increases meanings and values in some circumstances and decreases them in others (113).

Climate change also often degrades nature's meanings and values—although, as with development, it sometimes supports them. Examples of negative cultural impacts include climate-induced changes in salmon populations that impact Indigenous relationships with salmon, such as seasonal ceremonies and food-sharing (201); projected climate-induced modifications of recreation patterns in US public lands, with overall decreases in recreation (174); and how warmer weather and increases in drought/aridity decrease abundance of traditional and ceremonial plants (176,183,195) and also decrease water levels in reservoirs important for recreation (202).

The attributes of nature thus strongly impact relationships with nature, and associated meanings and values. However, multiple other forces are at play—in particular, the activities people do to interact with nature. Those activities and nature interactions display opposing trends (see Ch. 5: Connection). A clear trend shows that despite upward trends in participation rates in many outdoor activities (e.g., birdwatching, fishing, hiking, gardening) (203–207), Americans overall are spending less time in nature and engaging in fewer recreational outdoor outings (207). Figure 11.7 depicts the multiple forces influencing overall trends in relationships with nature and how they interact with one another.

Box 11.2. Human–Nature Relationships and the Mississippi River

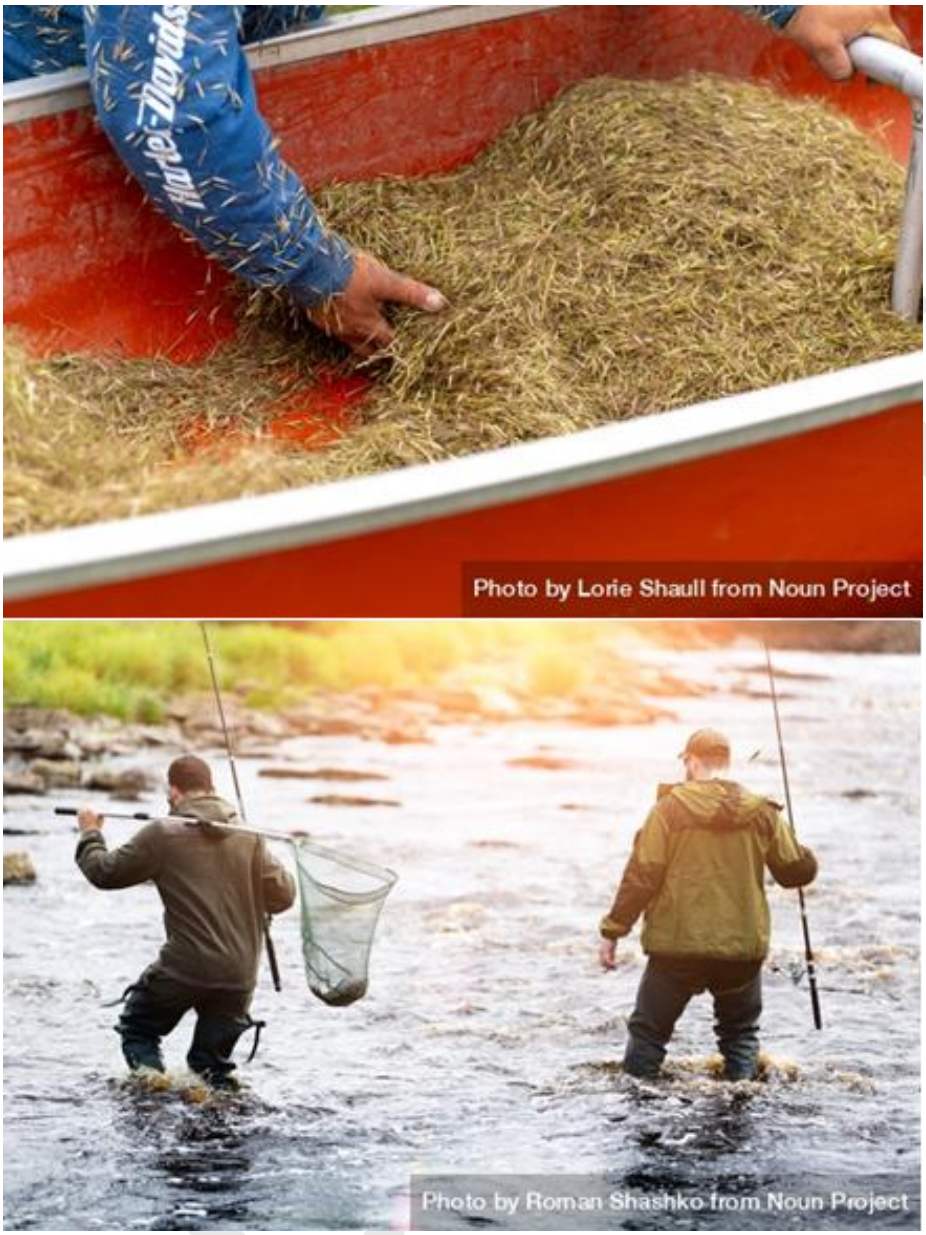
The Mississippi River serves as a backdrop for myriad cultural practices and heritages (Figure 11.6), but its relationships with people are linked with the condition of the river.

The river is a place of Indigenous memory, a traditional homeland (208,209). Manoomin (wild rice), a staple crop of the Ojibwe people that thrives in the Mississippi River headwaters, is threatened by constructed dams and other developments. Protection and restoration of this habitat represents environmental stewardship and perpetuation of knowledge systems and education through caretaking of a culturally important species (209). The river's ecological functioning and biodiversity are intertwined with Indigenous cultures of stewardship and caretaking; the strength of these relationships is evidenced by the resistance sparked by threats to the river's function and biodiversity (209).

