




Research

Exploring evolving spiritual values of forests in Europe and Asia: a transition hypothesis toward re-spiritualizing forests

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ABSTRACT. The development of societies, including spiritual development, is closely connected to forests. The larger interrelations among changing societies, transforming forest landscapes, and evolving spiritual values related to forests have yet to be extensively considered. Addressing this research gap is important to avoid the neglect of spiritual values in forest policy and management. Our exploratory study investigates spiritual values of forests from European and Asian perspectives, assessing 13 countries. Based on expert knowledge from 18 interdisciplinary experts, we first define forest spiritual values (forest spirituality). We then elaborate on the idea that forest spirituality evolves as societies and landscapes change, and propose a transition hypothesis for forest spirituality. We identify indicators and drivers and portray four stages of such a transition using country-specific examples. We find that during a first stage (“nature is powerful”), forest spirituality is omnipresent through the abundance of sacred natural sites and practices of people who often directly depend on forests for their livelihoods. An alternative form of spirituality is observed in the second stage (“taming of nature”). Connected to increasing transformation of forest landscapes and intensifying land-use practices, “modern” religions guide human–nature interrelations. In a third stage (“rational management of nature”), forest spirituality is overshadowed by planned rational forest management transforming forests into commodities for the economy, often focusing on provisioning ecosystem services. During a fourth stage (“reconnecting with nature”), a revival of forest spirituality (re-spiritualization) can be observed due to factors such as urbanization and individualizing spirituality. Our core contribution is in showing the connections among changing forest perceptions, changing land-use governance and practices, and changing forest spirituality. Increasing the understanding of this relationship holds promise for supporting forest policy-making and management in addressing trade-offs between spiritual values and other aspects of forests.

Key Words: *cultural ecosystem services; relational values; sacred forests; spiritual values of forests; spirituality; transition hypothesis*

INTRODUCTION

Humans have a close relationship with nature and perpetually depend on its ecosystem services. The emergence of nature-based belief systems, sacred forests, and reference to trees and forests in mythology and folklore are manifestations of the spiritual connectedness humans have with nature (Aubert et al. 2019, Farcy et al. 2019a, Studley 2019). Furthermore, societal development is closely related to the use of forests, including the manifold services they provide; societies and the natural environment shape each other, sometimes to the point of a mutual dependence (Ritter and Dakusta 2006, Ingold 2011). Human-forest interrelations over time can be characterized as a “co-evolution” process (Winkel et al. 2019), shaping societal perceptions and values attached to forests. These perceptions and values are often locally specific and dependent on cultural contexts (Konczal 2013).

Despite the fundamental role of forests in human development, the link between changing societies (that transform forest

landscapes and their management) and the dynamics of forest spirituality (i.e., spiritual values of forests) has not been sufficiently addressed in the existing literature (de Pater et al. 2021). The intangible nature and murky boundaries of spiritual values tend to prevent a rational analysis because “spirituality” is perceived as a supernatural, abstract phenomenon (Schroeder 1992). Furthermore, spiritual values are difficult to measure (i.e., rationalize), to govern (i.e., institutionalize), and to price (i.e., monetize). These difficulties may explain why forest scientists, experts, and policy makers have been cautious to address spiritual values explicitly. Beyond sacred natural sites (e.g., Bhagwat and Rutte 2006, Rutte 2011, Stara et al. 2015a, Plieninger et al. 2020), forest spirituality is poorly studied (Schroeder 1992, Ritter and Dauksta 2006). Consequently, it remains largely unexplored how spiritual values of forests have evolved over time, what drives change in forest spirituality, how studying forest spiritual values can improve the understanding of cultural and political meanings

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attached to forests, and how the answers might aid in the management of related conflicts (see also Cooper et al. 2016). The latter question holds specific promise because forest spirituality could play an important role in nature and landscape conservation (Hernández-Morcillo et al. 2013, Agnoletti and Santoro 2015, de Pater et al. 2021, Shakeri et al. 2021). Reflecting the significance of spirituality in the governance and management of natural resources could improve societal support for related policies and decision-making (McElwee et al. 2022, see also Daniel et al. 2012, Verschuuren and Brown 2019).

Our aims here are: (1) to clarify the meaning of spiritual values of forests, and (2) to trace the evolution of forest spirituality over time in different contexts in an exploratory way. We take a broad perspective across several countries, focusing on Europe and Asia to explore similarities and overarching trends, but also to elicit country specifics of forest spirituality. We begin by defining “forest spiritual values”. We then assess these values from selected perspectives and elaborate on the idea that forest spirituality evolves over time. This transition can be recognized through certain indicators, which we aim to identify. We then explore which drivers bring about the transition of spiritual values. Finally, we elaborate on the transition of spiritual values of forests on an aggregated level, identify and describe four stages of such a transition, and test the indicators and drivers using country-specific examples. We conclude with a forest spirituality transition hypothesis, the idea of re-spiritualization of the forest, drawing analogies between our hypothesis and the nature-culture dichotomy as well as Mather’s (1992) forest transition theory.

THEORETICAL BACKGROUND AND ASSUMPTIONS

Defining spiritual values of forests

Previous works and assessments have defined spiritual values varyingly. The Millennium Ecosystem Assessment (2005:457) describes spiritual values as “sacred, religious, or other forms of spiritual inspiration derived from ecosystem services.” Klain et al. (2014:312) understand “spiritual” as being “related to metaphysical forces that exist beyond the individual.” Ritter and Dakusta (2006) describe the spiritual functions of forests as abstract values related to forests and trees: spiritual and historical connections between culture, religion, and forests and their elements. The Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services, in its explanation of nature’s contributions to people, refers to the “symbolic relationships with natural entities to the extent that such relationships are inextricably linked to people’s sense of identity and spirituality” (Pascual et al. 2017:11). In these definitions and explanations, the interlinked character of nature, culture, and spirituality becomes apparent. Spiritual values are intermingled with cultural values and hence have different meanings and expressions across cultures (Daniel et al. 2012).

Although spirituality and religion are intertwined, spiritual values are not restricted to religion. For the purposes of our work, without attempting to define the concept, we follow a rather narrow view of “religion” as a cultural system of behaviors, practices, and ethics based on the belief in the existence of god (s) or deities and/or the teachings of a spiritual leader. It is often closely related to the divine. Spirituality is neither equivalent nor an alternative to religion, but rather, the two concepts partly overlap (Ammerman 2013). Spirituality can include religion but

goes beyond it to include “non-religious” spirituality. In secularized cultures, nature is often described as the place where spirituality is experienced by people without religious ties (Williams and Harvey 2001, Verschuuren et al. 2010, Clark 2011). Nature thus provides a place where people can experience spiritual enrichment, or a feeling of reverence, not necessarily linked to religion (Williams and Harvey 2001, Cooper 2016).

Spiritual values of forests are experienced through different practices. They become obvious, for instance, through nature-based belief systems. However, spiritual values can also be expressed indirectly through other cultural practices (Fish et al. 2016, de Pater et al. 2021) such as hunting rituals and festivals (e.g., St. Hubert festival), or individual practices such as experiencing serenity and awe while walking in the forest (Chan et al. 2012a, Cooper 2016, Cooper et al. 2016). This idea implies a difference between what people feel and what people do (Fish et al. 2016). The focus should be placed on what is felt or meant through the practice, rather than the action itself (see also Gilchrist 2020).

We suggest the following working definition: spiritual values of forests refer to the subjective significance an individual or community attaches to the intangible or metaphysical experience of connecting their beliefs, emotions, identity, and cultural heritage with forests and trees. According to Brown and Verschuuren (2019:6), significance “encompasses not only values but also knowledge, meanings, feelings, and associations of and with nature.” Significance thus goes beyond the experience and can lead to further actions, ritually, socially, and ecologically.

Clark (2011) suggests four broad categories of spiritual values of forests:

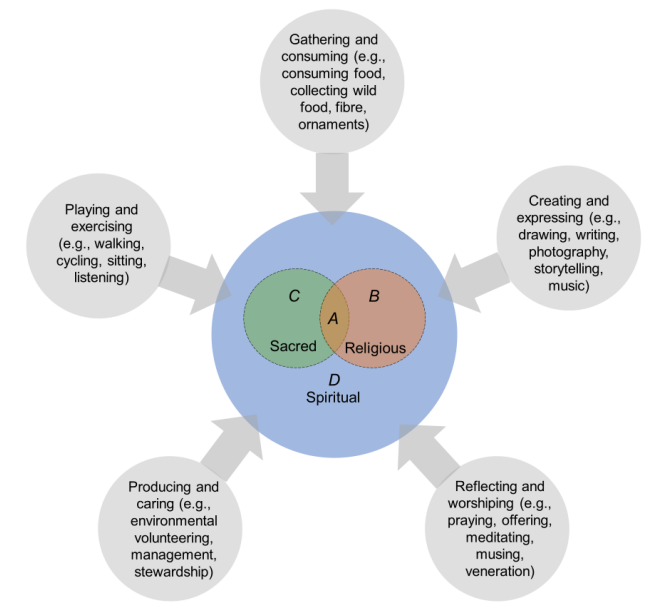
1. Intrinsically sacred forests: trees or forests believed to host deities or spirits. We include trees or forests that are themselves divine (e.g., sacred groves in India, ancient Italy, and Greece);
2. Associated sacred forests: forests that have significance due to spiritual history, ritual, or culture, such as forests surrounding churches, temples, monasteries, or places of cultural significance (e.g., trees surrounding burial grounds, Shinto shrines, or trees connected to saints in Islam and Christianity);
3. Forests as the work of a creator and reflection of its work: nature as a creation of god(s) and a gift to humans, or as a significant part of religion. Some religions believe that humans have the responsibility to protect, respect, and care for nature as stewards while they are entitled to use nature; e.g., Christianity and Judaism (Genesis 1:28 “Be fruitful and multiply, fill the earth and subdue it, and have dominion over the fish of the sea, and over the birds of the sky, and over every living thing that moves upon the earth”) and Islam (Qur-ân 35:39 “[Allah] is the One that has made you inheritors in the Earth”);
4. Forests as a place to find spiritual renewal and experience transcendence: nature providing solitude and peace to connect with oneself and/or something greater. This category could overlap with the previous ones if the individual is religious but could also be experienced by a non-religious individual.

