

Chapter 10

Biodiversity and Spiritual Well-being



**Katherine N. Irvine, Dusty Hoesly, Rebecca Bell-Williams,
and Sara L. Warber**

Abstract Among government agencies, practitioners and researchers there is growing interest in the potential of natural environments for human health and well-being. In parallel, conserving biodiversity is seen as critical in this effort. Likewise, spiritual well-being is increasingly considered as an important dimension of human health. This chapter examines the inter-relationship between biodiversity and spiritual well-being. We first consider what spiritual well-being is. Then, based on a review of literature, we discuss four themes that illustrate biodiversity and spiritual well-being relationships, including: (i) influence of spiritual traditions on biodiversity; (ii) sacred places as repositories of biodiversity; (iii) the spiritual domain within ecosystems services; and (iv) the effects of biodiversity on spiritual well-being. We bring these strands together in a conceptual model and discussion of measurement issues that can inform future research.

Keywords Spiritual traditions · Sacred places · Ecosystem services · Connectedness · Conceptual model

K. N. Irvine (✉)

Social, Economic and Geographical Sciences Research Group, The James Hutton Institute,
Aberdeen, Scotland, UK

e-mail: katherine.irvine@hutton.ac.uk

D. Hoesly

University of California, Santa Barbara, CA, USA

e-mail: hoesly@ucsb.edu

R. Bell-Williams

University of Nottingham, Nottingham, UK

S. L. Warber

Department of Family Medicine, University of Michigan, Ann Arbor, MI, USA

European Centre for Environment and Human Health, University of Exeter Medical School,
Truro, Cornwall, UK

e-mail: swarber@umich.edu

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Highlights

- Spiritual well-being includes relations to self, community, environment and a transcendent other(s).
- Spiritual beliefs and practices can foster respect and action for biodiversity.
- Few studies empirically examine the effect of biodiversity on spiritual well-being.
- Research can benefit from appropriate measures of spiritual well-being and biodiversity.
- Research could use existing conceptual frameworks for how nature affects human health.

10.1 Introduction

Governments and practice-focused organisations are interested in natural environments as a resource for improving human health and well-being (e.g. World Health Organization [WHO] & Secretariat of the Convention on Biological Diversity [CBD] 2015). Conserving biodiversity is increasingly considered critical for this effort (e.g. Hough 2014; Sandifer et al. 2015; CBD 2017a, b). In tandem, scholars and practitioners recognise spiritual well-being as an important dimension of human health (e.g. Chuengsatiansup 2003; McKee and Chappel 1992). This chapter focuses specifically on the beneficial relationships between biodiversity and the spiritual domain of human health and well-being. Our aims are to: (i) examine definitions of spiritual well-being; (ii) provide an overview of relationships between biodiversity and spiritual aspects of well-being; and (iii) develop a conceptual model to inform future research into the effects of biodiversity on spiritual well-being.

10.1.1 *Our Approach*

We conducted a literature review, identifying articles through structured searches and authors' knowledge of their respective fields. Searches were conducted primarily through Scopus and Web of Science and were supplemented by targeted topical sources (ATLA, PsychInfo, SSCI) and commercially available compilations (SpringerLink, JSTOR) alongside Google Scholar. As a starting point, we used definitions of biodiversity, health and spiritual well-being as indicated in Box 10.1.

Search terms included combinations of biodiversity, ecology or environment with spirit*, relig*, sacred, faith, well-being, health, meaning, connection, indigenous or beliefs. Searches were limited by language (English) and publication year (1945–2017). We sought to identify empirical studies whenever possible. Titles and abstracts were reviewed to assess relevance and focus; because of our focus on spiritual well-being (rather than physical health) and relative expertise, we excluded from consideration literature focused on medicinal plants, microbial diversity, economic valuation and environmental justice. When available, we noted research

Box 10.1: Definitions of Biodiversity, Health, Spiritual Well-Being

- **Biodiversity** is “the variability among living organisms from all sources including, *inter alia*, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems” (United Nations 1992, p. 3).
- **Health** is “a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity” (WHO 1948).
- **Spiritual well-being** is “concerned with meaning, connection to something greater than oneself and, in some cases, a faith in a higher power” (Linton et al. 2016, p. 12).

design, measurement – of biodiversity, of spiritual well-being – mediating pathways and moderating variables. We undertook a thematic, narrative analysis of the literature. Findings were interpreted through the lens of four spiritual well-being domains identified through our examination of definitions of spiritual well-being (see Sect. 10.2).

10.1.2 *Our Biases*

Our approach to such a task has several biases that we think are important to delineate up front. First, the authors’ different ways of knowing – academic researchers; disciplinary training in environmental psychology (KNI, RB-W), sociology and religious studies (DH); integrative family medicine (SLW); and Western worldview (USA, UK) – bring a certain perspective to the selection and interpretation of the literature. Second, while we recognise that aspects of religious traditions can have negative effects on biodiversity (e.g. White 1967) and that not all experiences of biodiversity or nature foster well-being (e.g. Dallimer et al. 2012, see pp. 52–53; Heintzman 2016, see pp. 394–395), this chapter focuses on beneficial aspects of the biodiversity/spiritual well-being nexus. Third, although this is a chapter about the relationship between biodiversity and spiritual well-being, our author team does not include an ecologist, which limits our interpretation of the biodiversity component within the selected literature.

10.1.3 *Chapter Structure*

In Sect. 10.2 we provide a contextualised understanding of the concept of spiritual well-being that is taken forward throughout the chapter. We discuss four themes from our assessment of the literature in Sect. 10.3: (i) influence of spiritual

traditions on biodiversity; (ii) sacred places as repositories of biodiversity; (iii) spiritual domain within ecosystems services; and (iv) the effects of biodiversity on spiritual well-being. Section 10.4 considers future directions for research.

10.2 Defining Spiritual Well-Being

The World Health Organization's (WHO) (1948) definition of health emphasises physical, mental and social well-being (Box 10.1). While lauded as a holistic approach to health, the importance of considering the spiritual domain is increasingly being recognized as well. This can be found, for example, in the WHO's Health Promotion Glossary (1998) and discussions of health impact assessments (Chuengsatiansup 2003) as well as in medicine's expanded focus on a biopsychosocial-spiritual model of health (e.g. McKee and Chappel 1992). In debates about health and wellness, spiritual health is considered by some as a component of overall health or integral to holistic health (e.g. Greenberg 1985; Hawks 1994), and there is a rich body of research on its role in illness recovery and end-of-life care (e.g. McClain et al. 2003; Lin and Bauer-Wu 2003) as well as its effect on other dimensions of health (e.g. depression; Bekelman et al. 2007). Despite this growing interest, definitional debates over the meaning – and measurement – of the spiritual domain continue.

To understand these definitional challenges we first consider the wider context within which the notion of spiritual well-being sits. While the word 'spirituality' historically arises from a Christian milieu (Principe 1983), it has been applied to non-Christian religions (e.g. Buddhism) and to non-religious orientations such as 'secular spirituality' (Jespers 2011; van Ness 1996). Such applications inevitably raise questions about the concepts of 'religion' and 'spirituality' as well as 'religious' and 'spiritual' (Casey 2013) – terms that are themselves difficult to define, and for which varying, and sometimes overlapping, definitions exist. For example, while some scholars describe spirituality as a subset of religion (Streib and Hood 2011), others consider these concepts as independent yet complementary (e.g. Berghuijs et al. 2013; Zinnbauer et al. 1997). Typically, religiousness is described narrowly as "formally structured and identified with religious institutions and prescribed theology and rituals" (Zinnbauer et al. 1997, p. 551), whereas spirituality is considered more expansively as subjective, eclectic and individualised, with authority deriving from personal experience (Fuller 2001). In one cross-cultural study (Gall et al. 2011), survey respondents claimed that spirituality referred to core aspects of personal identity and experiences of transcendence – "defined traditionally as God or a higher power, or in more secular terms as unity with the greater world or mystery" (p. 158) – with religion seen as a pathway for accessing spirituality and community. These scholarly distinctions between religion and spirituality reflect the growing population of those who identify as "spiritual but not religious" (Saucier and Skrzypinksa 2006). Rican (2004) and Moberg (2010) provide useful overviews of these debates.