Today, the “big muddy” continues to contribute to place identity for communities from the headwaters to the delta (210). Place and business names, like the regional “River City” clusters found up and down the river, suggest sense of place and community attachment to the Mississippi (210). Livelihoods and social structure of small-scale fisherman in coastal Louisiana are inextricably linked to the river’s ecosystem functioning; large-scale development projects, such as sediment diversion, can threaten these identities (211).

Industrialization of the Gulf Coast degrades aesthetic experiences for many (212), while nutrient runoff threatens local aquatic biodiversity. However, agricultural conservation practices address runoff and associated downstream dead zones in the Gulf while also improving regional aesthetics due to landscape diversity (213). As climate change accelerates, new threats will emerge, both unintended (214) and existential (215). Projects such as agricultural conservation in the headwaters (216), or oyster reef and bald cypress restoration in the Delta (217) can revive ecosystems and strengthen relationships with the Mississippi River (218).

Figure 11.6. Humans Connecting with the Mississippi River

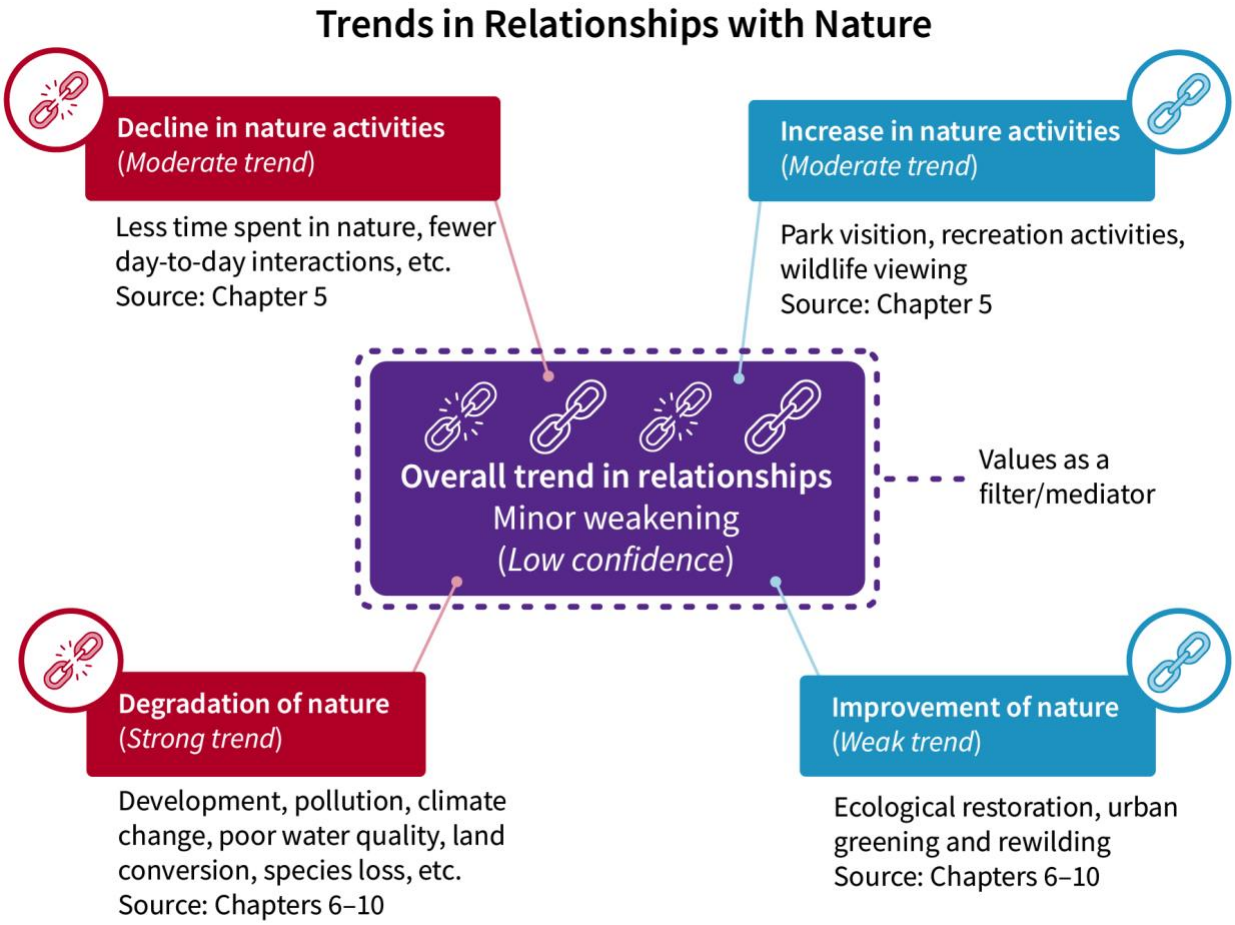


Human relationships with the Mississippi are diverse, from wild rice harvesting to fishing of many types.

*(**top**) Harvest of manoomin (wild rice); (**bottom**) fishing on the Mississippi. Photo credits superimposed on photos, and at https://thenounproject.com/photo/hands-harvesting-wild-rice-at-rice-lake-nwr-in-aitkin-county-minnesota-bYwvq9/ and https://thenounproject.com/photo/fishermen-crossing-river-in-search-0PGjvv/.*

[END BOX 11.2 HERE]

Figure 11.7. Trends in Relationships with Nature



Intersecting trends in activities and attributes of nature contribute to an overall trend of weakening relationships with nature.