Building on Clark’s (2011) categories, we suggest that forest spirituality consists of three non-exclusive, interlinked spheres. In

the narrowest sense, forest spirituality refers to the overlap of sacredness and religion, thus sacredness in a religious sense (Clark’s category 1 or 2; Fig. 1A). “Sacred” is understood as something to be regarded with reverence, deserving respect. An example would be a sacred tree or forest dedicated to a deity. Broadening the scope, spiritual significance of forests through a religious lens is included, referring not to sacred areas per se but where one becomes aware of a god through nature or acts as a steward of nature as a religious duty (Clark’s category 3; Fig. 1B). Another dimension refers to the spiritual value of forests through sacredness detached from religion. This dimension could include the associated sacred forest described by Clark’s category 2, e.g., burial grounds or natural sites where human ashes have been deposited (i.e., funeral forests) or places of remembrance commemorating persecutions, genocides, or war (i.e., hallowed ground; Gilchrist 2020; Fig. 1C). Spiritual values in the broadest sense include non-religious, non-sacred encounters with nature as a trigger for transcendence, invigoration, and renewal, e.g., activities such as forest healing or therapy (Clark’s category 4; Fig. 1D).

The spheres of spiritual values are reflected and generated through activities with(in) nature (illustrated with arrows in Fig. 1). These activities can be intrinsically spiritual (e.g., meditating) or even directed at a religion (e.g., praying, offering); however, they can also entail activities beyond the obviously spiritual (e.g.,

Fig. 1. Illustration of the different spheres of spiritual values of forests influenced by various practices. (A) Sacred in a religious sense (e.g., sacred tree dedicated to a deity). (B) Spiritual value in a religious sense, not sacred per se (e.g., managing nature in accordance with religious convictions). (C) Spiritual values of forest through sacredness (non-religious; e.g., funeral forest). (D) Non-religious, non-sacred spiritual experience in, with, or through forests (e.g., forest healing, spiritual renewal linked to nature). The activities that generate or manifest spiritual values are illustrated with arrows. Categories of activities are adapted from Fish et al. (2016).



walking, land management, consuming food). Categories of activities are adapted from the typology of cultural practices suggested by Fish et al. (2016): playing and exercising, producing and caring, creating and expressing (including performances and participation in customs and rituals that draw from and reflect on nature), and gathering and consuming (including the consumption of non-conversational media). We add a fifth group, reflecting and worshipping, which includes religious and secular activities, in solitude or collectively, such as seeking peace and reverence in nature (thus using nature as the means), plus worshipping nature (nature as the goal).

Evolving spiritual values: relational values as theoretical underpinning

Nature connectedness (or relatedness), as a human attribute, influences the need to visit nature and determines what kind of environment is preferred or suitable. The motive for interacting with nature and the natural characteristics of the environment reciprocally determine the (psychological) effects of nature on the individual. Forest spiritual values, accordingly, result from the exchange between place (nature), human, and the specific engagement (activity), which is based on shared cultural and individual connections (Pascual et al. 2017). The environmental space and cultural practices, perceptions, and values are not detached (e.g., Kovács et al. 2020). Rather, they function as “relational phenomena continually enabling and shaping each other” (Fish et al. 2016:214). Changing perceptions of nature are interconnected with changing attitudes toward forest management and policies, which again transform the landscape and consequently the perceptions of it (e.g., Mather 2001, McElwee et al. 2022).

In line with this thinking, we adopt the view taken in recent literature that spiritual values are relational values (Himes and Muraca 2018). Relational values “do not directly emanate from nature but are derived of our relationships with it and our responsibilities towards it” (Pascual et al. 2017:11). Forest spirituality is thus rooted in the relationship people have with nature and among people through or within nature. These values are closely connected to human interests, needs, and preferences, as people’s interactions with an environment through practices co-create these values (Chan et al. 2012b, Fish et al. 2016, Himes and Muraca 2018, Schröter et al. 2020). Changing one of the entities (place, practice, or cultural or individual conviction) affects the spiritual benefit provided by the forest and how it is perceived (valued) by the individual (Kovács et al. 2020, Plieninger et al. 2020). Landscape changes (e.g., re- or deforestation) as well as societal changes (e.g., scientific knowledge replacing traditional knowledge) affect, and hence, shape and interact with spiritual values related to forests (Millennium Ecosystem Assessment 2005), resulting in the idea of co-evolution among those dimensions.

METHODS

This research is based on the expert knowledge of scholars from a variety of countries and is supported by reviews of the respective academic literature (e.g., Fazy et al. 2005). We assess a total of 13 countries: 3 in Asia (India, Iran, and Japan) and 10 in Europe (Austria, Belgium, Czech Republic, Finland, Germany, Greece, Italy, Poland, Spain, and Switzerland). We investigate both European and Asian country perspectives because we have observed a recent trend of forest-related spiritual practices from

Asia being adopted in Europe (such as forest bathing, yoga, and meditation in nature). Hence, we aim to address both “source” and “recipient” regions of this trend. The European countries were selected to represent cultural variations and geographical zones across the continent. The diversity of countries also helps us to cover a wide range of spiritual values across different geographical, environmental, social, economic, and political contexts.

Based on their knowledge and scientific publications on spiritual values of nature and cultural ecosystem services, 18 scholars were invited to a three-day workshop held in Prague, Czech Republic in October 2019. They represent an interdisciplinary selection of scholars from a diversity of backgrounds, both geographically and in research fields, including rural and forest economists, environmental anthropologists, environmental and forest policy scientists, social-ecologists, and forest and environmental management experts. The scholars were asked to complete preparation documents assessing and identifying initial examples of spiritual values of forests in their country of expertise, addressing the social, environmental, economic, and policy aspects regarding forest spirituality. The workshop discussions enhanced the knowledge sharing and understanding of different disciplinary viewpoints (Knol et al. 2010). The examples prepared by the expert participants (Table 1) evoked initial interest and were further expanded during the iterative process.

The idea of a transition of forest spirituality emerged during the workshop and was seen as an inspiring notion to be further investigated. Consequently, we worked on a framework to assess forest spirituality and to substantiate the transition idea. Specifically, we developed a set of indicators to depict how spiritual values have been expressed in societies over time. As a starting point, we used literature on existing indicators for cultural ecosystem services, including Hernández-Morcillo et al. (2013), European Commission, Directorate-General for Environment (2014), and Czúcz et al. (2018), as no literature was available on indicators for spiritual values of forests exclusively. Building on the cultural ecosystem services indicators in the literature relevant to spiritual values, we qualitatively analyzed the workshop documents (preparation documents and workshop minutes) and further developed the set of indicators to observe spiritual values of forests. We then followed a similar process to identify drivers that cause an increase or decrease in the perceptibility of forest spiritual values. The initial drivers were obtained from literature on cultural ecosystem services, including Millennium Ecosystem Assessment (2005), Bell et al. (2007), Pröbstl et al. (2009), and Milcu et al. (2013). We then applied these initial drivers to the workshop documentation to identify drivers of forest spirituality transition. We thematically analyzed the data, enabling us to group the drivers into main categories and subcategories.

Subsequently, an iterative process between the lead author and the contributing scholars was followed to develop the framework further and to reach a common understanding of the different concepts, the proposed framework, and the transition hypothesis (Fazey et al. 2014). Appendix 1 illustrates the methodological path, including the iterative approach

Table 1. Countries examined and examples of forest spirituality as initially identified by experts.

Continent	Country	Initial identified examples of forest spirituality
Asia	India	Sacred groves (Kodagu region in Karnataka State) Legislation protecting sacred groves
	Iran	Sacred groves (Baneh County)
	Japan	Jomon Sugi (Japanese cedar), old trees with holy appearance “Tonari no Totoro”: a film about a mystical forest creature Forests of Shinto shrines and Buddhist temples Shinrin-yoku (forest bathing)
Europe	Austria	“Green Care”: public policy program focusing on forests’ contributions to human health and well-being Funeral forests (and related policy change)
	Belgium	Natural burial grounds Trees connected with Christian practices
	Czech Republic	Pilgrimages to sacred and religious sites in forests St. Hubert hunting celebration Forest cemeteries (e.g., Hradec Králové, Pisek, Zlín, Prague) Forest bathing and therapies
	Finland	Lutheran forest services and ceremonies (e.g., retreats, nature camps, counselling, forest churches) Forest-based psychological therapy Traditional forest cemeteries (Orthodox church in eastern Finland)
	Germany	Funeral forests (e.g., FriedWald, RuheForst) Fairy tales connected to forest spirituality Forest bathing Der Schöpfungspfad: trail connected to Christian beliefs (Eifel Forest)
	Greece	Sacred mountains or forests: ancient (e.g., Mount Olympus) or modern (e.g., Mount Athos and several sacred trees, groves, or forests, for example, in Epirus, Zagori, and Konitsa)
	Italy	Forests related to Christian orders (e.g., Valleombrosa and La Verna Forests, Benedictine and Franciscan monks) Natural park aimed to promote the connection between humans and nature (Oasi Zegna - Bosco del Sorriso)
	Poland	Forest use related to religious practice and spiritual valorization (Tuchola Forest region) Hunting customs and spiritual meaning of forest (St. Hubert festival)
	Spain	National park with a Benedictine monastery (Fragas do Eume)
	Switzerland	Funeral forest (Heavenly Oaks, Lenzia Forest) Hiking trails aimed at spiritual enrichment and human well-being (Seelensteg and Gesundheitspfad in Heiligkreuz in Luzern) Pilgrimage place believed to have magical powers (Glasbrunnen, Bern)

followed. Following the hypothesis that there is an evolution of forest spiritual values over time, we asked experts to test the indicators and drivers critically, reflecting on the transition idea in their respective country cases (Appendix 2), refining and adding further data. We then shared the consolidated framework with the coauthors to debate its accuracy.

DYNAMICS (TRANSITION) OF SPIRITUAL VALUES OF FORESTS

Indicators and drivers of a transition in spiritual values of forests

In this section, we propose a list of indicators (Table 2) and drivers (Table 3) relating to forest spirituality. First, because spiritual

Table 2. Indicators of spiritual values in forests.