These conceptual difficulties and cultural transformations have proved problematic for efforts to define and measure spiritual well-being. Its meaning is also often confused by the use of similar concepts, including spiritual health (e.g. Bensley 1991) and spiritual wellness (e.g. Westgate 1996), with debate as to whether these are synonymous or distinct (e.g. Ingersoll 1998). Some scholars (Klein et al. 2016; Koenig 2008; Moreira-Almeida and Koenig 2006; Salander 2006; Tsuang et al. 2007) have argued that spiritual well-being conceptually overlaps too much with existential well-being, psychological well-being and mental health, suggesting that spiritual well-being may be insufficiently distinct to stand as a separate category in rigorous empirical research. Similar problems attend distinctions among psychological, emotional or mental well-being (Hird 2003; Veenhoven 2008). These disparities may be a corollary to the fact that discussions are undertaken across multiple fields of inquiry: sociology (e.g. Moberg 1971, 1979), psychology (e.g. Paloutzian and Ellison 1982; Ellison, C. 1983), palliative care (e.g. Lin and Bauer-Wu 2003), nursing (e.g. Buck 2006) and leisure studies (e.g. Jepson 2015), which may understand and use the terms differently.

The concept of 'spiritual well-being' originated in the sociology of aging and health (Moberg 1971); there, it referred to social and psychological adjustments that draw upon a person's "inner resources" and "central philosophy of life" to provide meaning, stability and coping (p. 10). Spiritual well-being was subsequently defined at the US-based National Interfaith Coalition on Aging (NICA) as "the affirmation of life in a relationship with God, self, community and the environment that nurtures and celebrates wholeness" (NICA 1975, as cited in Moberg 1984, p. 352). This definition provides some guidance for understanding the phrase "connection to something greater than oneself" in Linton et al.'s (2016) definition of spiritual well-being. J. Fisher (2011) has further developed the relational element, arguing that spiritual health is dependent on the "extent to which people are living in harmony within relationships" (p. 21), i.e. relation with self, relations with community, relation with the environment and relation with a transcendent other(s). Thus, for J. Fisher (2011), "when [these] relationships are not right, or are absent, we lack wholeness, or health" (p. 23).

Across multiple disciplines, conceptualisations of the spiritual aspect of well-being and health appear to share a number of consistent features (Table 10.1) including: meaning, intrinsic values, wholeness, community relationship and transcendence (Bensley 1991; Fisher, J. 2011; Hawks 1994; Hood-Morris 1996; Ingersoll 1994; Westgate 1996). J. Fisher's (2011) articulation of the environmental aspect of spiritual well-being suggests that a relationship with the environment can go "beyond care and nurture for the physical or biological, to a sense of awe and wonder" (p. 22) and, for some, a sense of unity with the environment and a feeling of connection to nature. This same sense of oneness with nature is identified in Hawks' (1994) spiritual health literature review, which also examined how a spiritually-well individual would outwardly act (e.g. altruism, compassion, service).

This section has examined the development of the concept of spiritual well-being, the health contexts in which it originated and the variety of meanings that have been applied to the term 'spiritual' over time. For the purposes of this chapter, we take

Table 10.1 Proposed features of spiritual well-being organised by four relational domains of self, others, environment and transcendent other(s) (Fisher, J. 2011). These domains and their proposed features are used to interpret the identified literature in terms of the relationships between biodiversity and spiritual well-being

Domains	Example references
1. Self	
Meaning – meaning and purpose in life	Hawks (1994), Linton et al. (2016), and Westgate (1996)
Intrinsic values – values and beliefs of community and self; concern and care for something greater than self	Bensley (1991) and Westgate (1996)
Wholeness – a sense of completeness in life; a sense of all well-being dimensions being met	Bensley (1991) and Fisher (2011)
2. Others	
Community relationship – connectedness with others; in-depth relationships	Bensley (1991), Ellison (1983), Fisher (2011), Hawks (1994), Ingersoll (1994), and Westgate (1996)
3. Environment	
Environment – connection with nature; oneness with nature	Fisher (2011) and Buck (2006)
4. Transcendent other	
Transcendence – beliefs relating to something beyond the human level; the human-spiritual interaction; unity with something beyond the material world	Bensley (1991), Ellison (1983), Fisher (2011), Hood-Morris (1996), and Westgate (1996)
Divine – a god-like force; conception of the divine	Bensley (1991) and Moberg (1971)

forward an expanded understanding of spiritual well-being that encompasses one's relationships with the self, the community, the environment and a transcendent other(s) inclusive of the different features identified in Table 10.1. In Sect. 10.4.2 we discuss challenges in measurement of spiritual well-being.

10.3 Themes Within the Literature

Few empirical studies were identified that specifically investigated the effect of biodiversity on spiritual well-being. The literature did contain a rich account of the multiple relationships among various spiritual traditions, ecology and biodiversity conservation, including spiritual aspects of well-being, which we considered important to delineate. The identified literature is clustered into four themes: the influence of different spiritual traditions on biodiversity; sacred places as repositories of biodiversity; the spiritual domain ecosystem services; and the effects of biodiversity on spiritual well-being. Figure 10.1 provides a visual representation of these biodiversity/spiritual well-being relationships.

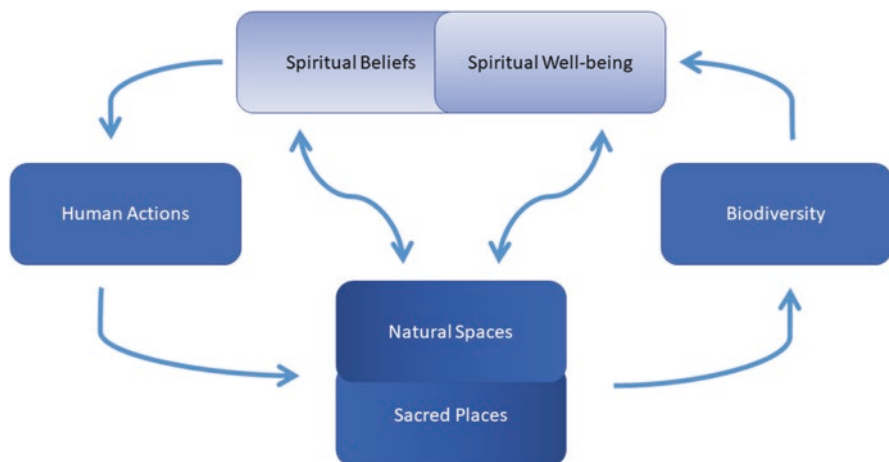


Fig. 10.1 Relationships among spiritual beliefs, nature, biodiversity and spiritual well-being. Our four themes are demonstrated in different sections of the diagram. The left side demonstrates how spiritual beliefs influence human actions and have influence on natural spaces (Sect. 10.3.1). The lower half of the diagram depicts how human actions (or protection from human actions) on sacred spaces affect biodiversity (Sect. 10.3.2). The center of the diagram demonstrates the bidirectional relations between spiritual beliefs, spiritual well-being, natural spaces and sacred places as reflected in ecosystem services literature (Sect. 10.3.3). The right side of diagram reflects the effects of nature and biodiversity on human spiritual well-being (Sect. 10.3.4). (Illustration by SL Warber and KN Irvine)

10.3.1 Influence of Spiritual Traditions on Biodiversity

The spirituality-nature connection has been explored across several academic disciplines and religious traditions, giving rise to a number of related topics, such as nature religion, nature spirituality, ecological spirituality, ecofeminist spirituality, eco-spirituality and ecotheology (see Kinsley 1995). Grim and Tucker (2014) and Kinsley (1995) outline how various indigenous traditions, ‘world religions’ and emerging spiritualities (e.g. Neopaganism) inspire ecological action and a deep relationship with the earth and all its beings. In an era of increased resource extraction and species extinction, it has been argued that such connections can foster conservation of biodiversity (Golliher 1999; Hamilton and Takeuchi 1993; Negi 2005).

10.3.1.1 Indigenous Spiritual Beliefs and Practices

Many indigenous cultures worldwide have spiritual beliefs, ethical values and/or traditional practices that directly link to the environment (Bodeker 1999; Posey 1999). For example, Gregory Cajete (Tewa), a Native North American educator,

emphasises the importance of understanding and incorporating an indigenous worldview to achieve long-term sustainability. He repeats an admonishment from Tewa elders to “look to the mountain”, that is, to think about the impact on future generations over thousands of years. He argues that “Indian kinship with the land, its climate, soil, water, mountains, lakes, forests, streams, plants, and animals has literally determined the expressions of an American Indian theology [of place]” (Cajete 1999, p. 3).