Trends in human–nature relationships depend on the intersections and multidirectional relationships between activities in nature and attributes of nature. Participation rates for many recreation-related activities are increasing, yet overall frequency of outdoor recreation outings is decreasing, and people are spending less time in nature (see Ch. 5: Connection). While increasing participation in recreation-related activities (overall) may indicate that more people have the potential to form relationships with nature and become stewards of the environment, increased participation without caretaking activities and sustainable use and management can degrade environments and experiences, undermining relationships with nature. Pollution/degradation, development, and climate change, which are primarily increasing (see Chs. 6–10), exert predominantly negative influences on relationships with nature, whereas valued landscapes, functioning ecosystems, biodiversity, certain species, and restoration predominately support relationships with nature. Increases in caretaking activities, including those that focus on

sustainability, cultivation of abundance, and conservation, positively influence these attributes of nature that support relationships with nature. For instance, acequia farming systems, a manifestation of Indigenous and Local Knowledges in the Southwest, involve a long-term relationship wherein communities steward soils and irrigation systems to support biodiversity, functioning ecosystems, and food production (219–221). *Figure original to The Nature Record.*

Description of Evidence Base

Relationships and outcomes of relationships are documented in many ways as benefits, services, contributions, values, gifts, and more. Abundant data from nationwide polling, government and industry records, and peer-reviewed research on outdoor recreation is in strong agreement, making it *virtually certain* that people in the US are overall spending less time outside, even as participation in certain activities increases (see Ch. 5: Connection) (203–207,222). To report on the implications of these changes for relationships, we rely on both observed impacts of these trends in outdoor time and activity and also on established causal relationships (e.g., that less time in nature degrades relationships with nature). Decades of research on outdoor recreation from diverse fields (including leisure sciences, psychology, natural resource sociology, and parks, recreation, and tourism studies) is generally in agreement, supporting the finding that recreational activities strengthen some relationships is *very well established* (135,223–236). Slightly less research, from fields such as values studies, interdisciplinary environmental social science, and, crucially, post-colonial studies, addresses whether declines in interactions weaken some relationships, making this finding *well established* (5,237–240). Ample research, covering multiple decades, from fields such as environmental psychology, human biology, anthropology, and environmental economics supports claims that the state of nature impacts people's ability to form relationships with nature: the finding that pollution and degradation impede relationships is *very well established* (30,99,112,157,170,173,175,177–183,188,190,192,193,195,198,199,241–243), while the finding that healthy ecosystems, species, biodiversity, and landscape support relationships is *well established* (35,99,105,151,154,155,159,160,167,170,244,245). Yet this work is often site-specific and dispersed and uses different disciplines and methods (246); human–nature relationships are not yet studied in standardized ways that are comparable at a national scale. The overall trend of weakening relationships between people and nature is thus a qualitative assessment made by chapter authors, and determined as *established but incomplete*, based on review of hundreds of studies of relationships with nature and how nature's attributes impact those relationships.

Key Message 11.3: Access to nature influences which relationships with nature are possible, and for whom; changes in access have supported some relationships but not others and led to overall decreases in biocultural diversity

Access to nature both enables and constrains human–nature relationships (very well established). Through time, changes in access have supported some relationships but not others, leading to overall decreases in biocultural diversity (established but incomplete). Actions that increase access are deeply intertwined with culture and can facilitate opportunities for human–nature relationships (well established). However, high levels of access can impose costs on those relationships when places and resources are overused or used in exploitative or incompatible ways (well established).

State of Knowledge 11.3

Access Concerns are Intertwined with Changes in Biocultural Diversity

Access to nature both enables and constrains human–nature relationships. Over several centuries, changes in access have facilitated some relationships and impeded others. The dominance of the *nature-for-people* worldview, particularly in its manifestation of facilitating a limited set of access types, led to a long trend of a decrease in biocultural diversity.

In the US, colonialism, settlement, and the industrialization of agriculture and fisheries was coupled with a systematic program of eliminating Indigenous lifeways in service of "manifest destiny" and "civilizing" North America (22,25,247). These changes constituted dramatic constraints to access for Indigenous Peoples: European settlement and the establishment of federal government agencies displaced regionally and culturally diverse Indigenous practices, replacing them with agricultural practices and systems imported from Europe that were sometimes poorly suited to North American ecologies and that favored colonists' extractive and state-building *nature-for-people* framing (25,248). Other aspects of Native American biocultural heritage, such as language, were also systematically suppressed (249). This contributed to a steep decline in linguistic diversity, which is an important subset of biocultural diversity, in the US. In the United States, 49 Indigenous languages are known to be extinct, and 193 of the remaining 197 are endangered (250).

The same pattern holds for other dimensions of biocultural diversity. Historically, the areas of the world with the richest agricultural crop diversity co-occurred with wild biodiversity and cultural/linguistic diversity (17). Modern agricultural practices (251,252) are centralized and homogenized (252,253); a small handful of crops dominate global food production (253). This mirrors trends in the US in land ownership, with fewer people controlling more agricultural land (254–256). A similar process has played out in US

fisheries; fisheries management policies have concentrated access (257–260), squeezed out small-scale or subsistence fishers (261–263), gentrified working waterfronts (264–267), and eroded the diverse social relations, local knowledges, and cultural practices embodied in fisheries.

Today, this trend of biocultural diversity decline may be reversing. Many communities are working to undo harm caused by colonialism, capitalism and other political–economic forces that suppressed and oppressed people's ability to access, and hence relate to, nature in the US. Via efforts to revitalize Indigenous languages, save, share, and expand the use of heirloom crop varieties, and the emergence of local food movements and community-supported fisheries, people are finding creative ways to restore and reweave a rich tapestry of biocultural traditions, knowledge systems, and ways of relating to place, thereby supporting cultural relationships for future generations (268,269).