Indicator	Description	Example
Sites	Number of identifiable locations used for spiritual purposes	Single protected or monumental trees, sacred groves, shrines, parks, funeral forest sites. For example, sacred oak of Dodona's oracle (ancient Greece), Donar oak (central Europe), Abarkouh cypress and sacred groves (Iran), Shinto Kashima shrine forests (Japan), Govinda sacred groves (Spain)
Visitors to sites	Number of people practicing spiritual values at specific sites or in the forest	Users of funeral forests, people practicing forest bathing, tourists or religious visitors to sacred groves, shrines, or pilgrimages. For example, visitors to Kyoto's Kamigamo Jinja shrine (Japan; Nelson 1996), pilgrimage to Hradisko of St. Clement (Czech Republic), results from national socio-cultural forest monitoring surveys (e.g., WaMos, Switzerland; Bundesamt für Umwelt 2013)
Forest management practices	Directed at or prescribed by spiritual values	Management as prescribed by religious practices. For example, Christian monastic communities such as Franciscan monks (Mallarch et al. 2014) Religious or community organizations determining the use of forests and enforcing their protection based on spiritual values (taboos). For example, sacred groves (India and Iran), management restrictions to sacred places of Sámi people (Finland)
Policy and legislation	Reference to spiritual values, spiritual sites, or spiritual activities, or the use of forests in policy and legislation; easing of prohibiting policies	Policies regulating spiritual aspects of forest and forest management. For example, the Roman "Lex luci Spoletina" and "Lex luci Lucerina"; <i>Wildlife (Protection) Act</i> and <i>Forests Rights Act</i> (India) Austria, Belgium, Czech Republic, Germany, and some cantons in Switzerland amending legislation to allow or no longer prohibit the deposition of human ashes in forests
Economic or business innovations	Paid services delivered directed at spiritual values	Funeral forests, forest bathing, forest therapy (Fraccaroli et al. 2021). For example, FriedWald (Germany), "Green Care" (Austria), "Himmliche Eichen" (Switzerland)
Spiritual activities	Practices and events, not necessarily site specific	Individuals or communities conducting spiritual activities. Festivals, rituals, traditional activities, therapeutic activities. For example, forest bathing, hunting rituals, the Finnish tradition of dedicating trees to the dead ("Karsikko" tree)
Media, art, literature	Reference in media, art, and literature	Blog posts, magazine articles, website articles, or websites dedicated to spiritual values, literature, or art (landscape or visual). For example, Homer's reference to sacred groves in the Iliad, "Sacro Bosco Garden of Bomarzo in Italy.
Research	Scientific studies or papers on spiritual values, activities, or sites in forests	Research on sacred groves (e.g., Bhagwat and Rutte 2006, Benedetti et al. 2021, Shakeri et al. 2021), research on the existence of sacred groves in ancient Greece, initiatives such as International Union for Conservation of Nature's World Commission on Protected Areas Cultural and Spiritual Values Specialist Group, Delos Initiative

values of forests are subjective and often difficult to describe, we use a set of indicators to observe how societies and individuals express the spiritual significance they attach to forests over time, making these values more concrete and visible. Surveying fluctuation in an indicator could assist in observing the transition of spiritual values of forests over time and thus identify trends (e.g., a reduction in sites or a rise in business innovations).

Second, the transition of forest spiritual values is driven by various factors. These drivers have different effects depending on the country context and time; they can hinder or enable spiritual values of forests. The drivers can affect each other and often occur concurrently. Understanding drivers is not only essential for understanding how and why forest spirituality evolves, but also enables us to anticipate change and to identify conditions to give room for forest spirituality to unfold. Overall, we identified 18 drivers (with subdrivers) that can be grouped into five categories following the "STEEP" approach: socio-cultural, technological, economic, environmental and policy-governance (Rounsevell and Harrison 2016; Table 3). An extensive list, including subcategories and further examples, is presented in Appendix 3. Both indicators and drivers are portrayed in more depth while introducing the transition hypothesis.

A transition hypothesis of forest spirituality

We next explore the idea of a transition hypothesis related to forest spirituality. As societies develop from hunter-gatherers toward an agrarian, then industrial, and then the current information society, the respective human-nature relationship changes, and with it, the

spiritual connections to forests. As society's perception of forests evolves, so do its actions toward forests, consequently altering the landscape. Reversely, a changing environment and people's interaction with this environment reciprocally transform society's values of forests. Based on the assessment of our country-specific case studies, we hypothetically structure the resulting transition of forest spirituality into four stages, according to the identification of common patterns in the perception of forests (the dominant value attached to forests) and a related evolution of forest spiritual values. The division of the stages does not necessarily follow a specific timeline (i.e., nonlinear), to avoid limiting the stages to a particular culture, region, or time (see also Farcy et al. 2019a).

Indicators (Table 2) and drivers (Table 3) are incorporated into the four transition stages, using country-specific examples as illustrations. Table 4 and Fig. 2 provide an overview of the transition stages of forest spirituality.

Stage 1: omnipresent forest spirituality: "nature is powerful"

During the first transition stage, the direct human dependence on forests and their ecosystem services is high, and the possibilities to influence their provisioning through land management is still limited (Farcy et al. 2019a). The spiritual connection to forests is strong; at least, it was strong in the investigated countries. Nature (not limited to forests or trees) is the highest power and is often considered sacred. The divine and nature are perceived as identical, natural objects are inspirited, or deities and gods are closely linked to forests and other elements of nature. Animistic

Table 3. Summary of the drivers of the transition of spiritual values of forests.

Category	Driver	Example
Sociocultural	Religion or secularity	Strength of connections between religion and nature ranging from animism to major religions banning nature worshipping; using religion as basis for nature management to science and technology replacing religion in nature use and management; moving away from formalized religions to finding spiritual fulfillment in nature itself
	Socioeconomic situation of society	Socioeconomic dependency on nature compared to other human–nature interconnections; relying on nature for subsistence or economic gains or for spiritual desires (intangible demands), especially in societies where material (tangible) demands are satisfied
	Knowledge systems	Importance of scientific compared to indigenous or local traditional knowledge; formal and informal beliefs and truth claims
	Cultural identity or tradition	Forests as part of the national or regional identity; traditional uses of or visits to forests (recreation, hunting, mushroom picking)
	New attitudes and behavioral change	Lifestyles focusing on physical and mental health and well-being, and the role forests can play in them
	Globalization	Influence of other cultures and spiritual values and practices relating to forests (e.g., <i>Shinrin-yoku</i> forest bathing from Japan, now popular in Europe)
	Urbanization	Disconnection from nature and reduced dependency on nature compared to escaping city life through spiritual fulfillment in nature
Technological	Information society	Access to information (e.g., the benefits of nature or existing spiritual sites or trends) through the Internet and media
	Development	Use of science and technology in forest management and operations, increased possibilities to optimize operations (revenue); demand from society and industry for space, resources, and infrastructure, affecting the natural environment; access to remote or isolated places
Economic	Economic attractiveness of different forest ecosystem services	Spiritual values in forests, and other cultural ecosystem services, revived as an alternative to declining timber production, and vice versa
	Markets (economic diversification)	Societal demand for spiritual values, and willingness to pay met by supply through business innovations
Environmental	Climate change and natural disasters	Affecting forest attributes or forest management; enabling or preventing fulfilment of spiritual needs
	Land-use change	Agricultural expansion and intensification of forestry (loss of “wild” nature and related spirituality), reforestation (including plantations), rewilding of abandoned land
	Change in forest management	Shift from largely unmanaged forests to (systematically) managed forests, or shift from focus on timber production to multifunctionality or ecosystem services-based management approach, or emphasis placed on biodiversity conservation or promotion and cultural aspects of forests
Policy, governance	Intrinsic nature of forests	Green, quiet, peaceful space, nature sounds
	Political conflicts	Competing interests, ideologies, worldviews, and interests in forest use and conservation
	Multilevel governance	Sectoral policies and policy (dis)integration (conflicting policies and effects on spiritual values of forests); centralization vs. devolution (bottom-up policy pressure through communities, minorities, religious groups, or public mood, leading to change in policy, acknowledging spiritual values)
	Formal and informal policies	Policies directly or indirectly supporting spiritual values (e.g., policies targeted at biodiversity protection or cultural heritage; religious or cultural taboos protecting forests or trees for their spiritual values); regulations prohibiting or enabling spiritual practices (e.g., forest access rights, permitting funeral forests)
	Changing political ideologies	Changing political ideologies (gradually or abruptly, e.g., through a regime shift)

religions such as Shamanism (Japan), Paganism and nature worshipping (Austria, Belgium, Czech Republic, Finland, Germany, Greece, Poland, Spain, Switzerland), and Mithraism and Zoroastrianism (Iran) are associated with this stage. During this stage, Clark’s (2011) category 1 (corresponding to Fig. 1A) is mostly present.

Examples of this stage include specific trees (e.g., the Donar Oak of Germanic pagans) and sacred groves (remnants of which can be found today in such countries as Greece and India). Further applications include the Zoroastrian tradition in ancient Iran to dedicate a tree to newborns, and the Finnish tradition to dedicate trees for the dead (usually old spruce or pine trees located in the burial site of the village). This latter tradition (Karsikko-trees) prescribes that the time of death of the deceased is to be carved into the trunk to guide the soul of the deceased to the burial sites.

In this stage, a form of “spiritual governance” (Studley 2019) protects natural resources; it is often taboo to destroy trees of high spiritual significance. For instance, using the forests and its

products was accompanied by asking permission from deities and providing offerings (Greece, India, Iran, Italy, Japan). This respect toward nature can be connected to a humble “nature gives, nature takes” approach. Nature’s gifts to humans, such as game, mushrooms, berries, medicines, and wood, are appreciated and embedded in a spiritually grounded dependency on nature.

This stage generally occurred from early periods of society up until the establishment of agrarian societies or organized states. Remains of this stage can still be found in some of the case countries, for instance, in certain elements of the Sámi and Metsälappalaiset culture in northern Europe, in certain hunting rituals in Germany and Poland, and in relation to ancient trees such as the 4000-year-old Abarkouh cypress in Iran (Khoshnevis et al. 2017), protected for its spiritual significance. Another example is the practice of planting a tree for a newborn, which is a long-standing tradition in some cultures and religions (e.g., Judaism). In Belgium, this practice has been revitalized, as local authorities pledge to plant a tree for every newborn, often in the form of “birth forests”.