Grim (2001) asserts that most native peoples share a perception that non-human beings are equal in status with humans, that all life exists in familial relationships, and that these relationships are sustained in ritually prescribed ways that often conserve biodiversity. While “there is no one ‘indigenous’ view on religion and ecology... spiritual relationships established between native peoples and their homelands” often foster ecological commitments and activism, including biodiversity conservation (Grim 2001, p. xxxiv). For example, the indigenous Ifugao Igorots of the Philippines conduct rituals led by a native priest to control rice pests, thus preserving plant species on which the Igorots rely for food. Additionally, the Ifugao believe that “nature spirits” inhabit trees and stones in forests and watersheds, which are “centers of biodiversity,” including over 200 plant varieties (Tauli-Corpuz 2001, p. 295).

Furthermore, indigenous groups value reciprocity. They care for the land, and thus their health, including spiritual well-being, is maintained. K. Wilson (2003) writes of the importance of tangible places for maintaining the physical, emotional, mental and spiritual health of individuals and communities among the Anishinabek (Ojibway and Odawa) living in northern Ontario, Canada. She summarises this as:

Activities such as hunting and harvesting are not only of nutritional benefit, which supports physical health, they also allow individuals to connect spiritually with Mother Earth, the Creator and spirits while being on the land. This is important because it allows individuals to pursue simultaneously physical and spiritual connections to the land that are important for emotional and mental health (Wilson, K. 2003, p. 90).

Many native peoples have engaged – and continue to engage – in local ecological activism to preserve their lands, cultures and spiritual traditions, struggles that often preserve biodiversity. For example, in the 1970s the James Bay Cree in Quebec taught non-natives their spiritual worldview and formed a coalition to oppose a hydroelectric dam that threatened Cree hunting spaces and lifeways (Feit 2001). The dam threatened the destruction of many species on which the Cree rely for sustenance and cultural vitality as well as the ancestral homeland where Cree spirits live alongside them. More recently, Native Hawaiians protested the construction of a new telescope on Mauna Kea because it was to be located on a sacred mountain that is rich in biodiversity and home to important native deities. In Nigeria and other West African countries, native African religious traditions have blended with African Christian churches to support tree-planting projects, including developing “inter-religious rituals” that “tap salient aspects of indigenous knowledge” and add “conscious, proactive conservation” of biodiversity (Kalu 2001, p. 242).

Grim (2001) observes that native lifeways that stress the inter-relatedness of all beings do not necessarily result in ecological balance or harmony, and that romanticised notions of the “ecological Indian” could disempower native actors in their environments (p. xxxiv–xxxvii). Despite these caveats, the examples provided in this section illustrate the potential of indigenous worldviews to promote biodiversity conservation. The deep connection with the earth and reverence for nature and spirits that inhabit the natural world that are expressed through indigenous beliefs and practices echo themes of environmental connection and relations with a transcendent other(s) found in spiritual well-being definitions. Thus, indigenous biodiversity conservation can be a pathway from spiritual beliefs to spiritual well-being.

10.3.1.2 World Religions and Alternative Spiritualities

Ethical prescriptions and community practices that can promote ecological conservation are also present in various ‘world religions’ and alternative spiritualities. Whether the divine is seen as transcendent or immanent, dualistic or monistic, the range of beliefs and practices described in this section demonstrate increasing concern for biodiversity and engagement in specific actions to preserve it.

The Religions of the World and Ecology series from Harvard University Press illustrates the vitality of concern for ecological conservation within many ‘world religions’. The series includes volumes on Buddhism, Christianity, Confucianism, Daoism, Hinduism, Indigenous Traditions, Islam, Jainism and Judaism. Similarly, various ‘world religions’ alongside other spiritual orientations are included in several scholarly handbooks on religion and ecology (e.g. Jenkins et al. 2017), at least one of which includes a chapter on biodiversity (Lovejoy 2017). In Hinduism, for example, natural objects such as rivers, trees, stones and animals can manifest the sacred as forms of divinity worthy of devotion and conservation. As one Hindu woman explains: “When I look into the face of the goddess on the tree, I feel a strong connection (*sambandha*) with this tree” (Haberman 2017, p. 40). Such an orientation can lead to environmental activism, for example, cleaning up the polluted Yamuna River in northern India or protecting sacred groves threatened with deforestation (Haberman 2017). Similarly, Buddhist environmentalists rely on Buddhist teachings about interdependence to support claims to oneness with nature and conservation. Joanna Macy, an eco-Buddhist activist, writes that in Buddhism the egotistical self is “replaced by wider constructs of identity and self-interest— by what you might call the ecological self or the eco-self, co-extensive with other beings and the life on our planet” (quoted in Ives 2017, p. 44). These religious perspectives, based on modern interpretations of ancient traditions, can spur people toward conservation of biodiversity.

Some Christian theologians and ethicists argue that since biodiversity is part of God’s creation, it must be conserved (Jenkins 2003, 2013; McFague 1997; O’Brien 2010; S. Taylor 2007). They suggest that since God is present in all things, experiences of biodiversity are sacramental opportunities and that human-created species

loss impoverishes the human connection to God. Catholic theologians have discussed how biodiversity gives rise to sacred feelings of enchantment and suggests the divine multiplicity of the Holy Trinity (Boff 1997). Pope Francis' environmentalist encyclical *Laudato Si'* (2015) includes a major section entitled "loss of biodiversity", lamenting species extinction caused by capitalist exploitation and calling on people of faith to protect all life. The pope claims biodiversity is important intrinsically but also for its potential for food, medicine and other factors: "Because of us, thousands of species will no longer give glory to God by their very existence, nor convey their message to us. We have no such right" (p. 25). Jewish leaders have also reinterpreted their tradition to provide a "foundation for a Jewish ethic of biodiversity" based on biblical texts that show "God creates, takes care of, and takes pleasure in the diversity of life in the world" (Troster 2008, p. 4 and 11). From this theocentric perspective, Creation provides an environmental "ethic of the inherent value of all species which would... demand the preservation of whole ecosystems... where all creation becomes a source of wonder" (Troster 2008, p. 16). Reinterpreting sacred texts in light of present environmental concerns has led religious leaders to advocate eco-activism and biodiversity conservation.

Indeed, a large-scale 'religious environmentalism' movement in America has challenged prior emphases on humanity's dominion over the earth, instead insisting on 'creation care' or 'stewardship' as a central religious principle (Ellingson 2015; Fowler 1995; Gottlieb 2006a). Early American impulses toward environmental preservation and conservation emerged from the idea that nature is God's creation and should be protected in all its diversity (Berry 2015; Stoll 2015). Similarly, some British Muslims have used Islamic principles to grow gardens in neglected public green spaces to preserve natural habitats, reduce mosque carbon footprints and build environmental sustainability organisations that have helped facilitate biodiversity conservation (Gilliat-Ray and Bryant 2011).

New Age and Neopagan spiritualities, including Wicca and Goddess worship, are also engaged in biodiversity conservation, in part because practitioners experience spiritual well-being through interaction with nature. These new religions draw on indigenous traditions, Asian religions and/or Western sources to create holistic spiritualities based on unity with nature and harmony with natural cycles. As Neopagan leader Starhawk writes: "The craft is earth religion, and our basic orientation is to the earth, to life, to nature.... All that lives (and all that is, lives), all that serves life, is Goddess" (1979, p. 263). Identification with nature in all its diverse manifestations impels Neopagans to protect nature through social engagement and religious practice. One survey study showed that members of such alternative spirituality movements view both experiences in nature and environmental actions as spiritual (Bloch 1998). One practitioner of this Gaia-centered spirituality said that "getting back to the earth" means to "give back and give thanks to the earth, and be more of that one community... [of] oneness" (Bloch 1998, p. 66). Based on these views and experiences with nature, many Neopagan and New Age people engage in ecological activism and preservation efforts, including "recycling, tree-planting, alternative energy strategies, petitions, and so forth" (Bloch 1998, p. 59).

10.3.1.3 Nature Spirituality

Apart from the discrete traditions discussed above, our review of the literature found voluminous sources on ‘nature spirituality’, which can be related to particular religious traditions or its own orientation (e.g. Gottlieb 2013). In his book on nature spirituality, B. Taylor (2009) defines ‘dark green religion’ as that “in which nature is sacred, has intrinsic value, and is therefore due reverent care” (p. 10). Contemporary nature spiritualities combine indigenous, Asian, Western and scientific sources to foster biophilic kinship, reverence and humility, and a metaphysics of interconnection and interdependence wherein biological diversity is intrinsically valuable and sacred, and thus worthy of defense (B. Taylor 2009, 2012). Related worldviews include deep ecology (Sessions 1995), eco-spirituality (Cummings 1991) and other earth-based spiritualities. Examples of biodiversity conservation actions rooted in nature spirituality include protecting endangered species, preserving natural habitats, supporting environmental regulations, and protesting polluters (B. Taylor 2012). These feelings of connection, humility and transcendence align with concepts of spiritual well-being outlined in Sect. 10.2.