Access to Nature Influences Which Relationships with Nature Are Possible and for Whom

Access can facilitate or constrain people's ability to develop and sustain relationships with nature. Although access can involve physical interaction with nature (e.g., via gathering plants, boating, walking) or virtual interaction with nature (e.g., via film, television, social media, webcam), this analysis focuses on physical access. Note that considerations of "access to nature" often implicitly assume some separation between people and nature—nature as "place to go" rather than part of oneself; that is, not the *people-with-nature* worldview.

Supporting access to nature is complex because the US population is not uniform in backgrounds, interests, and ways of seeing the world; this means that different people advocate for different kinds of access, and access issues often manifest differently for different groups. Nine categories capture most access considerations (Table 11.1, Figure 11.8).

Table 11.1. Access Categories and Management Actions That Impact Them

Descriptions and examples are provided for nine categories that capture most access considerations. In addition, management actions that can impact each access type are suggested (Figure 11.8 offers a distillation of these management actions). Although many access-related management actions can protect ecosystems and balance different users' needs, those actions can also create tensions: they can impede the scope and quality of human–nature relationships for others.

*Key to symbols in the Management Actions column: * indicates an especially relevant tension between different worldviews/preferences and/or between protecting ecosystems or facilitating some types of access; + indicates particular importance for participatory processes in that type of access.*

With many options possibly producing tensions while expanding or restricting access, participatory processes on how to manage what and for whom become more important to understanding the impacts on nature–culture relationships.

Type of Access Consideration	Description	Examples	Management Actions
Institutional	Rules set by governments, land managers, and other groups. Delimits what activities are allowed where, who is allowed to participate in them, and when people can do them.	**Property rights** (e.g., trespassing laws, privatization, common property rules); **seasons** (e.g. for fishing, hunting); **visitation caps**; **permitting systems (or outright prohibitions)** for activities (e.g., ceremonial burning, off-road driving, using sport fields, foraging (243,270)). Can **influence large-scale societal injustices**, e.g., dispossession of Indigenous lands via policies that expand access to relationship types valued by European settlers, at the expense of relationship types valued by Indigenous communities (25) (see Ch. 9: Drivers).	*Expand publicly managed natural areas; +include local communities and people with diverse worldviews in rulemaking (271); streamline or eliminate regulatory processes/permissions structures (e.g., for longstanding cultural traditions or low-impact activities) (272); return stewardship authority to Indigenous Peoples (273).

Type of Access Consideration	Description	Examples	Management Actions
Physical infrastructure	Physical aids to access	Roads, trails, parking, piers, marinas, and boardwalks; amenities (e.g., electricity, bathrooms, signage, shelters, maintained facilities (274,275)).	Reduce infrastructural barriers (e.g., increase transit options); *support diverse activities (e.g., with marinas, grills); invest in maintenance to keep facilities usable (276,277); +create opportunities to reflect with communities on how infrastructure can welcome diverse relationship types; *attend to how some infrastructure can create tensions (e.g., roads facilitate access but can increase crowding); consider the US Forest Service's Recreation Opportunity Spectrum to help balance uses (114,115).

Type of Access Consideration	Description	Examples	Management Actions
Proximity	Nearness to nature; living or working near natural spaces facilitates stronger relationships (35,278)	Greater difficulty for people living in urban areas without nearby access to nature and parks to visit and form close relationships to nature (7,175)	Expand/improve green space where people live, especially in urban areas (e.g., plant street trees, clean informal green spaces, restore waterfronts, green-up schoolyards); equitably distribute these actions across neighborhoods and socioeconomic classes (200,201). In rural areas, address proximity-related issues via institutional access actions (e.g., make private land accessible to visitors) or diversifying types of nearby nature (e.g., restore wetlands or prairie adjacent to large-scale agricultural fields) (281–290).

Type of Access Consideration	Description	Examples	Management Actions
Economic	Concerns the ability to afford costs associated nature-based activities or stewardship (80).	**Travel costs** (e.g., transport, lodging, and entrance fees); **licenses and permitting** (e.g., for fishing)**; equipment** (e.g., gear for skiing, SCUBA, hunting, fishing, or rock-climbing); **stewardship costs** (e.g., farmers' stewardship investments (149); Indigenous communities' debt-induced land leasing (291); ranchers selling property due to economic non-viability of ranch-based livestock production (80).	Invest in nearby low-cost green spaces or travel options; educate about low-cost ways to interact with nature; develop gear-lending libraries; offer grants and subsidies that support stewardship practices (292–294).

Type of Access Consideration	Description	Examples	Management Actions
Social acceptability	Atmosphere of belonging or exclusion. Activities may be technically legal yet socially discouraged because norms about "proper" ways to interact with nature often reflect expectations of dominant cultural groups and framings of human–nature relationships (295).	**Activities** that are legal but socially sanctioned (e.g., urban fishing, family picnics, chants, and religious rituals; e.g., Native Hawaiians may collect seaweed in front of resorts but receive dirty looks if they do (296)); **issues of representation**: whether people "like you" are represented (e.g., a person of color may be/feel unwelcome in a predominantly White neighborhood park (297) because they perceive the space as racialized (and White) (298,299) or do not see others like them among other users, staff, leadership (300,301)).	Cultivate welcoming social norms inclusive of diverse activities and worldviews; reach beyond typical audiences via *+intentional efforts to invite and include diverse forms of interaction (e.g., co-design rules and spaces with marginalized communities); encourage and facilitate interactions with nature that reduce informal exclusion through explicitly inclusive programming such as via gatherings, stewardship, and cultural events (e.g., Latinos Outdoors, Black Birders' Week) (302–304).