Table 4. Summary of the transition hypothesis of forest spirituality, including the most common patterns and examples of indicators and drivers for each stage.

Characteristic	Forest transition stage			
	1. Omnipresent forest spirituality: “nature is powerful”	2. Religion controlling nature and spirituality: “taming of nature”	3. Science and technology replacing religion: “rational management of nature”	4. Immaterial values driving re-spiritualization: “reconnecting with nature”
Common pattern identified	Plenty of forests; total dependency on forests for livelihoods (pre-agricultural and early agrarian societies); strong spiritual dependence on forests (nature religions)	Nature spirituality strongly influenced by organized religions; changing landscape (including deforestation); human control over nature increases and is expressed in shifting spiritual connection (taming nature)	Deforestation, partially transitioning to reforestation (including plantations); rationalization and commercialization of forests (particularly timber); nature-related spirituality at a low	Increasing emphasis on multifunctionality of forests; reconnection with nature as a response to urbanizing societies, partially capitalism driven (innovations) and partially immaterial (post-materialism)
Examples of indicators	Several spiritual sites and activities exist related to nature (sacred natural sites); spiritual governance of sites (taboos); use of sacred forests accompanied by permission and providing offerings; art inspired by forests, animals, or myths	Sacred natural sites are replaced or incorporated by new religious sites or structures; organized religions guide or legitimize land management and use practices in accordance with their convictions; statist laws, codified by humans, govern sacred or spiritually significant natural sites	Nature use and management practices no longer legitimized or guided by religion, but rather science and technology (scientific or planned forestry, sustainable forestry); decreasing number of spiritually significant sites	New sites are established; spiritual activities (e.g., forest bathing) and visitor numbers (often as tourists) increase; new economic and business innovations related to spiritual values (demand driven); media, film, art, and literature romanticize forests (including their spiritual significance); sustainable forestry indicators expand to include spiritual values
Examples of drivers	Animistic religions promote forests for their spiritual value; informal customs protect spiritually significant forest elements; socioeconomic dependency results in strong spiritual connections	Organized religions’ approach to forest spirituality often emphasize rule of humans; agricultural expansion and forest use (deforestation) transform wild into cultural landscapes; formalized policies related to forest spirituality (initially partially protecting sacred groves, later partially banning nature worshipping)	Secularization (science over religion); increasing urbanization and technological development detach society from forests; “monofunctionalization” of forest management and focus on commodifiable assets (sustainable wood production); formal policies govern forest management	Role of religion in conservation is recognized; secularized society searches for alternative spiritual enrichment; forest management promotes multifunctionality; policies and international organizations protect old sites (as landscape elements and for biodiversity conservation)
Main way of thinking	“Nature gives, and nature takes”: respect it and be thankful for its gifts	Nature is tamed to serve humans and god(s)	Nature management is optimized through science and technology for the benefit of state, economy, and thus society	Nature is threatened and desired; society reunites with nature for its non-material benefits

Stage 2: religion controlling nature and spirituality: “taming of nature”

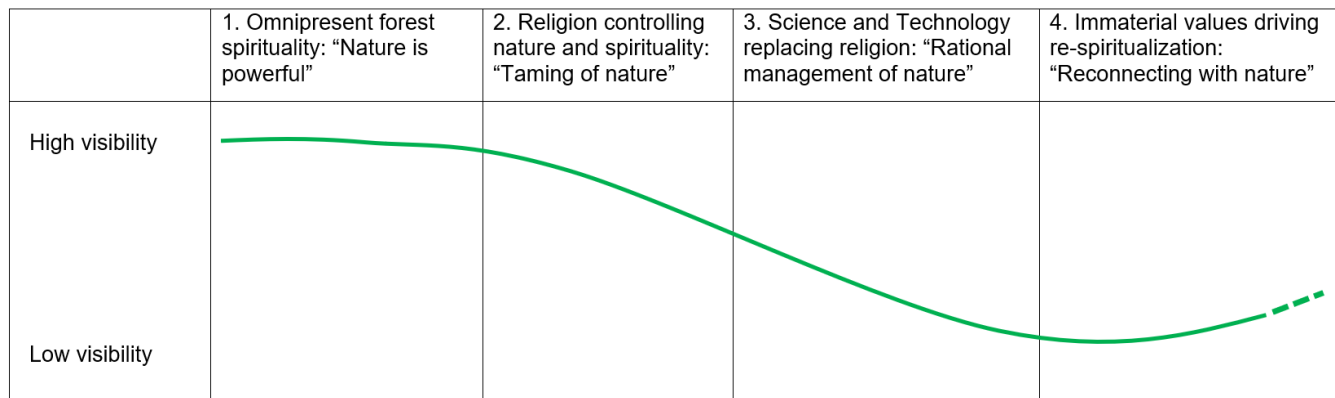
As belief systems shifted from animism (biophysical elements such as trees and forests are inspirited) to pantheism (referring to the transcendence of the divine onto the universe; Studley 2019), society’s perception of nature changed. This second stage of the transition is characterized by the increasing control of humans over nature, accompanied and legitimized by changing religion and spirituality. The spiritual relationship toward forests changes to a perspective attributing humans power and control over nature, entitling them to tame and transform it to serve humans and god(s) (see Redman 1999:19 quoting Cicero: “man as the highest being in the scale, changes nature by using his hands”).

With new possibilities to manage the land, large shares of forests are cleared and transformed into agriculture and settlements to meet increasing material needs (Kaplan et al. 2009, Farcy et al. 2019a) or are managed, often as agroforestry systems (Agnoletti and Santoro 2015). In some cases, forests commence to be areas of economic activity (Agnoletti 2018 for Italy). Forest clearing and agroforestry practices significantly alter the environment,

accompanied by a change in the spiritual connection to the remaining forests (Lamentowicz et al. 2020). “Wild” forests are perceived as uncultivated, savage, and dangerous, where enemies and evil spirits hide, and heathens live (Jedrzejewska and Samojlik 2005, Konczal 2013). Arcadia, developed from Greek mythology, depicts a version of paradise where nature is an orderly idyllic place, and people live in harmony with nature through pastoralism; this idea is juxtaposed with wild and untidy forests.

Nature and forest spirits are increasingly replaced by anthropomorphic deities (Rose 1935), mirroring the transition toward agricultural societies and the establishment of cities (Kaplan et al. 2009). Nonetheless, strong connections with natural elements remain (e.g., deities having powers over certain aspects of nature). In ancient Greece, sacred groves were the first places of worship (Nelson 2013; e.g., Altis in Olympia, dedicated to Zeus and established by Hercules, according to myth). In the case of India, Freeman (1999) argues that the anthropomorphizing of deities into human royalty could serve as an explanation for the establishment of sacred groves; the gods’ personal property was not to be encroached by humans. Specific tree species become

Fig. 2. Hypothetical change in the visibility of forest spirituality within society through the four transition stages. Visibility refers to how observable the expression of spiritual value is within society. Inspired by Holmgren and Scheffer (2017) and the forest transition theory as suggested by Mather (1992) and Angelsen (2007).



symbols of the divine. For instance, in India, the Goddess Lakshmi resides in sandalwood, and the Goddess Parvati crafted a statue from turmeric and sandalwood paste, which later came to life as Lord Ganesh (Sandeep and Manohara 2019). In Greek mythology, there are persons metamorphizing into trees (e.g., Kyparissos into a funeral cypress), and trees that are dedicated to deities (e.g., oak to Dioni and later to Zeus; laurel to Apollo; Baumann et al. 1993).

Customs and taboos protecting sacred trees and forests become more formalized. The spiritual governance of nature is replaced with statist laws, which are “predicated on human agency and formally codified” (Studley 2019:25). This change serves as a further manifestation of the increasing control of humans over nature and religion. One example of written law is the *Lex luci Spoletina* of ancient Rome (Italy), which listed prohibited activities (harvesting of timber or nontimber forest products) in the sacred grove dedicated to Jupiter, as well as punishment for noncompliance and giving a sin-offering to Jupiter in the form of an ox (Johnson et al. 2003). Furthermore, temple committees or village leaders in Greece (Stara et al. 2016), India (Freeman 1999), Iran (Plieninger et al. 2020), Italy (Agnoletti 2018), and Japan (Naumann 1964, Fukuda et al. 2000) determined that forests are protected for spiritual reasons. Damaging these trees was a religious taboo; hunting, grazing, and collecting plants and mushrooms for commercial purpose was forbidden in these areas.

With the advent of organized religions (such as Christianity, Judaism, and Islam), the perception of nature is conditioned accordingly (Redman 1999). Nature worshiping is banned, absorbed, or transformed into these religions. In ancient Rome, an edict of emperor Teodosio abolished the cult of trees (dendrolatry); similarly, the Councils of Arles and Nantes definitively banned forest cults. Sacred groves and trees diminish (Bhagwat and Rutte 2006) as they are replaced with “new” religious structures such as churches, monasteries and their gardens, or temples. In Germany, the Christian archbishop Saint Boniface ordered the felling of the Donar Oak and replaced it with a church. As the example in India shows, local folk deities are replaced by more formalized religious deities (in this case

Hindu), and sacred groves are replaced by temples (Bhagwat and Rutte 2006). Rutte (2011:2392) describes this change as the spiritual disconnection from nature through “[a] shift from nature worship to icon worship.” At the same time, harvesting forests remains, in part, a spiritually shaped activity, including the harvesting of sacred trees to construct temples, shrines, or statues (Totman 1998, Ueda 2013). In Japan, permission was ceremonially obtained from Yama no Kami (the God of Mountains) to harvest logs from remote forests to build the Todaiji Temple (Nihon Ringyo Chosakai 1997). In India, sandalwood (a sacred tree) was used to carve religious artifacts and construct temples (Sandeep and Manohara 2019).

Nature worshiping is further incorporated into the “new” religious beliefs and rituals (Stewart 1991) through transformation and adaptation to changing spiritual needs. In Greece, ceremonial litanies were performed annually within sacred forests. The priest, accompanied by the community, would consecrate old sacred trees. This practice served as a protective character for the community, causing the trees to act as guardians against epidemics or evil spirits (Kyriakidou-Nestoros 1989). In south India still today, a sandalwood tree in the home garden is believed to avert evil spirits (Sandeep and Manohara 2019). With cultivation of the land being the main ambition, spiritual values become more detached from wild nature, and gods move from nature to human-made places, fortifying the idea that evil spirits remain in the wild (Bhagwat and Rutte 2006, Rutte 2011).