Historian Michael P. Nelson claims that people commonly argue for wilderness preservation because nature is a “site for spiritual, mystical, or religious encounters: places to experience mystery, moral regeneration, spiritual revival, meaning, oneness, unity, wonder, awe, inspiration, or a sense of harmony with the rest of creation – all essential religious experiences” (quoted in Gottlieb 2006b, p. 15). This motive is amply demonstrated across a variety of religious and spiritual traditions, linking various spiritual ecologies (Sponsel 2012) with experiences of spiritual well-being and biodiversity conservation. The indigenous traditions, world religions, alternative spiritualities and nature spiritualities described in Sect. 10.3.1 promote a view of humans as interdependent and interrelated with the rest of the natural world, living in reverential humility with fellow natural beings, and thus inspiring ecological activism. These worldviews and their related practices can result in conservation of biodiversity and increased spiritual well-being, expressed through experiences of connection, meaning and transcendence in nature.

10.3.2 *Sacred Places as Repositories of Biodiversity*

In addition to spiritual beliefs and practices that can foster respect and action for biodiversity, we found ample sources on sacred natural sites as repositories of biodiversity. Spiritual values and taboos associated with sacred natural sites can help to preserve biodiversity (Dudley et al. 2009, 2010; Verschuure et al. 2010). In this context, sacred places are natural areas that have special significance for local communities, often linked to religious myths or rites. In their review of this topic, Dudley Higgins-Zogib and Mansourian (2009) conclude that sacred natural sites,

which are often rich in biodiversity, “can contribute to biodiversity conservation strategies” due to the special precautions associated with them (p. 575). Additionally, conservation of these sites aids the preservation of local cultures and their traditional ecological knowledges.

Of particular interest amongst researchers in this area are sacred groves and sacred forests (e.g. Juhé-Beaulaton 2008; Ormsby and Bhagwat 2010; Sheridan and Nyamweru 2008; Sponsel 2012; Tomalin 2009). Sacred groves are patches of natural vegetation dedicated to local deities and protected by religious tenets and cultural traditions; they may also be tree-stands raised in honor of heroes and warriors and maintained by the local community (Ramanujam and Cyril 2003). Taboos against over-harvesting, harming particular sacred species or disrupting the ecological balance of sacred groves and forests can preserve species richness. For example, the Nkodurom and Pinkwae sacred groves in Ghana have been protected through traditional beliefs and taboos, resulting in preservation of threatened mollusk, turtle, monkey and heron species (Ntiamo-Baidu 2008). In India, the number and spatial distribution of sacred groves creates a network that preserves “a sizable portion of the local biodiversity in areas where it would not be feasible to maintain large tracts of protected forests” (Bhagwat and Rutte 2006, p. 520). Local traditions that include worshipping trees in a sacred grove helped to preserve a rare bat species, and, in another area, spiritual beliefs about a hidden shrine within a sacred grove preserved riparian forests and streams (Bhagwat and Rutte 2006). In central Italy, local Catholic practices around pilgrimage sites have helped to conserve biodiversity through preserving relic habitats and vegetation assemblages, protecting old growth forests and tree species, and maintaining greater habitat heterogeneity due to sacred grottos and water sources (Frascaroli 2013). Reflecting on forest preservation by the official association of Shinto shrines in Japan, Rots (2015) observes: “The significance of these forests ... extends well beyond ecology and nature conservation proper. Constituting continuity between the present and the ancestral past, they have come to be seen as local community centers that provide social cohesion and spiritual well-being” (p. 209).

Many studies of biodiversity at sacred sites have used standard ecological survey techniques of tree species diversity, tree species richness, regeneration status, floristic surveys of vegetation composition and ethnobotanical uses of species (Bharathi and Devi Prasad 2017; Hu et al. 2011; Khumbongmayum et al. 2005). An alternative approach was taken by Anderson et al. (2005) in documenting the biodiversity of sacred mountains in the Himalayas of Tibet. Existing vegetation maps and geographic information systems (GIS) were used to remotely assess species composition, diversity and frequency of useful and endemic plant species. Sacred mountains had significantly greater overall species diversity than surrounding areas. These studies highlight the various measures being used to document biodiversity preservation in sacred protected areas.

10.3.3 *Spiritual Domain Within Ecosystem Services*

A third way in which biodiversity and the spiritual domain of human health and well-being can be considered is through the lens of ecosystem services (ESS). The ESS concept broadly frames the relationship between people and nature in terms of benefits and services, i.e. the benefits people derive from the ‘services’ provided by ecosystems (Millennium Ecosystem Assessment [MEA] 2005). This framework has been used to try to incorporate the value – often in monetary terms – of these services for use in decision-making (Fisher, B. et al. 2009). The MEA (2005) structured ESS into four clusters: provisioning (the products obtained from ecosystems, e.g. food, water), regulating (benefits obtained from the regulation of ecosystems, e.g. water purification, pest control), supporting (processes necessary to produce other ESS, e.g. soil formation, photosynthesis) and cultural (“nonmaterial benefits that people obtain from ecosystems through spiritual enrichment, cognitive development, reflection, recreation and aesthetic experiences” [MEA 2005, p. 4]). There is ongoing debate over the concept of and categorisation of ESS, the relationship between and operationalisation of ‘service’ and ‘benefit’ – in particular those conceived of as ‘cultural’ – as well as the knowledge base that has informed such effort (see Daniel et al. 2012; Díaz et al. 2018). Our focus here is to understand how spiritual well-being is discussed and operationalised in relation to biodiversity in this literature.

The language within this literature refers to spirituality, spiritual enrichment, spiritual values, spiritual fulfilment and spiritual benefits (e.g. MEA 2005; WHO and CBD 2015; UK National Ecosystem Assessment Follow-on 2014). One of the few specific mentions of spiritual well-being is found within the framing of spiritual and religious values, described as:

Sacred elements of the biota, worship of biota, kindness and gratitude toward biota together or individually make a contribution to spiritual well-being, and a sense of wholeness and being ‘at one’, everywhere and forever (connecting the present with the past and the future) (WHO and CBD 2015, p. 213).

This description implies that spiritual well-being – and aspects conceived in this chapter as features of spiritual well-being, i.e. wholeness and connectedness (Table 10.1) – could be indirectly related to biodiversity through incorporating elements of the natural world into religious/spiritual practices. For example, a ceremony dedicated to the jaguar in southern Mexico among the Nahuatl (Caballero et al. 1998, cited in Russell et al. 2013) demonstrates how a particular species could serve local communities’ spiritual well-being. Another route through which one might experience spiritual well-being is through acts of ‘kindness and gratitude’, for example, through environmental conservation volunteering. The following examples illustrate ways in which researchers have sought to measure the spiritual dimension of ESS and integrate biodiversity to enhance understanding of the relationship.

Using the ESS framework, De Lacy and Shackleton (2017) conducted a socio-ecological study of sacred urban greenspaces (i.e. gardens associated with places of worship) in South Africa to investigate the contribution of biodiversity (measured using ecological surveys) to worshipers' spiritual and aesthetic experience (collected via questionnaires). Analysis found a positive association between woody plant basal area (an indicator of volume or the footprint of an area taken up by trunks and stems) and participants' spiritual and aesthetic experience. The aesthetic experience was also positively associated with woody plant species richness and abundance (number of woody plants).

Hunter and Brehm (2004) explore spiritual values in their qualitative study of rural residents living in proximity to a national forest in the USA previously identified as a 'hotspot' for vertebrate biodiversity. Spiritual values were expressed in terms of biophilic moralistic values, defined as "a spiritual reverence and ethical concern for nature" (Kellert 1996, as cited in Hunter and Brehm 2004, p. 14). Interview participants described a responsibility on the part of humans to be good stewards for the environment and an inter-reliance between people and wildlife. For a few, this moral value was expressed in terms of a spiritual connection, e.g. "... yeah, I think there is certainly a spiritual connection between me and the animals around me" (as quoted in Hunter and Brehm 2004, p. 21). Such statements are also illustrative of the spiritual well-being domain of connection with nature (Table 10.1).

Callicott et al. (2007) approach the integration of biodiversity and spirituality through the use of biocomplexity modelling, the simulation of coupled biodiverse environments and human systems. This modelling considers material connections (e.g. through food, building materials; a.k.a. provisioning ESS) and psycho-spiritual connections (e.g. through religiously significant sites, ethnic identity) to the natural environment. Through a case-study analysis of biocomplex sites, the researchers operationalise the psycho-spiritual through an examination of the cultural history of the place. In their South American case study, the psycho-spiritual connectivity focuses on the symbolic meaning, religious practices and cultural identity associated with the natural setting. They argue that such modelling "may reveal historic synergies and symbioses between human systems (human life ways and livelihoods) and natural systems that may be useful for future biodiversity conservation strategies" (Callicott et al. 2007, p. 323).