Type of Access Consideration	Description	Examples	Management Actions
Psychological	Encompasses people's understanding and awareness of natural places and nature-related activities and their confidence that these places and activities are "for them" (305).	**Lack of awareness** (e.g., of local parks, fishing spots); **lack of knowledge** (e.g., of how to bird-watch or engage in historic cultural practices "correctly" (306)); **issues of representation** (see "Social acceptability" above)—often **created by historical, enduring injustice** (e.g., some Black Americans' generational trauma related to nature's complicated role during and after slavery and being explicitly unwelcome in many natural areas during segregation) (307)).	Partner with community organizations that share nature-related activities with groups less familiar (e.g., *promotores verdes'* outreach to low-income Latino communities); provide clear, culturally relevant information about nearby opportunities; highlight everyday, accessible nature experiences (e.g., urban community science) (308).

Type of Access Consideration	Description	Examples	Management Actions
Safety and security	Real or perceived concerns about dangers in nature (309).	**Hostile encounters** (e.g., crime, dangerous wildlife); **environmental hazards** (e.g., "sneaker waves," hurricanes, wildfire smoke, radiation, unsafe ice); **cues** like overgrown vegetation, abandoned facilities, or litter can make natural areas feel unsafe (164).	Balance genuine risk reduction with respect for ecological processes and diverse forms of recreation through thoughtful lighting, well-maintained facilities, and equitable policing (310,311); use programs and signage on wildlife or environmental hazards to empower visitors with knowledge of how to navigate dangerous circumstances (312); resolve conflicts between user groups (e.g., designated trail days for bikers versus hikers) to reduce accidents (313).

Type of Access Consideration	Description	Examples	Management Actions
Temporal	Influences on when people can develop relationships with nature	**Lack of free time** due to, for example, long work hours, childcare duties, or multiple jobs (176,314)*;* **timing of people's lives** (e.g., parks that close at dusk and exclude people with 9–5 jobs; reservation systems that assume people have stable schedules or ability to plan months ahead); **timing of natural processes** (e.g., bad weather, timings of ripening and readiness for gathering)	Extend park hours or transit schedules; offer same-day or staggered reservation windows; align access with culturally important seasons or ceremonies; provide real-time information on weather, air quality, or timing of nature-related events (e.g., fall foliage, meteor showers) (315).
Physical Ability	Physical capabilities that shape nature experiences	**Mobility** (e.g., impacted by surface type, available activities, injury, and aging (316,317)); **stamina** (e.g., impacted by steep trails); **sensory ability** (e.g., impacted by visual impairment).	Support low-effort ways to experience nature; *provide diverse difficulty levels; invest in adaptive equipment and programming; avoid cultural norms that prioritize strenuous recreation (318).

Actions People Can Take to Balance Access and Ecological Impact

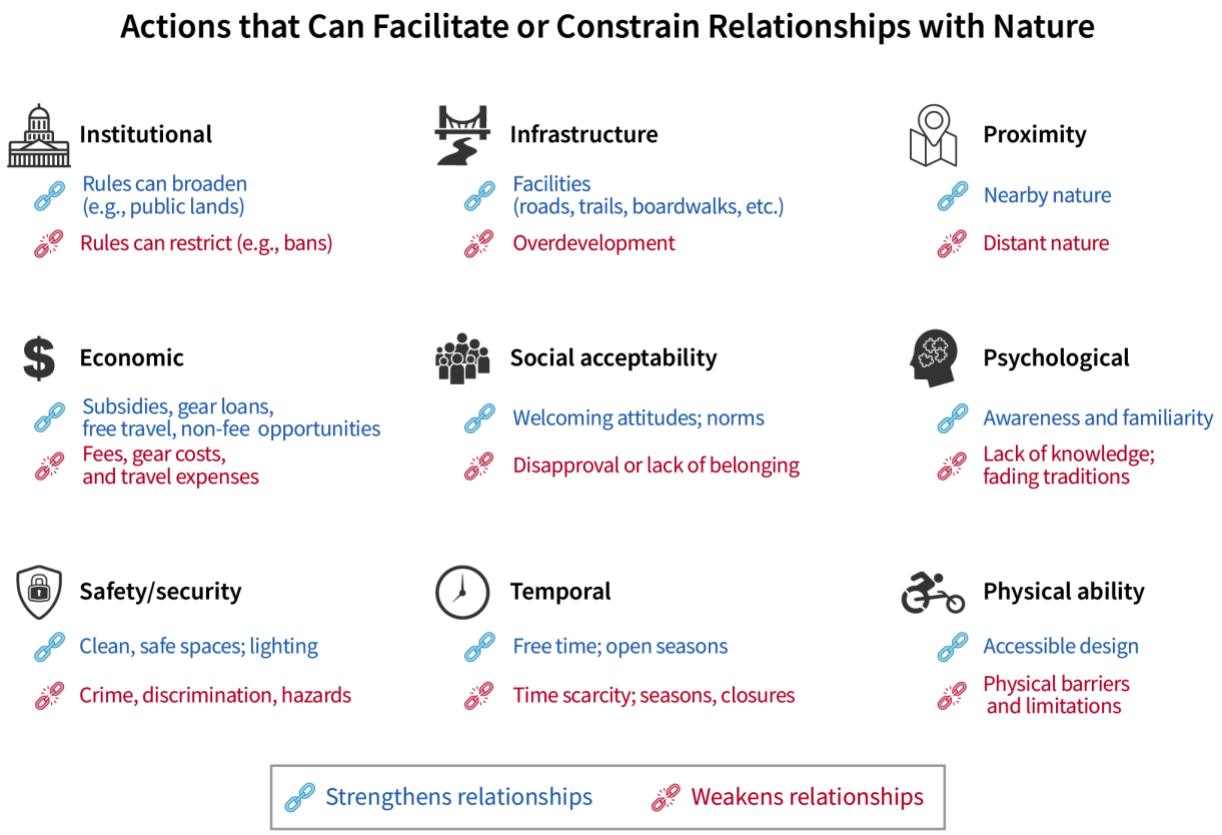
Done well, thoughtful consideration of access enables a wide range of people to build cultural meanings from relationships with nature. Decision-makers must balance a mosaic of uses—such as thru-hiking, off-road motoring, accessible walkways, and passing of

generational knowledge on harvesting wild plants—to ensure the very nature that people derive meaning from is not degraded (Table 11.1, Figure 11.8).