In Islam, nature itself is not seen as sacred; only God, prophets, and saints are sacred. However, certain trees obtain sacredness through their connection with a saint: holy men appear or conduct miracles in or near trees; the tree hosts or mediates the saint’s spirit; and the saint’s grave is linked to the tree (Dafni 2006). However, sacred groves and trees in Muslim communities in Iran do exist, possibly resulting from the veneration of saints from pre-Muslim communities (mainly Mithraism and Zoroastrianism; Shakeri et al. 2021).

Christianity also gives new meaning to earlier beliefs through an assimilation process, adopting and adjusting them into the church’s celebrations and calendar. Trees are incorporated into

Christian traditions and events: the Christmas tree (originating from the Baltic states and Germany), planting linden trees at chapels (Belgium, Czech Republic), placing statues of Mother Mary in linden trees (Belgium), and the symbolic meaning of the yew tree (Austria, Czech Republic, Germany, Poland, Spain, Switzerland; Bechmann 1990). Paganism associates the yew with death and rebirth; in Christianity it retains its connection with eternity (rebirth) and is often found in church cemeteries.

Consequently, forest spirituality, as a component of culture, is affected through assimilation and integration (Gerdner 2021) by religious and governing institutions (see Fonneland and Äikäs 2020 and Szpak and Ochwat 2021 for Sámi; Freeman 1999 for India). The human desire to control becomes partially evident through the management of forests under the guise of religion; religiously legitimized rule over nature then goes hand in hand with expressing rule in human societies. Or, as Freeman (1999:264) puts it for India, “This dominance [by humans through an enforced hierarchy] clearly extended to the control and management of ‘divine property’—temples, groves, and the like—where the god’s will was far more likely to reflect the personal desires of landlord-chieftains.”

In sum, with Christianity, Judaism, and Islam, the belief is established that God made nature and appointed humans as stewards of nature to use and manage it. Nature spirituality is transformed accordingly, corresponding to Clark’s (2011) category 3. The new spiritually embedded superiority of humans goes hand in hand with pushing back the “untamed” forests in favor of agricultural land or managed forests (Lamentowicz et al. 2020). Forest spirituality remains present, connected to well-defined places such as areas surrounding churches, temples, or monasteries, or sacred groves are incorporated into the “new” religions (Belgium, Czech Republic, Germany, Greece, Spain), representing Clark’s (2011) category 2. Moreover, some monasteries apply forest management in accordance with their religious practices, such as the San Bernardo and Benedetto in Italy, or Christian Orthodox monks in Greece (Papayannis 2007), corresponding to Clark’s (2011) category 3. Some of these Christian monastic communities’ sustainable management of forests and natural areas eventually led to the establishment of protected natural areas (e.g., Sacro Eremo delle Carceri in Italy, Mount Athos in Greece; Mallarach et al. 2014). Thus, spiritual values of forests remain present, although in a different form than in stage 1. Stage 2 corresponds mostly to spirituality (Fig. 1B; Clark’s categories 2 and 3).

Stage 3: science and technology replacing religion: “rational management of nature”

During the third stage, in several countries connected to the Enlightenment period, religion and spirituality as a legitimizing source for decision-making on land management erode in importance. This cultural change is related to the rise of “modern forestry” (Scott 1998, Brown and Verschuuren 2019). In many of the investigated countries, societal traditions, cultures, and values change through industrialization, urbanization, and globalization (e.g., Gojda 2000 for Czech Republic). With the concurrent advancement of science and technology, land-use practices that had dominated for centuries change rapidly: agroforestry practices with shifting cultivation patterns are abandoned, and forested land becomes separated from agriculture to serve the accelerating industrial and urban development with wood

resources. The importance of forests for local livelihoods and spiritual significance decrease as urbanization further reduces everyday nature experiences while the city life replaces human interactions with nature.

In industrial societies, timber production becomes the main function of forests. For this purpose, “scientific” or “rational” forest management systems are introduced and formalized (Farcy et al. 2019a, Torralba et al. 2020). Other uses are suppressed or minimized, often backed by new forest laws (Fischer-Kowalski and Haberl 1998, Weiss 2000). Forests are seen as resources to be used systematically for sustained timber supply while generating maximum income to advance human welfare. Countries such as Austria and Germany were leading in monofunctional forest management, with a focus on sustained timber production (Mather 2001). New forest legislation mirrors the changing perspective, acting against deforestation and overuse of timber resources but also multiple agroforestry uses by applying sustained-yield forestry to ensure continuity of timber production. In several countries, the professionalization of forest management went along with bureaucratization as legislation required forest management plans; forest schools and formal training institutions were established (Austria, Finland, Germany, Greece, India, Italy, Japan, Poland, Spain, Switzerland; see also Farcy et al. 2019a).

Although deforestation continues in some countries, at least in the initial phase of this stage, in many countries, this period is considered to be a turning point in the forest transition process: forest area reaches a minimum, and planned afforestation and reforestation occurs (e.g., in central Europe, later expanding into the rest of Europe and Asia). Reforestation is often connected to forest growth science and economics, focusing on increasing and sustained wood production for the future. Afforestation in abandoned or cleared land (the beginning of plantation forests or fast-growing coniferous species such as spruce or pine in central Europe) and rapid urbanization modify the landscape. These dynamics lead to a breakdown in the relation between forests and communities concerning institutional (change in the way the land is governed) and functional (change in and disappearance of traditional forest uses) dimensions.

Connected to the professionalization of forest management, the relationship between people and forests is increasingly demystified, and spiritual sites decrease even further. In Japan, the number of shrines decreased from approximately 190,000 to 110,000 due to the central government’s policy of merging local and small shrines (Minakata 1971, Mineo 2020). Sacred groves and sacred trees remain important only around sacred sites, shrines, and other religious elements.

Thus, in many countries, the introduction of scientific forestry based on natural science knowledge, and the strong focus on sustained wood production connected to industrialization, minimize the spiritual significance of forests and its relevance for forest management (for India see Sivaramakrishnan 1995). In colloquial terms, science and economics become the “new religion”, preaching the “gospel of efficiency” (compare Nelson 2013) to optimize nature’s management during this period. Neither spirituality (as per Fig. 1) nor Clark’s categories are present in this stage.

*Stage 4: immaterial values driving re-spiritualization:
“reconnecting with nature”*

Resulting from increasing urbanization, industrialization, and a growing concern for human well-being and health, post-material effects of forests have risen in importance in several of the investigated countries. Some authors ascribe this change to the paradigm shift that occurred, i.e., from the utilitarian benefits for which forests were valued toward environmental benefits and recreational use of forests (Bell et al. 2007, Hendee and Flint 2014), including urban and peri-urban spaces (De Vreese et al. 2016, De Vreese et al. 2019, Stevenson et al. 2020).

This stage can be described as the “re-spiritualization of nature”, driven by post-materialist values. It is connected to the rise of environmentalism and the increased focus on forest multifunctionality (Mather 2001, Schriewer 2015), including providing a place for humans to revitalize the inner self (Daniel et al. 2012, Cooper et al. 2016, De Vreese et al. 2016), and occurs, at least partially, in parallel (or as a response) to the “rationalization” of forest management (stage 3). Mather (2001) refers to postindustrial forests, characterized by a decrease in timber production relative to an increased enjoyment of other services. He lists biodiversity and recreation; we add spiritual values. Relatedly, evolving perceptions of deadwood in forests in the context of re-spiritualization can be observed. Previously, deadwood was associated with forest mismanagement (stage 3); now, it is perceived as a critical element for forest biodiversity (Gustafsson et al. 2020) and a manifestation of forest spirituality (Kohsaka and Flitner 2004, Kovács et al. 2020).

In the more affluent societies in the case countries, non-monetary values of nature gain importance. There is, however, a trend of economization of non-material values of forests, transforming these values into new business models and innovations (e.g., Torralba et al. 2020). In today’s “leisure society”, forests are used for recreation and adventure, but also for spiritual practices (Pröbstl et al. 2009). This usage is observed through increasing offers of spiritual (and other cultural) forest services (see also Gilchrist 2020), including organized spiritual tours or practices and health-related offers. In Italy (and similarly in Spain), examples include tourism developed from pilgrimages through sacred woods and sacred trails (e.g., Via Francigena), natural sites (eco-tourism), and outdoor forest museums or parks (e.g., Arte Sella, Sacro Bosco di Bomarzo). Health-related services include therapeutic uses (e.g., forest bathing, forest therapy, or “green care”; Weiss 2019, Stander et al. 2020, Weiss et al. 2020, Živojinović et al. 2020). The Forestry Agency of Japan has been promoting *Shinrin-yoku* (forest bathing) since the 1980s, presumably in search of alternatives to a previously wood-production oriented forest-management model. Forest bathing and other forms of forest therapy are growing in popularity and have made their appearance in European markets (Austria, Czech Republic, Finland, Germany, Italy, Poland, Spain, Switzerland). Globalization facilitates the spread of these trends (de Pater et al. 2021).

Furthermore, the re-spiritualization stage is visible in science and research. Sacred groves are increasingly recognized as biodiversity hotspots (Bhagwat and Rutte 2006, Avtzis et al. 2018, Shakeri et al. 2021, Zannini et al. 2021). It is also visible in the increasing research on traditional and local knowledge relating to forests,

rooted in cultural and spiritual values and connections to the land (Stara et al. 2015b, Joa et al. 2018, Plieninger et al. 2020). Thus, academic curiosity connects the (re-)discovery of spirituality relating to nature in this fourth stage of the transition to the nearly lost (in the third stage) spirituality (of the first stage).