Delgado et al. (2010) consider a biocultural approach to the management of natural resources that includes sacred natural sites, biodiversity conservation, spiritual values and spiritual well-being of local indigenous peoples. Working with local community members and other stakeholders, a set of mutually agreed upon indicators and criteria of spiritual well-being were developed; these included teaching and revitalisation of spiritual knowledge and the extent to which sacred sites were used and considered valuable by the local community. To assess spiritual well-being over time, the approach measured the proportion of families who implement ritual practices. By linking these ritual practices with measures of biodiversity conservation, the authors conclude that "human well-being and biodiversity is intimately related in sacred natural sites and imbued with spiritual values" (Delgado et al. 2010,

p. 192). Other authors have drawn similar conclusions that, due to their importance for local environmental decision-making, “sacred natural sites support spiritual well-being that many people find in their relationship with nature” (e.g. Verschuuren 2010, p. 63; see also Sect. 10.3.2).

Emerging from both conceptual frameworks and empirical evidence, the above examples suggest that the relationship between biodiversity and the spiritual domain is strongly related to cultural beliefs and practices, both current and historical. Cooper et al. (2016) and Russell et al. (2013) have argued that much of the ESS literature on the spiritual dimension of ESS and spiritual well-being focuses on indigenous peoples. We observe that the language within this literature suffers from a conflation of spiritual beliefs (antecedents) and spiritual well-being (outcomes), as discussed previously. We would add that most studies produce associative findings and few studies directly measure the relational aspects of spiritual well-being as contained within Table 10.1.

10.3.4 Effects of Biodiversity on Spiritual Well-Being

The preceding sections examined how spiritual beliefs/practices may influence attitudes and actions towards biodiversity, and how sacred natural sites might aid biodiversity conservation. We saw that religious worldviews and practices regarding nature and biodiversity can foster meaning, connection with nature and feelings of transcendence, linking them at least implicitly with spiritual well-being. Likewise, these attributes of spiritual well-being can be found in sacred natural sites that conserve biodiversity, and within the ecosystem services literature there continues to be a focus on clarification, measurement and integration of the spiritual aspect of well-being in relation to the natural environment. In this section, our focus is on how biodiversity and biodiverse settings contribute to spiritual well-being. While no studies explicitly investigated biodiversity’s effect on spiritual well-being, we examine this relationship through an interpretation of several strands of research using our derived categories of spiritual well-being (Table 10.1).

10.3.4.1 Spiritual Outcomes from Wilderness Recreation

Within the field of leisure studies, a body of research has specifically examined the spiritual experience of wilderness settings. Price (1996) identified wilderness recreational activities as a form of modern secular spirituality and developed a taxonomy that includes: adventurous (e.g. mountaineering, surfing); observational (e.g. whale-watching, sightseeing); blended adventurous and observational (e.g. fly-fishing, scuba diving); and educational, such as programmes that embed an individual within a wilderness setting to learn skills (e.g. Outward Bound). He asserts that these nature-focused activities, where one encounters the natural environment as

wilderness, can provide transformative experiences of that which is totally ‘other’. He notes:

Each of these recreational activities offers an experience in nature that often provides the participants with a sense of wonder, awe, wholeness, harmony, ecstasy, transcendence, and solitude. ... Each can transfix and transform. Each takes place in a natural arena where the trials of the heart and the tribulations of the soul can be overcome (Price 1996, p. 415).

Price suggests that “the reason for returning to nature...is to regain touch with the divine” (p. 440) and that “replenished spiritually by the experience, the participants hope to retain its joy, its serenity, ... its harmony” (p. 441), elements Hawks (1994) associates with spiritual well-being.

Curtin’s (2009) study of wildlife tourists examined observational recreational activities and psychological well-being. Drawing on interviews and ethnographic fieldwork of wildlife tours in locations with high levels of species richness (Spain – bird watching; California – whale and bird watching), Curtin’s analysis identified feelings of wonder, awe and a sense of timelessness that emerged through an encounter with wildlife. Wonder was expressed in terms of the beauty of what was being seen (e.g. seabirds in flight), the intricacy of nature’s design (e.g. diversity of species) and the sense of being part of – rather than separate from – the natural world. Participants also noted a temporal shift whereby, as Curtin writes, “linear... time slips away” and one is provided with “still and motionless time in which to marvel, contemplate and philosophise” (p. 470). Participants described these moments as points during which one can transcend the self and find meaning through connection with the wildlife and the wider natural world. Although Curtin did not label these experiences as contributing to spiritual well-being, such descriptions are in keeping with our dimensions that make up spiritual outcomes.

Mitchell’s (2016) study of national public parks in the USA illustrates how, through park design and viewpoint placements, people can experience such moments of awe, humility and wonder before scenes of natural grandeur that visitors label as ‘spiritual’. A former director of the US National Park Service called these parks an “investment in the physical, mental, and spiritual well-being of Americans as individuals” (quoted in Mitchell 2016, p. 34), and spiritual well-being has been identified as both a reason for and an important benefit of visiting protected areas in Canada (Lemieux et al. 2012). Given that such places can contribute to conservation of biodiversity, they are examples of how experiences of biodiversity can contribute to spiritual well-being.

10.3.4.2 Heintzman’s Model Connecting Nature-Based Recreation and Spirituality

Drawing together qualitative and quantitative research on nature-based recreation and spirituality, Heintzman (2000, 2002, 2009, 2016; Heintzman and Mannell 2003) has identified four elements that contribute to this relationship. These include: antecedent conditions, setting components, recreation components and spiritual outcomes (Box 10.2). The spiritual outcomes are parsed into three aspects: spiritual

Box 10.2: Elements of Nature-Based Recreation and Spirituality (Heintzman 2009, 2016)

Antecedent Conditions: Person-related factors; things people bring to their outdoor recreation experience, e.g.

- Personal history (e.g. previous experiences in nature; previous spiritual experiences)
- Current circumstances (e.g. present-day issues and events)
- Motivation (e.g. seeking or escaping spiritual experience)
- Socio-demographic (e.g. gender, age, income)
- Spiritual tradition and background (e.g. religion)

Setting Components:

- Nature (e.g. wilderness)
- Being away, i.e. physically being away from one's day-to-day setting and constraints
- Place processes (e.g. emotional attachment)

Recreation Components:

- Activity, i.e. type of and challenge associated with the recreational activity (e.g. canoeing, hiking)
- Free time, i.e. availability of unstructured time
- Solitude, i.e. being alone
- Group experiences (e.g. discussion, group effort)
- Facilitation

Spiritual Outcomes:

- Spiritual experience (e.g. awe, wonder, connectedness, heightened senses, inner calm, peace, happiness, joy, elatedness)
- Spiritual well-being (Hawks 1994)
 - Internal Aspects (e.g. sense of purpose/meaning; oneness with nature; connectedness with others; commitment to something greater than self; sense of wholeness in life; strong beliefs, principles, ethics and values that may or may not be grounded in a specific religion; feelings of love, joy, peace, hope, fulfilment)
 - External Manifestation
 - Interaction with others is characterised by, e.g., trust, honesty, integrity, altruism, compassion, service
 - Regular community or personal relationship with a higher power or larger reality that transcends observable physical reality
- Spiritual coping: i.e. “ways that people receive help from spiritual resources (e.g. higher power, spiritual practices, faith community) during periods of life stress” (Heintzman 2009, p. 84).

experience – considered a short-term outcome; spiritual well-being, something that occurs over the longer term; and the use of leisure for coping with issues (e.g. job change, cancer) that can raise spiritual questions (e.g. meaning of life). Spiritual well-being is delineated in terms of Hawks' (1994) interpretation, which distinguishes between the internal experience and the outward manifestation of spiritual well-being (see Box 10.2).