Effective access decisions must remain locally responsive. While coordination can support broader federal environmental management goals, access to nature is most successfully governed when local meanings, relationships, and benefits are recognized–including historic uses and norms from native communities.

Overly restrictive measures and actions that privilege access can have unintended consequences. Some access limits are necessary to protect ecological conditions and culturally significant practices, but overly uniform, homogenized, or restrictive approaches can exclude important relationships with nature. Improving access requires explicit consideration of access for whom and for what purposes–and for how access might change other relationships with nature. Policies that privilege certain uses, for example, recreation or commerce, can conflict with other relationships with nature, for example, spiritual relationships. Recognizing this diversity within a coordinated, multilevel governance system can reduce conflict and support more inclusive and durable environmental management (319). Tailoring access rules to specific places, while remaining aligned with broader governance goals remains important.

Figure 11.8. Actions That Can Facilitate or Constrain Relationships with Nature



Nine dimensions of access both facilitate and hinder relationships with nature in the US, and management actions can either hinder or support relationships in each of these categories.

Nine dimensions of access capture most access-related concerns that influence formation and maintenance of human–nature relationships. These dimensions impact people currently and have impacted human–nature relationships across time. Importantly, these access considerations exist in dynamic interplay with framings of human–nature relationships: certain kinds of access resonate with certain framings. Considering access necessarily involves asking Access for whom—for which kinds of human–nature relationships? The text below each access type distills core action items from Table 11.1, related to how decision-makers can act to eliminate or reduce access-related barriers across the nine dimensions of access, thereby allowing more people to develop relationships with nature. For each dimension, access often involves finding a balance between restriction and autonomy, given that some level of access restriction can be important to protect the quality of both nature and culturally significant human relationships with nature. Figure original to The Nature Record.

Description of Evidence Base

An interdisciplinary body of recent research provides *very well established* evidence—both abundant and in wide agreement—that access to nature is a central determinant of which relationships with nature are possible, for whom, and under what conditions (270,320–322). Access to nature enables the formation and maintenance of relationships with nature, including recreational, caretaking, and reciprocal relationships. National-scale surveys, longitudinal recreation datasets, and place-based qualitative studies consistently show that proximity to nature (323), institutional permission (273), and availability of infrastructure (324), as well as the other dimension of access noted above, strongly predict participation in nature-based activities and associated relationships.

Across diverse social, ecological, and geographic contexts in the United States, studies consistently demonstrate that access is not only a logistical or recreational concern, but a culturally consequential process that enables, constrains, redistributes, and sometimes erodes relationships with nature (197,273,325). The literature more recently suggests that access is multidimensional, uneven across geographies and populations, and strongly related to equity.

There is *well established* evidence that actions intended to increase access can strengthen some relationships while simultaneously weakening others (326). Therefore, access involves trade-offs; there is ample evidence that uncritical modification of access can impose cultural costs on particular communities and constrain or otherwise disrupt important human-nature relationship types, which has been a major driver of biocultural diversity loss (247,248,327–331). Because these studies are mostly place-based and locally specific, this finding is *established but incomplete*.

Environmental Justice and Equity Highlights

Our focus on understanding how nature's attributes and access concerns impact human–nature relationships reveals differences in who can establish and maintain relationships, how they have been involved in the processes related to their management, and even which relationships are deemed important to consider. In each of these cases, elements of access and meaning play a role.

Relationships with Nature Are Not Distributed Uniformly

As discussed above, the distribution of environmental positives (e.g., parks, green spaces) and negatives (e.g., pollution, hazardous waste (332–334)) is uneven (332–334).

The degree to which all communities can engage in meaningful, valued, and relevant activities in nature, and thus establish and maintain relationships with nature, relies on people's ability to access natural spaces. At the same time, some communities may bear higher burdens than others from circumstances that facilitate nature access. For example, gateway communities to natural areas may experience over-tourism or an influx of new types of residents seeking proximity to nature (i.e., amenity migration) that changes the character of their community (335,336). Other groups may be forced to limit or change traditional activities if, for instance, they are restricted from harvesting species that become endangered or are replaced by invasive species (337).

Relationships with Nature Are Not Well Represented in Typical Management Practices

Because of the recent focus on the status of biophysical elements of nature, cultural aspects of relationships with nature have been difficult to integrate into management (5,140,338). In any given natural resource management plan, the amount of space devoted to condition of attributes of nature dwarfs societal outcomes, and cultural outcomes are only rarely mentioned. This focus is related to institutional procedures and processes that prioritize *nature for people*, which unintentionally yet systematically ignores the values and worldviews important to large numbers of Americans and lacks appropriate language and analytical frameworks for many of the concepts core to other types of relationships with nature, such as *people with nature* (5).

Institutional access can affect decision outcomes, for example by preventing Indigenous Peoples from accessing sacred lands that have been designated national parks. Institutional access also includes the procedures used to engage publics in determining those outcomes (including who is invited, how meetings are structured, and where and when they are held) (339).

Many Cultural Relationships (and Perspectives That Underlie Them) May Not Be Recognized

As noted above, people have diverse understandings of what nature is, why it matters, and what responsibilities humans have toward it (i.e., different framings of human–nature relationships; Figure 11.1). Adequate recognition of different groups' understandings in management can help to ensure that desired relationships are available to a wide variety of people (340).