A link between environmentalism and re-spiritualization is also visible in statements of religious leaders encouraging nature conservation: see Pope Francis’s (2015) Encyclical Letter (Cooper et al. 2016) or Sadhguru’s (2012) manifestos (*A Tree can Save the World*), initiatives such as the Interfaith Rainforest Initiative launched in Oslo in 2017, the Ecumenical Patriarchate Ecological Symposia (e.g., “Toward a Greener Attica: Preserving the Planet and Protecting its People” in 2018), and earlier, the 1986 World Wide Fund for Nature (WWF) meeting with leaders from five major religions (Buddhism, Hinduism, Islam, Christianity, and Judaism) to explore solutions to environmental issues (Palmer and Finlay 2003). Clark’s category 3 (Fig. 1B) becomes visible again, as the religious duty to care for nature is highlighted (Mallarch et al. 2014, Cooper 2016). As per Gottlieb (2006:6), “world religion has entered into an ‘ecological phase’ in which environmental concern takes its place alongside more traditional religious focus.”

The increased spiritual interest in forests is not always (or not primarily) rooted in formal religions. Confronted with science and technology and a disconnection from formal religions (stage 3), forest re-spiritualization can often be interpreted as a pursuit for alternative ways of expressing spirituality in secularized modern societies. This idea is visible in the rising trend of natural or woodland “cemeteries” (or funeral forests; Fig. 1C) in which people opt for an alternative to conventional cemeteries, allowing for a certain spiritual openness (e.g., Austria, Belgium, Czech Republic, Germany, Italy, Japan, Switzerland; see Ueda 2016 for a comparative analysis of natural burials in Germany and Japan). This trend is an expression of the wish to relate to nature, even after death (Bauer and Schraml 2018). Cooper et al. (2016:222) refer to a sense that “the spiritual has taken over from the religious”; people are looking for spiritual fulfillment and transcendence in nature beyond organized religious structures (which have opposed natural burials in some countries, at least initially). In this sense, remote areas offering pristine nature are increasingly favored because they offer solitude and tranquility, providing an escape from urbanism (Boller et al. 2010). Another example is the current establishment of the Govinda sacred groves in Spain, where the community plants trees with a significant meaning (e.g., the oak representing strength, the cypress immortality, and the ash wisdom). These groves serve as grateful tributes to nature and places of seclusion for calming the mind and refreshing the spirit.

Spiritual values and their contributions to cultural heritage are also being considered in policies. Certain spiritually significant trees and forests are protected through formal policies (e.g., United Nations Educational, Scientific, and Cultural Organization) preserving cultural heritage (including spiritual natural sites; e.g., Belgium, Czech Republic, Greece, Japan, Iran, Italy, Poland, Switzerland). In India and Japan, spiritual sites are protected through biodiversity conservation policies. Furthermore, global policies and strategies aimed at sustainable forest management now also include the importance of spiritual values

of forest, often related to the social aspect of sustainable forest management (e.g., Principles 3.5 and 4.7 in Forest Stewardship Council 2015; Indicator 6.11 in Ministerial Conference on the Protection of Forests in Europe 2003; Criteria 6 in Programme for the Endorsement of Forest Certification 2018; see also Mather 2001, de Pater et al. 2021).

In a complementary manner, the easing of prohibiting policies linked to certain spiritual values can be observed. In some European countries (Austria, Belgium, Czech Republic, Germany), laws that did not allow the burial or depositing of human ashes outside conventional cemeteries have now been amended to permit natural burials (funeral forests). This shift has resulted from a demand-driven bottom-up approach (pressure from companies, forest owners, and citizens).

Nonutilitarian connections to nature become further evident in the increasing societal objection to harvesting trees (Bell et al. 2007, Pröbstl et al. 2009, Maier and Winkel 2017, Farcy et al. 2019a) and with an emphasis on maintaining old forests (ancient, primeval, or old-growth forests) in contrast to plantation forests (Jedrzejska and Samojlik 2005). Society observes the fragility of nature as it experiences a loss of natural and cultural landscapes. This loss motivates some sort of spiritual resistance, driven by ecological consciousness, as the realization dawns that “rather than a new heaven on earth, in the worst case modern science and economics [stage 3] could even potentially bring about a new hell on earth” (Nelson 2013:14). Civil protest against harvesting trees regularly refers to emotional (including spiritual) values (see Ritter and Dakusta 2006). The bestselling books of Peter Wohlleben (*The Hidden Life of Trees* 2015, *The Secret Wisdom of Nature* 2017) are exemplary of the support for the popular forest perspective that understands trees and forests as living beings and part of a larger social ecosystem (Farcy et al. 2019b). This perspective is also connected to the emerging research agenda investigating the “social relationships” of trees (Simard 2021).

As noted, the division of stages is not linear. The roots of re-spiritualization trace back into the past, and in Europe, specifically to the Romantic period. During this period, the “cultural and spiritual” resistance to the rational and economic paradigm was expressed in art and literature (see also Cooper et al. 2016). Forests were no longer seen as a dangerous place, and the threatening myths of the dark forests became beloved fairy tales with a more Romantic perception of forests (e.g., Brothers Grimm in Germany, Božena Němcová in the Czech Republic). German poets created the term *Waldeinsamkeit* (forest-solitude), referring to the feeling of self-contentment experienced in the quietness provided by forests, which is echoed in the current rising demand for wilderness and remote areas (e.g., Switzerland; Boller et al. 2010).

Similar trends are observed today in popular writings and movies: Wohlleben’s (2015, 2017) books, connecting to the rise of environmentalism; Tolkien’s (1954) *The Lord of the Rings: The Two Towers* and its film adaptation (New Line Cinema 2002), illustrating the relationship between human-like characters and trees, specifically the ancient tree-giant, Fangorn; and “Avatar” (20th Century Fox 2009), focusing on the powers of a sacred mother tree. Such themes can also be found in modern Japanese animated fantasy films such as “My Neighbor Totoro” (Studio

Ghibli 1988) or “Princess Mononoke” (Studio Ghibli 1997), where forests and their spirits or creatures are central (Takemoto 2013). This fourth stage of the transition corresponds to Clark’s (2011) category 4 (Fig. 1D).

CONCLUDING ON A TRANSITION HYPOTHESIS: EVOLUTION OF FOREST SPIRITUALITY AND RE-SPIRITUALIZATION

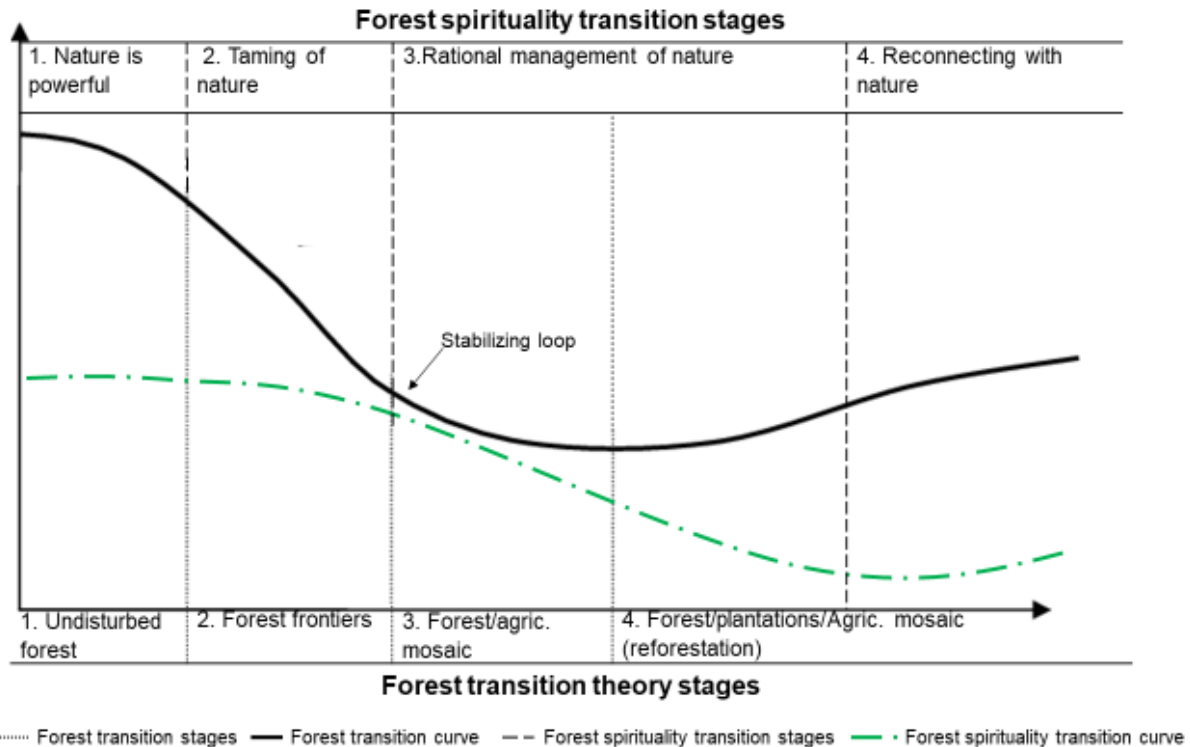
Our analysis makes two main contributions: it proposes a definition of “forest spiritual values” and provides a spiritual transition hypothesis investigating the evolution of the spiritual relationship between humans and forests. The core idea is in showing the connections among changing perceptions of forests, changing land use, and changing spirituality as nature-use influences spirituality and vice versa. A better understanding of societies’ ancient and present relationships with forests, the use and perceptions of forests, and the related spiritual significance could assist in decision- and policy-making and address trade-offs in the different applications of forests ecosystem services (Ritter and Dakusta 2006).

The boundaries of what is regarded as “spiritual” are vague and varied. It is therefore essential to define forest spirituality before considering its development over time. We set broad boundaries, elucidating the concept while maintaining a wide scope. We acknowledge that our definition, use, and interpretation of certain concepts (e.g., spirituality, religion, and sacredness) may pose limitations when subjected to other disciplines (such as religious studies); however, we anticipate that it may reduce the abstractness of forest spirituality.

It is stimulating to compare our transition hypothesis to other ideas. One analogy is with the anthropological debate regarding the nature-culture dichotomy, which explains the human-nature relationship along two polarities. On the one hand, nature stands opposite to humans but is the most important factor shaping human culture. Culture thus results from adaptation to nature (to simplify, nature is dominant over culture). On the other hand, human relationships with nature are determined by cultural representation. “Nature dictates the initial conditions, of course, but after that it becomes no more than a background for the intricate and kaleidoscopic elaborations of the symbolic mind” (Scarso 2013:92; see also Ingold 2000). In this sense, nature is “rationalized” by culture. It is beyond our scope here to elaborate on this debate. However, culture is evidently relevant when assessing the relationship between humans and nature; how nature is perceived influences this relationship (Redman 1999, De Vreese et al. 2016, Brown and Verschuuren 2019). When nature is perceived as dominant over culture (possibly the case with animism), or even as indistinguishable, then spirituality is omnipresent. When, instead, nature is rationalized through culture, spirituality is subdued by dominant institutions (either states or major religions).