10.3.4.3 Setting Component

In terms of our interest in the biodiversity-spiritual well-being relationship, the setting component of Heintzman's model is perhaps most relevant. Heintzman's (2009) discussion of why the natural dimension of nature-based recreation might contribute to spiritual-focused outcomes specifically highlights extent and fascination as relevant qualities, two characteristics of a restorative environment (e.g. Kaplan, S. 1995; see Marselle 2018). As Heintzman (2009) describes it:

...nature settings are characterized by extent (i.e., natural ecosystems provide rich settings that captivate, foster exploration and connect people to a larger world). Second, nature settings allow for soft fascination or attention, which suggests that natural features (e.g. sunsets, clouds, mountain vistas) can be observed effortlessly leaving opportunity for reflection on spiritual matters. (p. 78)

The restorative environment features of 'being away' and 'compatibility' (Kaplan, S. 1995; see Marselle 2018) are also present in Heintzman's model. 'Being away' is embedded in the setting element; for many, being in nature is a physical change in location and a removal from everyday routine and responsibilities, which has been found to facilitate spiritual outcomes (e.g. Ellard et al. 2009, as cited in Heintzman 2009). Compatibility – the degree of 'fit' or congruence between an environment and one's purposes, inclinations or reasons for being there – is implicitly present in Heintzman's (2002, 2009) discussion of the setting. He more explicitly argues that the activity itself can be compatible – or not – with fostering spiritual well-being.

Biodiversity, e.g. richness of species, is hypothesised as something that could contribute to the fascination quality of a restorative environment (Ulrich 1983; see Marselle 2018). It could also contribute to a conceptual sense of 'being away', an additional dimension of this restorative environment feature (Kaplan, S. 1995). As Goodenough (1998) argues and Curtin (2009) illustrates empirically, biodiversity can inspire spiritual feelings of humility, communion, awe, wonder and inter-relatedness with nature. Goodenough suggests that: "The outpouring of biological diversity calls us to marvel at its fecundity. It also calls us to stand before its presence with deep, abiding humility" that she likens to religious reverence (1998, p. 86).

The empirical research into the spiritual dimension of outdoor recreation is primarily qualitative and largely situated in wilderness within the USA (e.g. Fredrickson and Anderson 1999; Kaplan, R. and Kaplan 1989), Australia (e.g. Williams and

Box 10.3: Stargazing as a Spiritual Experience (Bell et al. 2014)

Bell et al.'s (2014) mixed methods study explored the well-being effects of stargazing – an intentional nature-interaction activity (Keniger et al. 2013) or, as per Price's (1996) typology, an observational recreation activity. Nature connectedness (Mayer and Frantz 2004) was found to be higher among individuals who had been stargazing for more years and for those who reported seeing wildlife, such as birds and bat species along with other nocturnal ground-dwelling wildlife (e.g. foxes, badgers, hedgehogs), when stargazing.

In response to open-ended questions, participants reported experiencing spiritual aspects of well-being, with comments reflecting the spiritual or transcendent aspect of stargazing. Some comments reflected a consideration of one's place in the universe, including: "The sense of crushing smallness compared to the universe one feels" and "Realizing how small we are." Others identified "the peace and the intrigue" and "the beauty" of the experience. Some participants mentioned regular occurrence of emotions such as awe and wonder whilst stargazing. One individual stated "I feel in awe of nature and the natural world... A sense of wonder at it all!" whilst another reported "It relaxes me and reminds me of how precious life is...". Emotions of awe and wonder, peaceful feelings, and greater connectedness echo Heintzman's (2009, 2016) description of spiritual experiences, which, though short-term, may contribute to longer-term spiritual well-being.

Harvey 2001), New Zealand (Schmidt and Little 2007) and Canada (e.g. Heintzman 2012) thus representing specific environmental and socio-cultural contexts. Some exceptions are studies of recreational use of urban parks in the Netherlands (Chiesura 2004) and the UK (Irvine et al. 2013), and several studies of gardens as spaces for leisure amongst individuals experiencing life challenges such as a health crisis or loss of a loved one in the UK (Milligan et al. 2004), the USA (Heliker et al. 2000; Infantino 2004/2005) and Canada (Unruh and Hutchinson 2011). Bell et al. (2014) provide an example of the spiritual experiences associated with stargazing (Box 10.3).

Few studies directly examine the specific environmental elements of the setting that might contribute to spiritual outcomes. Williams and Harvey's (2001) questionnaire-based study of forests in Victoria, Australia is one exception; they sought to identify how different qualities of forests might influence such experiences. People who visit, live or work in forests associate spiritual feelings of insignificance and humility with forests that contain compelling features or powerful symbols of the natural environment, such as tall trees, extensive views or high waterfalls. By contrast, settings that were more open in character fostered what the authors described as a "deep flow" experience, e.g. feelings of connectedness and belonging.

A recent US-based study by Joye and Bolderdijk (2015) sought to experimentally test these effects. Using a between-subject design, participants viewed one of three slideshows online: extraordinary nature (e.g. dramatic mountains, landscapes dominated by phenomena such as sunsets, thunderstorms), mundane nature (e.g. lawns, foliage) or neutral (e.g. everyday objects such as a chair). Those who viewed the extraordinary nature images experienced greater levels of awe, fear and smallness compared to the other two conditions. Participants in both nature conditions felt more spiritual, caring and connected to others; those who viewed extraordinary nature scenes felt more ‘other’ oriented (as measured by social values orientation).

10.3.4.4 Parallel Measurement of Biodiversity and Spiritual Well-Being

The previous Sects. (10.3.4.1, 10.3.4.2 and 10.3.4.3) detail studies that do not explicitly incorporate measures of biodiversity. Two interdisciplinary mixed methods field-based studies of urban public parks in the UK, utilising ecological surveys alongside quantitative and qualitative social science methods, provide further insight into how biodiversity might relate to spiritual well-being (Fuller et al. 2007; Dallimer et al. 2012). Ecological surveys assessed species richness of plants, birds and butterflies (direct measures of biodiversity) along with diversity of habitats and tree cover (proxy measures of biodiversity). Self-report questionnaires conducted with users of the same study sites during the period of ecological sampling explored motivations for park use and well-being benefits. Well-being measures included place attachment, place identity and reflection, the former two are related to place processes (Altman and Low 1992; Twigger-Ross and Uzzell 1996) and the latter, interpreted as the ability to think about things (e.g. personal matters) and gain perspective (e.g. on life), a dimension of attention restoration theory (Kaplan, S. 1995; see Marselle 2018). Fuller et al. (2007) reported positive associations between tree species richness, habitat diversity and both reflection and place identity; bird species richness was positively associated with attachment. Dallimer et al. (2012) found that all aspects of well-being had positive associations with bird species richness and tree cover but a negative association with plant species richness.

These findings are suggestive that greater diversity could contribute to place processes and restoration. While these are not conceptually considered spiritual outcomes (see Table 10.1), they could be considered a mechanism through which spiritual well-being might be achieved. For example, given the centrality of meaning and purpose in definitions of spiritual well-being, having opportunities to “reflect on one’s life, on one’s priorities and possibilities, on one’s actions and one’s goals” can be considered a deeply restorative experience (Kaplan, R. and Kaplan 1989, p. 197). Indeed, as J.W. Fisher, Francis and Johnson (2000) argue, the “personal domain – wherein one intra-relates with oneself with regards to meaning, purpose and values in life” (p. 135) is an important component of spiritual well-being.

Irvine et al.’s (2013) qualitative analysis of open-ended responses from Fuller et al.’s (2007) park users, as to why they were using the park and how they felt after being there, identified numerous statements reflective of features of spiritual well-

being. While motivations largely fell within the physical health domain (e.g. walk, eat) and nature-focused reasons (e.g. fresh air), a small number of comments can be considered as factors that might facilitate achieving spiritual well-being: wanting to think; wanting to take a break; the peace and quiet of the place. Spiritual well-being was identified as one of the effects of being in the park. This was expressed in terms of a sense of calm, peace, being at ease, feeling tranquil, serene and quiet. A second theme included feeling a connection to nature, a sense of being part of a larger reality.

In light of these qualitative findings, it is instructive to examine the closed-ended statements that formed the reflection measure in Fuller et al. (2007) and Dallimer et al. (2012). Fuller et al. (2007 [data supplement]) included the statement “being here makes me feel more connected to nature”, found within discussion and definitions of spiritual well-being. In Dallimer et al. (2012 [Supplementary Data]), the items “I feel peaceful”, “I feel part of something that is greater than myself” and “I do not feel calm” were added in an effort to further explore spiritual outcomes. Future studies could usefully expand the reflection measure and develop appropriate close-ended statements, drawing from qualitative insight, to measure spiritual well-being.

In summary, few studies directly investigated biodiversity’s effect on spiritual well-being. Literature on wilderness-based recreation provides some insight into the potential contribution that biodiverse settings could make to spiritual well-being. Fuller et al.’s (2007), Dallimer et al.’s (2012) and Irvine et al.’s (2013) socio-ecological studies identify outcomes (e.g. reflection, place processes) that could act as mediators for the effect of biodiversity on spiritual well-being outcomes and provide insight into quantitative measure construction for future studies. Heintzman (2009, 2016) provides one of the few conceptual models that specifically explores relationships between nature settings, recreational interaction and spiritual well-being.