Management and research related to human–nature relationships disproportionately focuses on leisure and recreation. However, viewing nature primarily as an "amenity" that facilitates leisure does not resonate with the worldviews of many people in the US. For instance, for people who work closely with the land, ecosystem-based work can be joyful and fulfilling and can provide access to many deeply meaningful relationships and productive enjoyment (in Indigenous worldviews in particular, land-based work is also connected to responsibilities and reciprocal caring). For example, motivations for hunting are well-established to extend beyond leisure, including deeply rooted cultural factors, spiritual relationships, and achievement-oriented motivations (341–343). For these reasons, a focus on leisure is incomplete (344).

Recognition is growing that Indigenous Knowledge and local (place-based) subject-matter knowledge and expertise (i.e., **Indigenous and Local Knowledges**) are important other ways of knowing about relationships between nature and people. However, these worldviews were systematically subjugated for centuries, and are only beginning to become a regular part of mainstream governance (Figure 11.2) (5,337,345). Researchers have identified a need for considering cultural relationships in assuring agencies meet their mandates to provide the greatest benefits to the nation (345).

Emerging Issues

Data and Research Gaps

The richness and nuances of relationships with nature make them particularly challenging to study for at least two reasons.

First, many relationships with nature are intimately tied to place-specific characteristics and meanings (346). This makes large-scale summaries, aggregations, and modeling approaches difficult to apply. Place-based research and narrative-based collection of qualitative data are well-suited to understanding these types of place-based meanings but are less comparable across geographies, cultures, and scales. This means that attempting to characterize human–nature relationships at a national scale may require additional work to ensure meanings that are important to place-based identity and well-being are captured rather than obscured by the chosen methods (347).

Second, although these values are extensively addressed in other knowledge systems, they are in the early stages of study within Western science—at least in a unified way that allows their characterization at the national scale. Although scholars have addressed issues related to relationships with nature for decades (and longer), these diverse concepts have only recently been collected under the large umbrella of human–nature relationships and its constituent categories of nature's gifts, nature's contributions to people, ecosystem services, relational values, and the like (348,349). Thus, novel methods of finding indicators to represent nature's meanings and values—that is, expanding the use of existing indicators and creating new ways to explore and characterize meanings and values—is important (349,350).

Status for Measurement of Human–Nature Relationships in the US

Research on human–nature relationships in the US exhibits numerous important gaps. For instance, it focuses strongly on non-marginalized communities—White, middle- and upper-income populations. It also focuses strongly on recreation, despite the deep importance, to many Americans, of relationships more accurately understood as caretaking, stewardship, and enactment of responsibility and culture. There is a noticeable uptick in research on more relational understandings of human–nature links in roughly the last decade (e.g., on concepts such as relational values), but studies of this type are still the minority (65,351).

In addition, much research and monitoring that addresses human–nature relationships is imprecise about biophysical details. That is, we often know little about the details of the "nature" involved in these relationships.

To make meaningful, reliable inference from states of nature to what that likely means for human well-being, increased specificity about the "nature" involved in the work is needed. For instance, many studies note relationships with a landscape in general—a forest, perhaps, or a coastal area. They do not specify details of the condition of the area, such as dominant species or levels of degradation. More detail in this regard would aid analysis.

Further, many studies report only limited details about nature interaction (e.g., amount of time or activities). More specificity around these details—for instance, details related to exposure (including the duration, dose, and intensity of engagement) and interaction type (e.g., activities engaged in)—would enable more meaningful, and thus more useful, inferences about how attributes of nature, exposure to nature, and activities jointly contribute to benefit attainment.

There are also data gaps related to specific kinds of relationships. A lack of large-scale data in many areas makes it difficult to project the status and trends of relationships closely associated with certain activities. Notable gaps include the following:

- There is a strong lack of data on more care-based activities. Multiple agencies and institutions collect data on recreational activities, but activities related to

caretaking, knowledge-transfer, art-making, and similar activities are rarely monitored. This is likely related to the more direct contributions that recreation makes to economic balance sheets, but caretaking and related activities are deeply important and support strong, locally and physically grounded economies; more information on these activities would be beneficial.

- There is inconsistent reporting of sociodemographic information in recreation participation estimates, including visitation to parks and public lands and outdoor recreation activity engagement. Sparse data on demographic differences limits the ability to draw widespread conclusions about how different segments of society engage with nature and thus develop relationships with nature.