Adjacent to the nature-culture analogy is the use of knowledge systems pertaining to forest spirituality. Diaz et al. (2015:13) describe knowledge systems as “a body of propositions that are adhered to, whether formally or informally, and are routinely used to claim truth.” Agents, practices, and institutions organize the production, transfer, and use of knowledge (Tengö et al. 2017). Addressing forest spirituality, and its institutionalization (e.g., through codification in a law), raises the question of what can be

Fig. 3. Hypothetical comparison of forest transition theory as per Angelsen et al. (2009:4) and our proposed forest spirituality transition from a European perspective. Although high deforestation rates occurred during the “forest frontier” stage, a different type of forest spirituality can be observed in the “taming of nature” stage. With the stabilizing loop, deforestation slows down through the “rational management of nature” stage. Although the forest area may increase, spiritualization of the forest is at its lowest point. The “re-spiritualization” stage might represent an additional stage in the forest transition theory in a post-materialist society supporting the environmental movement.



seen as spiritual knowledge (as opposed to “rational” or scientific knowledge) and may create perplexity regarding who qualifies as the holder of spiritual knowledge. One example is the debate in northern Europe on who qualifies as Sámi (and Metsälappalaiset; see Valkonen et al. 2017, Gerdner 2021). Assigning knowledge as spiritual can carry the danger of reinforcing knowledge-power relationships (Ingold 2000, Valkonen et al. 2017, Tuulentie et al. 2020). As Heywood (2017:9) notes, “Your interlocutor may ‘believe’ the tree to be a spirit, and you may ‘respect’ this belief as much as you wish, but your own belief is probably not what you would consider to be a belief at all; it is what you would think of as ‘knowledge’. You do not think of yourself as ‘believing’ it to be a tree, you know it to be so.” We acknowledge this dilemma for our attempts to define forest spirituality and the transition hypothesis.

Another analogy of our hypothesis is with the forest transition theory (FTT) first described by Mather (1992). FTT identifies a global pattern in the transition of forest area. It distinguishes four stages, starting with the undisturbed forest stage (high forest cover, low deforestation rates due to inaccessibility for market exploitation), followed by a period of deforestation connected to socioeconomic development and population growth in the forest frontiers stage. The last two stages occur in a stabilizing loop in

which deforestation slows down, collectively called the restoration stage; the third stage is marked by forest-agricultural mosaics, and the fourth by forest-plantations-agricultural mosaics. This restoration stage refers to net forest cover gains that occur at a point when socioeconomic development is progressing and socioeconomic needs are decoupling from deforestation, and, moreover, when new forests are created, often in response to the demands of an industrial society (e.g., plantations for biomass production; Angelsen 2007, Angelsen et al. 2009).

There are some connections between the stages of FTT and the transition of forest spirituality that we suggest (Fig. 3), which so far have not been considered in the forest transition debate (Wilson et al. 2017). Specifically, FTT’s undisturbed forest stage connects to our first stage (“nature is powerful”), FTT’s high-deforestation forest frontier stage corresponds to our second stage (“taming nature”), and FTT’s final two stabilizing stages correspond to our third stage (“rational management of nature”). We add an additional stage (“reconnecting with nature”) as an important explanatory compound to the transition model.

Still, caution needs to be applied against the assumptions of causality between the development of forest spiritual values and the forest transition. Spirituality is only one aspect of the human-

forest relationship through which the forest obtains significance for humans. One deviation of the forest spirituality transition hypothesis from FTT pertains to the quality of the forest after the forest transition occurs. As Wilson et al. (2017) note, the new forests are ecologically different from the forests they replace; from an ecosystem services perspective, the quality varies. The last stage of FTT often results from plantations. Plantations are mostly linked to our third stage, where we see the largest de-spiritualization trend. According to Almeida et al. (2018), forests with certain attributes (e.g., biodiversity-rich, old-growth forests) may enhance the spiritual experience. Thus, an increase in forest cover does not necessarily lead to re-spiritualization of forests or vice versa; however, the cultural drivers and socioeconomic factors that lead to the forest transition could also bring about forest re-spiritualization. Similarly, the drivers of re-spiritualization can promote reforestation. In some regards, re-spiritualization is a reaction (even protest) to the rational “plantation approach”. Further exploring the interlinkages and convergences of our spiritual transition hypothesis with FTT would be highly interesting.

Finally, we emphasize that the analysis of forest spirituality conducted here remains initiatory, formulating a hypothesis to be explored through future research. The four proposed transformation stages are unavoidably a simplification of complex human–nature interactions to illuminate inspiring general patterns and to provoke a debate on the possibility to generalize. Arguably, as we have shown, these patterns can be observed to varying degrees in the investigated countries. The stages, however, are neither linear nor chronological, and may occur simultaneously (e.g., currently the focus may fall on re-spiritualization while at the same time attention is being paid to scientific forest management; thus stages 3 and 4 occur together). This attribute presents the possibility of some erratic developments, e.g., a movement back and forth between stages 3 and 4, depending on factors such as demographic change, changes in hegemonic ideology, etc. Also, examples for the continuation or presence of stages 1 and 2 can be found in some of the investigated countries; other examples might be more conspicuous in other countries and regions that we did not cover.

For future research, it would be interesting to reflect on the transition hypothesis beyond the scope of observations in the 10 European and 3 Asian countries covered here. Testing the idea in different contexts and over different time periods, including in ostensibly contradicting contexts where forest spirituality has evolved differently, could better elucidate the drivers, indicators, and consequences of changing forest spirituality. Interlinkages between countries and cultures, and spillover effects between them, in relation to the importance of country context, could be another focus for further work. Modes of governance and borders of countries have evolved drastically throughout history, affecting spirituality as well as governance and management of forests. A more in-depth trace into the developments and interrelations between countries, cultures, and religions would be highly interesting in view of the transition of forest spirituality.

Responses to this article can be read online at:
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Data Availability:

Qualitative data used for this paper are in the form of workshop documentation (preparation documents and minutes), which is available from the lead author (J-L.R.) on request, and case-specific data sets, contained in the appendices of this article.

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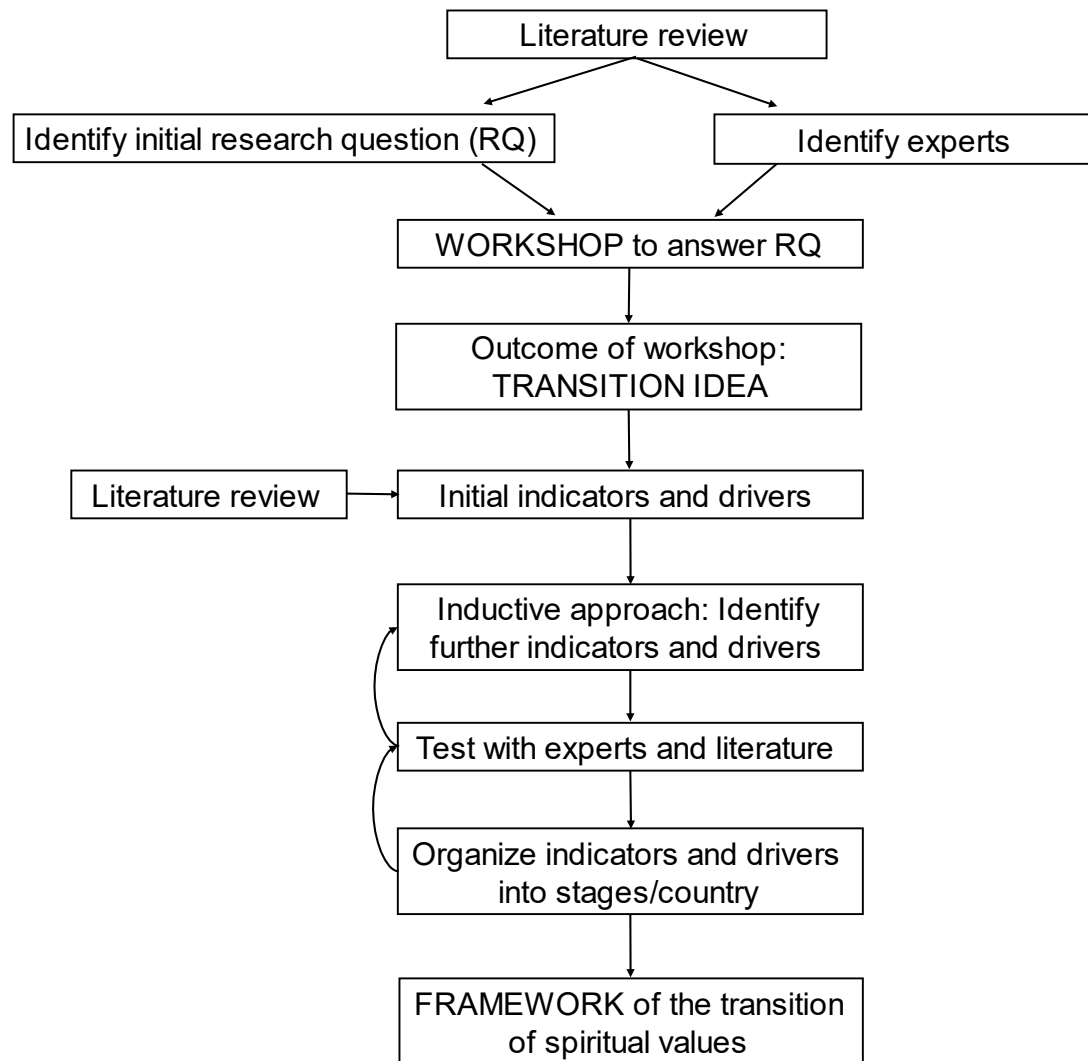
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Appendix 1 Figure 1 (Fig. A1. 1) Methodological path indicating an iterative approach.