10.4 Discussion

In this chapter we have sought to provide insight into the spiritual dimension of human health and explore its relationship with biodiversity. The body of literature identified contained few empirical studies that directly assessed the effects of biodiversity on spiritual well-being. The literature does, however, paint a holistic account of the wider suite of connections with respect to the interplay between biodiversity and spiritual well-being. We considered these connections in terms of four narratives which focused on the influence of spiritual traditions on biodiversity, sacred places as repositories for biodiversity, the spiritual domain within ecosystem services and the effects of biodiversity on spiritual well-being. Here we consider how one might parse these relationships for research investigation, measurement issues related to both spiritual well-being and biodiversity, and potential future directions.

10.4.1 *Conceptualising Relationships*

Our review has stimulated an awareness of the challenges inherent in understanding these aspects of nature and human health. We began with a simple model (Fig. 10.1) of the overlapping relationship between spiritual well-being and spiritual beliefs and considered how these constructs might relate to behaviour, nature and biodiversity.

There is suggestive, but not robust, evidence about specific elements of nature, including biodiversity, that appear to contribute to spiritual outcomes or to potential mediators for the relationship. Species diversity (trees/birds), habitat diversity and tree cover are associated with place processes and reflection; the same parks provided tranquility and connection with nature. Extraordinary nature, with beauty and grandeur, such as mountains, sunsets or big waterfalls, are associated with awe, humility and inspiration. Wilderness contributes to a sense of solitude, timelessness, transcendence, putting people in touch with the divine and experiencing serenity or harmony. Open nature scenes are associated with feelings of deep flow, wholeness and belonging, while ordinary nature, such as lawns or parks, tends one towards spiritual caring and connections to others. These findings highlight a need to measure both biodiversity and the composite type of environment of interest.

Another challenge uncovered is the lack of clarity as to whether or how spiritual well-being is different from spirituality/spiritual beliefs. Some conceptualise differences; some overlap or conflate them. Table 10.1 synthesised elements from across these concepts, structured by four relational aspects of spiritual well-being, i.e. relation with self, community, the environment and transcendent Other(s), that create wholeness.

What is clear is the fundamental and growing intersection of spiritual beliefs with the natural environment, whether among indigenous groups, world religions or new eco-spiritual practices. These beliefs and values are associated with actions or practices that may preserve biodiversity, a link noted in many models of environmental behaviour (e.g. Stern 2000). Additionally, such beliefs and values may predispose one to experience spiritual well-being within nature. Incorporating both spiritual beliefs and spiritual well-being measures will thus be important.

An overarching challenge is how to parse relationships between spiritual beliefs/well-being and nature/biodiversity. Studies investigating nature and spiritual well-being are largely qualitative; few account for the biodiversity of the setting. The evidence is almost exclusively correlational, which leads to a circularity of associative relationships, and causality is difficult, if not impossible, to ascribe. A way forward is to take what we have learned here and map it onto existing causal models of how nature may affect human health and well-being. In Fig. 10.2 we propose such a model. Structured using the four relational elements of spiritual well-being, it overlays Heintzman's nature-spirituality model (Box 10.2) onto Hartig et al.'s (2014) nature-health model while also incorporating insights from others (Irvine et al. 2013; Marselle et al. 2016; Shanahan et al. 2016; Yeh et al. 2016). This model is framed in terms of public health notions of an exposure (that affects health) and

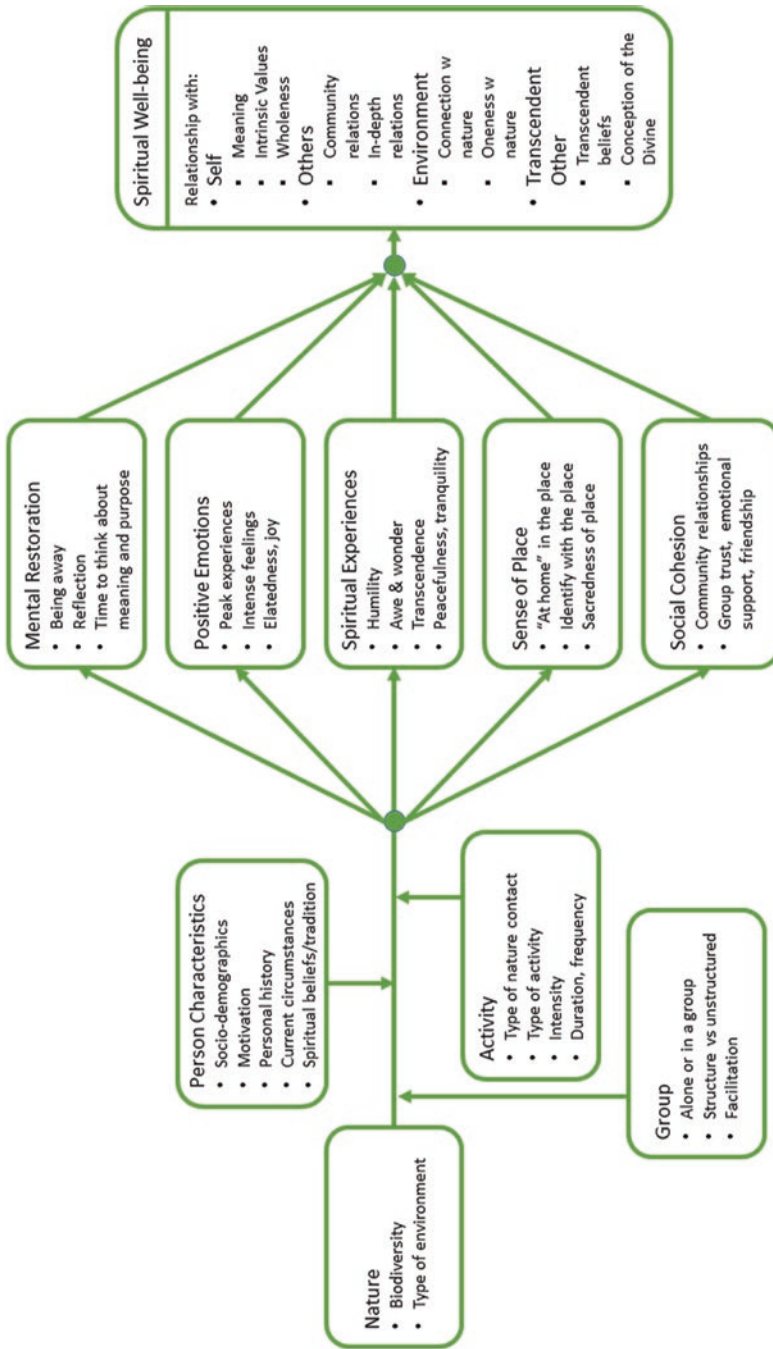


Fig. 10.2 Conceptual model of aspects to consider measuring and their relationships in order to assess the effects of biodiversity on spiritual well-being (developed from Irvine et al. 2013; Fisher, J. 2011; Hartig et al. 2014; Heintzman 2009, 2016; Marselle et al. 2016; Shanahan et al. 2016; Yeh et al. 2016). The model includes the exposure of interest (nature), potential moderators of effects (personal characteristics, activity and group processes), possible mediators (mental, emotional, spiritual, place and social) and the outcome of interest, spiritual well-being (see also Table 10.1). (Illustration by SL Warber and KN Irvine)

takes the positivist stance that we can quantitatively measure exposure, moderators, mediators and outcomes in meaningful ways. Below we explain our decision-making in the development of the model.

Exposure: Nature – The exposure of interest is the natural environment, particularly as measured by biodiversity. The literature reinforces the need to also consider the composite type of environment (see Marselle et al. 2013).

Moderators: Personal Characteristics, Activity, Group – The effects of any exposure or intervention will necessarily be moderated by the antecedent factors that the unique individuals bring to the situation. Socio-demographics are a well-known example in health literature, but Heintzman (2009, 2016) identifies additional features that are relevant for spiritual outcomes, including motivation, history, current circumstances and spiritual beliefs/traditions. Heintzman (2009, 2016) and Yeh et al. (2016), respectively writing in the leisure studies and sports medicine literature, identify various elements of the activity in nature as an important part of the exposure that will impact health. Additionally, Heintzman recognises that being alone or with a group, whether the group is structured or unstructured, and the type of group facilitation has a further impact on whether or not spiritual experiences are appreciated. Other authors have highlighted the importance of intensity, duration and frequency of a nature-based activity as being of relevance (e.g. Marselle et al. 2016).