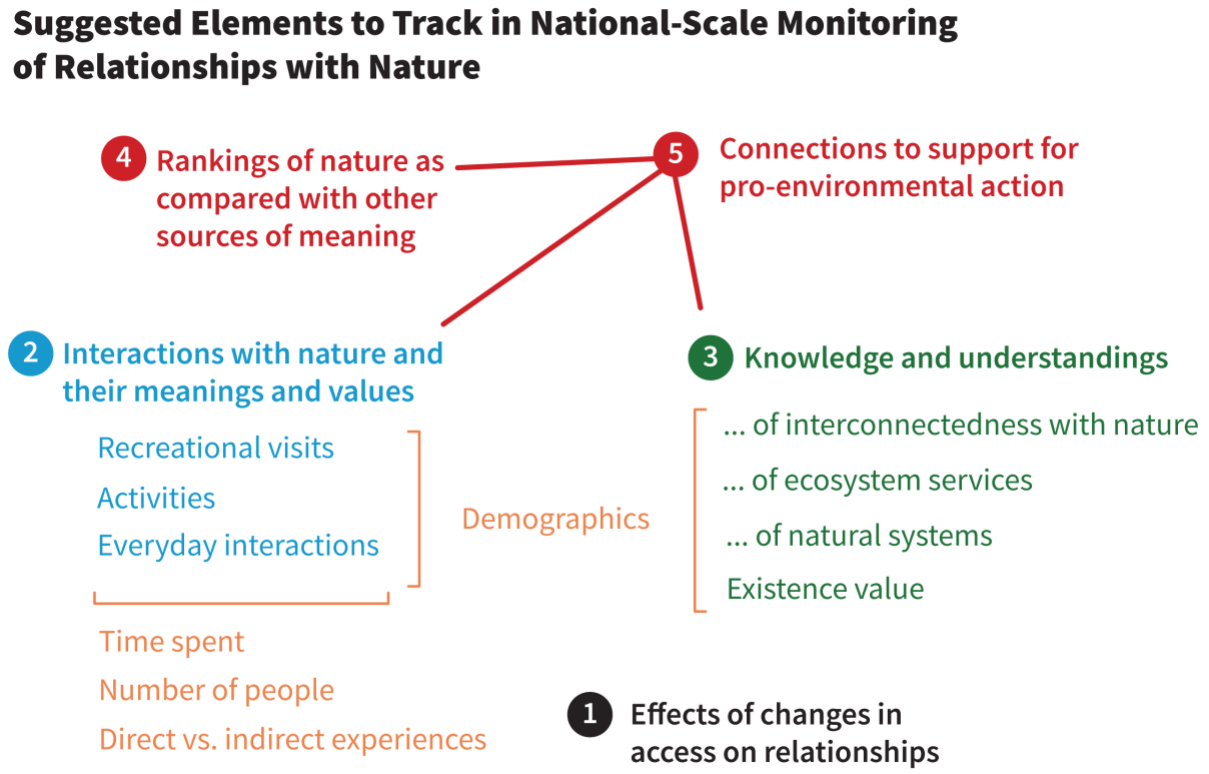
- Aesthetic value is important to many, and though approaches to modeling aesthetic quality exist (e.g., the Bureau of Land Management's Visual Resource Inventory), they are highly contested conceptually. More information on how aesthetic value relates to biophysical details would improve projections (352).

- Existence value (i.e., satisfaction and fulfillment from knowing that nature exists) is another central element of relationships with nature in the US; improved methods to understand and characterize existence value could enhance the ability to represent its richness and depth. At present, existence value is often measured using contingent valuation: willingness-to-pay for a nonmarket good or for a positive outcome, often at a small scale. An important challenge is that most willingness-to-pay studies do not explore the composition behind the dollar amount (e.g., is it use-related or existence-related?) (353).

One way to begin addressing these gaps is by improving how people's perceptions of relationships with nature are tracked over time. The United Kingdom conducts a long-term systematic national survey on public engagement with nature (the Adults' People and Nature Survey) that offers a useful model (354). Such an effort could explore how nature contributes to well-being compared with other aspects of life, how relationships vary across social groups and environments, and how access, time spent outdoors, or even indirect experiences—like viewing nature through media—shape people's sense of connection to nature and other people, sense of meaning and purpose, and life satisfaction. If such a targeted national survey were not possible, a set of standardized human-nature relationship questions could be appended to existing surveys (e.g., those conducted by federal agencies for various purposes, such as the National Park Services' periodic survey (355)).

Specific elements that would be helpful to track in such a national-scale survey include those in Figure 11.9. In all instances, relationships with nature could be assessed via both free-response questions and those with predetermined answer options.

Figure 11.9. Suggested Elements to Track in National-Scale Monitoring of Relationships with Nature



A systematic, wide-scale effort to track interactions, values, and knowledge related to nature could greatly increase the ability to equitably and effectively manage cultural relationships.

*(Figure under development.) Conceptual overview of factors that could be tracked to monitor the diverse cultural meanings of, and relationships with, nature in the US. Data needs can be understood as having five main dimensions. At a base level, (**1**) longitudinal monitoring of how changes in access (see Table 11.1) impact human–nature relationships would inform management. Then, sociodemographically detailed data would be helpful in two domains: (**2**) peoples' interactions with nature and associated meanings and values (i.e., data on recreation and everyday nature interaction across varied natural settings), with attention to frequencies, time spent, and modes of engagement; and (**3**) records of public understandings of the interconnectedness of social–ecological systems, ecosystem services, and existence values that people derive from knowing nature persists, even without visitation. There are also two overarching needs, for data on: (**4**) relative contributions of nature versus other aspects of life (e.g., family, career) in generating meaning and (**5**) support for conservation and pro-environmental actions. Correlations between many of these items would be informative. Importantly, many Indigenous communities protect privileged cultural knowledge about their interactions with nature;*

respect for cultural and data sovereignty would be needed in any monitoring approach. In addition, monitoring approaches should holistically consider how collected data can inform participatory, inclusive management. Figure original to The Nature Record.

Understanding Relationships with Nature Helps Us to Consider the Future

National assessments can influence a society-wide conversation related to why nature matters most to people. A powerful step toward in such a conversation would be to align terminology around the measurement of human–nature relationships and how those relationships connect to meaningful, fulfilling lives. The diversity of people and their experiences in the US underscores the importance of understanding the multiple framings of human–nature relationships and the various versions of a meaningful, fulfilling life. From *people with nature* and links to identity to one's cultural identify, to *nature for people* for recreation or economic use, to *nature for itself*, these different framings change how relationships manifest. Shared methods and concepts would facilitate future pursuits to measure trends and thus provide clearer understanding of how and the extent to which relationships with nature contribute to meaningful, fulfilling lives for Americans. It would also allow more comparable, and thus informative, understandings of how the relationships that underlie that meaning may be changing through time. This shared understanding can contribute to the maintenance of rich, diverse, and meaningful relationships that sustain dynamic human–nature coexistence now and for future generations.

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