Mediators/Pathways: Mental, Emotional, Spiritual, Place, Social – Hartig et al. (2014) posited several mediators or pathways through which nature might affect health. Based on the literature around spiritual well-being as an outcome, we have made modifications to their model: excluding physical activity and air quality; parsing stress into subcomponents of mental restoration and positive emotions. This latter change enables greater specificity in accommodating aspects of the nature experience associated with spiritual well-being. Heintzman (2009) proposes spiritual experiences as a short-term outcome, but other authors suggest that these experiences are what produce spiritual well-being which has informed our placement of spiritual experiences as a mediator. Heintzman also identifies place processes as important; here we subsume them under sense of place, including identification with, and attachment to, special places but also the sacred dimension of place that is clearly relevant (see Sects. 10.3.1 and 10.3.2). Social aspects of nature experiences have also been recognised as important by many authors, however measurement of relevant constructs is complicated. Heintzman's description of the literature and others' qualitative findings suggest that social cohesion is potentially critical for the development of spiritual well-being.

Outcome: Spiritual Well-being – Here we follow the synthesis presented in Sect. 10.2 and Table 10.1 that someone who has spiritual well-being has significant beneficial relationships with self, others, the environment and some type of transcendent Other(s) that confer wholeness. In Fig. 10.2 we identify possible constructs to measure as part of spiritual well-being.

In putting forth this model, we recognise that others may suggest placement of various constructs in different positions. We emphasise, however, that this model is a set of hypotheses to be tested. We also recognise that testing them all in one study

is unlikely to be feasible; researchers will necessarily need to choose pieces of the model to investigate and may test various constructs as moderators, mediators or short-term outcomes.

10.4.2 Measurement of Key Constructs

Figure 10.2 provides insight into important elements and relationships of biodiversity and spiritual well-being. Here we consider the measurement of the two key constructs.

10.4.2.1 Spiritual Well-Being

Measurement of spiritual well-being has proved challenging and may be seen as aiming to “measure the immeasurable” (Moberg 2010, p. 99). Although few spiritual well-being measures have been applied in nature-health research, more than 300 scales to measure spiritual well-being, spirituality or similar constructs have been developed (see Fisher, J.W. 2015). The majority utilise closed-ended Likert scale measurements (e.g. Delaney 2005; Ellison, C. 1983; Elkins et al. 1988; Reker 2003) and often concentrate on specific aspects of spiritual well-being such as existential well-being (life meaning, purpose, values) or religious well-being (relationship with higher power) (see, e.g., Ellison, L. 2006; Peterman et al. 2002). In health-care settings, existential well-being, but not religious well-being, has been predictive of better quality of life, mental health or physical health (e.g. Edmondson et al. 2008). Spiritual well-being scales also have been critiqued for an overreliance on correlates of traditional Western religiosity, such as institutional affiliation and belief in God or a higher power (e.g. Klein et al. 2016). Such faith- or religious-focused content may alienate individuals who experience spiritual well-being but do not think of themselves as religious (Moreira-Almeida and Koenig 2006). Spiritual beliefs and well-being are culturally specific and need to be measured using language and ideas that fit the particular group of respondents under study. For example, Dominguez et al. (2010) created a Saint’s Belief Index to explore the association of traditional beliefs in local Islamic Saints and new agro-pastoral practices that had previously been linked to biodiversity loss.

Few existing scales cover our four relational domains of spiritual well-being (see Table 10.1) evenly, with the relationship to the environment or to community often neglected. However, researchers have utilised qualitative methods effectively to explore the meanings and lived experience behind the concept of spiritual well-being and its presence in and through interaction with the natural environment (e.g. Bell-Williams 2016; Fredrickson and Anderson, 1999; Unruh and Hutchinson 2011). We favour measuring J. Fisher’s (2011) four domains of spiritual well-being as the outcome of interest in studies of the effects of being in/living with biodiverse, extraordinary and ordinary nature, because of the explicit inclusion of the domains

of relationship to environment and community. J. Fisher has published several scales that may be useful. For example, in the Spiritual Health and Life Orientation Measure (SHALOM)-generic (Fisher, J.W. 2014) participants select language for the ‘transcendent Other(s)’ to fit their own beliefs. This scale has been administered worldwide with adults. Similar scales for secondary school students (Gomez and Fisher 2003) and primary school children (Fisher, J. 2004) are also available.

10.4.2.2 Measuring Biodiversity

Appropriate measures of biodiversity also need to be incorporated into studies that purport to examine how biodiversity affects spiritual well-being. In our review, we encountered several approaches including field-based assessment (e.g. surveying species richness or abundance), use of secondary data (e.g. GIS) and categorisation of natural setting (e.g. wilderness). Within the field of ecology, numerous types of counts can be made. Dallimer et al. (2012) suggest that the number of animals or plants (i.e. species abundance) may be easiest for humans to recognise as representative of biodiversity. Other aspects of biological complexity which may be important to consider include species composition, functional organisation, relative abundance and species numbers (see also de Vries & Snep 2018; Marselle et al. 2018).

10.4.3 Future Directions for Research on Biodiversity’s Effect on Spiritual Well-Being

There are continuous calls for upping the science bar, hence the examination here of how the relationship between nature (biodiversity) and health/well-being (spiritual) has been investigated in the literature. As noted in Sect. 10.4.1 and by others (Lovell et al. 2014; Marselle et al. 2018), most studies are cross-sectional and yield only associative results. We recommend taking a public health perspective and selecting research designs to more clearly investigate causal relationships. We would argue that activities in nature constitute complex interventions or exposures, including physical activity and group organisational effects, and recommend following suggestions about how to think about such interventions (Clark 2013) and the UK Medical Research Council guidance on how to study them (Craig et al. 2008). There is also a need for mixed methods research that integrates findings from qualitative and quantitative research methods (Fetters et al. 2013) to unpack the various components of both exposures and outcomes. Quantitative study designs could be improved by using natural experiments, quasi-experimental and before-and-after repeated measures designs as well as long-term longitudinal studies. Complex analyses are also needed, for example, structural equation modelling that allows identification of significant pathways or analyses that test various constructs as moderators,

mediators or outcomes (see also commentary in Sect. 10.4.1). Given the complexity of both nature and health, illuminating research will necessitate interdisciplinary teams comfortably working across epistemologies (Diaz et al. 2018) and able to work with community groups and policy-makers to gather relevant data (CBD 2017c).

10.5 Implications and Conclusions

There is increasing international recognition of the role of biodiversity in human health and the relevance of considering the spiritual domain. Using a broad set of search terms, we identified an extensive body of scholarship that could provide important insights into the complexity of the relationship between biodiversity and spiritual well-being. We have identified and explained four themes from this literature: (i) influence of spiritual traditions on biodiversity; (ii) sacred places as repositories of biodiversity; (iii) the spiritual domain of ecosystem services; and (iv) effects of biodiversity on spiritual well-being. We have brought these strands together into a conceptual model and discussion of measurement issues that can inform future research. Research into spiritual well-being benefits from the natural environment needs to incorporate more detailed assessments of the environment, such as measures of biodiversity. The identified sacred places literature primarily focuses on measuring biodiversity; adding culturally-appropriate measures of spiritual well-being into these studies would address calls for interdisciplinary work and would help fill the gap of evidence on biodiversity and spiritual well-being. Within the ecosystem services rhetoric, the spiritual domain seems to be largely associated with indigenous peoples who hold monistic worldviews. Yet there are important emerging spiritualities as well as existing world religions that also have sacred beliefs about the importance of the natural environment. We need to embrace these as well. Additionally, given the availability of spiritual well-being scales that consider the relationship with the environment, these could be incorporated into research.

Lastly, we come to the question of ‘so what’? The non-communicable diseases that the world currently faces – obesity, heart disease, depression – would suggest a need to focus on physical and mental well-being, thus raising the question of what an understanding of biodiversity and spiritual well-being would bring to such discussions. Yet the literature identified through our review, in particular the qualitative studies, illustrates an important additional dimension that can answer the question posed by E.O. Wilson in 1993 of “what service [do species bring] to the human spirit?” (p. 37). Given the role of biodiversity in health and the numerous ways in which biodiversity is related to spiritual well-being, the spiritual domain is clearly an important aspect of how nature influences us. Perhaps it is time to embrace this ethereal, enigmatic aspect of human culture and bring it into the mutually beneficial service of biodiversity conservation.

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