Appendix 2 Table 1 (Table A2. 1) – Table 14 (Table A2.13) Transition stages per country.

These tables form part of the data collected during the iterative approach between lead- and contributing authors to demonstrate the drivers, indicators and stages per countries. The information contained in these tables were further tested with literature, overarching trends were identified, developed and refined into the stages presented under Section 4.3 in the main text.

TABLE 1 (A2.1): AUSTRIA		
Stage and description	Indicator and description	Drivers
<p>1. <u>Spiritual forest</u></p> <p>Prehistoric, primeval or archaic culture / subsistence society</p> <p>Austria is in that time part of the Germanic cultural area (since Austria as a country did not exist). This period is therefore identical with Germany.</p> <p>In early European cultures, the whole life was spiritual, and life was mostly based on nature, and nature was mostly forest. Forest was thus the basic for human living, and thus had a spiritual value in its entirety.</p>	<p>Forest as a central element in many old myths. The landscape – the world as such was a forest, and a mystical forest.</p> <p>This can be seen in many “Grimm’s fairy-tales” where the forest has a central mystical role.</p> <p>Also, the popular American fantasy drama series “Once Upon a Time” (ABC) where they live in a world they call the “Enchanted Forest” (Zauberwald).</p>	<p>Socio-cultural: archaic culture Technology: prehistoric skills and culture Economic: subsistence society Environmental: nature as basis for living, mostly represented by forests (and natural waters) Political: clans, tribes.</p> <p>Main way of thinking: Nature rules human life.</p> <p>See “Germany”</p> <p>All subsumed under being in prehistoric, primeval or archaic culture and subsistence society.</p>
<p>2. Cultural landscape</p> <p>Agrarian society</p> <p>The basic economic system is agriculture, with trade and pre-industrial uses. Forest is used in relation to two main systems:</p> <p>Traditional farm use:</p> <p>subsistence use with domestication of plants and animals; forest is used for the farm system for fire wood and providing food and feed (various foods and herbs for nutrition and medicinal uses; feed/fodder for animals in the form of grass, tree foliage and cuttings for cattle and sheep etc., litter for animal bedding, and nuts, acorns and other fruits for pigs etc.)</p> <p>Pre-industrial: Before mineral coal was discovered, the forest was THE resource for pre-industrial production such as the early production of salt, iron, etc. (wood era).</p> <p>(Sieferle 1997, 1982; Johann 2005, Sandgruber 2005, Weiss 2000)</p> <p>Altogether, forest where largely depleted or transformed and used for agricultural uses (deforestation and degradation). Partly also role as feudal hunting space.</p> <p>Besides that it still kept important roles for the subsistence use of local communities (firewood, herbs, etc.).</p>	<p>See left.</p> <p>Forest used as resource; otherwise also seen as dangerous and “uncultivated” place.</p> <p>Forests were highly important with a strong competition of various traditional local and feudal industrial uses.</p>	<p>Socio-cultural: feudal system Technology: pre-industrial Economic: Agrarian, pre-industrial Environmental: role as important resource for various subsistence, agricultural and pre-industrial uses Political: monarchies/feudal system/monocratic state.</p> <p>Main way of thinking: use as a resource, besides with further traditional spiritual roles or also seen as dangerous and “uncultivated”.</p>

<p>Austria can directly be compared with Germany.</p>		
<p>3. Rational land management</p> <p>Industrial society.</p> <p>In the industrial society, the main role of forests became the production of timber. For this purpose, the “scientific” or “rational” (German) forest management system was introduced. Any other uses were suppressed in technical and as much as possible legal terms.</p> <p>Monofunctional production system, mainly for timber.</p> <p>Besides of that, forests always kept some subsistence value and spiritual roles. Forest is, regarding the relation of society and nature, a central element in German culture.</p>	<p>“Rational” forest management and “forest science” for timber production. Mono-functional production system. Neglect of other roles.</p>	<p>Socio-cultural: enlightenment; transformation to industrial society; “rational” use of the natural resources; dominant role of science and technology.</p> <p>Technology: industrial technologies.</p> <p>Economic: industrial society, establishment of “economic growth” paradigm, colonization of nature.</p> <p>Environmental: natural resources used as physical resource; neglect of environmental functions and ecological limitations; optimization of use of nature.</p> <p>Political: democracy, increasing differentiation of political-bureaucratic systems, bureaucratization.</p> <p>Main way of thinking: optimized rational use of natural resources for economic growth and physical well-being.</p>
<p>4. Re-Spiritualization</p> <p>With further intensification of industrialization, forests regained a cultural importance as a balancing element to the industrial strong destruction of nature (particularly in industrial centers) as a contra-ideal to the industrialization, an object of aspiration and desire. Is gaining importance in post-industrial, information society and “leisure society” of today.</p> <p>From 19th century, with interruptions but increasingly until today.</p> <p>Forest is in regard to the relation of society and nature a central element in German culture. Forest is “the” ideal image of nature in Germanic cultures (as for example, the garden is in Romanic cultures).</p> <p>Multifunctionality – “Forest functions”</p>	<p>Other uses and values of forests are re-discovered, starting in the period of romanticism, again in the beginning of in the 20th century but disrupted by two World Wars, and again with the growing wealth of society after the time of the German “Wirtschaftswunder” which was similar in Austria (affluent society).</p> <p>Multifunctionality – “Forest functions”: The idea of forest functions formulates the observation that the forest has various values for modern society.</p> <p>Concepts of the “full value of forests” and (forest) “ecosystem services” try to formulate the idea of multiple values of forests in economic terms.</p> <p>In our affluent society, non-monetary values of nature gain importance. There is, however, also a trend of economization of non-physical or non-material values/services of forests by transforming those into economic offers. In today’s “leisure society” where people have increasingly leisure time available, forests are used for recreation, sports and adventure, but also spiritual practices. This can partly be described by the concept of “experience society” and is observed with an increasing set of offers of spiritual (and other cultural) services of or in forests, including green burials in forests or organized spiritual tours or practices, but also in care or health-related offers such as medicinal and therapeutic uses such as “forest bathing” or “green care”.</p>	<p>Socio-cultural: post-industrial, information society and “leisure society”</p> <p>Technology: re-discovering non-technological value of forests.</p> <p>Economic: affluent society, non-monetary value of nature, but also economization of non-physical (non-material) values/services of forests. Cultural services of forests as an innovation field in forestry.</p> <p>Environmental: environmentalism/environmental movement; re-discovery of environmental functions and ecological limitations (“limits to growth”); re-discovery of medicinal, health or therapeutic uses of the forests (herbs, therapy, well-being, etc.).</p> <p>Political: new forms of governance emerging; increasing role of democracy and civil society</p> <p>Main way of thinking: emerging awareness of ecological limits and complexities</p>

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TABLE 2 (A2.2): BELGIUM

Stage and description	Indicator and description	Drivers
<p>1. Spiritual forest (before 500 AD)</p> <p>Prehistoric, primeval or archaic culture / subsistence society</p> <p>Belgium is heavily influence by the German and Celtic culture until the area is included in the Roman Empire (50 BC – 400 AD).</p> <p>Apart from providing food, fodder and fuel, forests were home to spiritual and religious values and practices (see also Druid practices). Deforestation happens for agriculture, construction, fuelwood and charcoal, but also to avoid places where enemies could hide.</p> <p>In the 5th Century, Frankish tribes took over the reign in Belgian territories. The demise of the Roman Empire results in a reduced pressure on forests, and a recovery of the forest cover. The Frankish religious practices are influenced by German practices, until Clovis converted to Catholicism (496 AD) and declared Catholicism as official religion. This is the start of the Christianization of Western-Europe.</p>	<p>Forest and trees as a central element in many old myths and stories. Forests and trees as source of life and inspiration, but also places for worshipping, justice, etc.</p>	<p>Socio-cultural: archaic culture</p> <p>Technology: prehistoric skills and culture</p> <p>Economic: subsistence society</p> <p>Environmental: nature as basis for living, mostly represented by forests (and natural waters)</p> <p>Political: clans, tribes.</p> <p>Main way of thinking: Nature rules human life.</p> <p>All subsumed under being in prehistoric, primeval or archaic culture and subsistence society.</p>
<p>2. Cultural landscape (500 AD -)</p> <p>Medieval period/dominance of Christianity and feudal state systems</p> <p>Similar to Germany: De-spiritualization of nature in a sense that nature becomes the creation of one god but is not a representation of many gods; nature to be used by human beings.</p>	<p>Policy and legislation; Sites; spiritual activities; Media, art, literature.</p> <p>Sacred groves and worshipping trees banned but at the same time "tamed" big trees remain important accompanying Christian symbols (churches, churchyards, wayside crosses), fairy tales</p>	<p>Socio-cultural (Religion and Cultural identity/tradition): continued use of forests and trees as spaces for worshipping (natural gods banned but replaced by Saints, Holy Mary, etc.)</p> <p>Technology (available knowledge and development):</p> <p>Limited but growing abilities to manage nature and exchange information</p> <p>Increasing agricultural intensification</p>

<p>Increasing deforestation between 650 AD and 1250 AD, followed by more strict forest laws and a reforestation until 1775 (first area-wide map in Belgian by Austrian geographer de Ferraris).</p>	<p>representing forests predominantly as dangerous place</p>	<p>Economic (economic dependency): decreasing dependency on forests for livelihoods, but forests remain important for many products and services (wood, hunting, non-wood products), also widespread agroforestry systems, and as land reserve</p> <p>Environmental: forest goods and services become (locally) scarce</p> <p>Political (multi-level governance): feudal systems and monarchies</p> <p>Role of churches and monasteries as forest managers</p> <p>Exclusive rights to the powers (kings, landlords), including hunting</p> <p>From 1200: large landowners/seigneurs are selling land to abbeys and privileged citizens.</p> <p>1617: Edict by Albrecht & Isabella (Luxembourg) & 1772: Maria-Theresia (Burgundy) – more strict forest legislation.</p> <p>Main way of thinking: nature can be tamed/used through hard work – this is the spiritual inspiration/expectation</p>
<p>3. Rational land management (1750 – present)</p> <p>Enlightenment/rationalization and industrialization period</p> <p>Continued de-spiritualization of nature, science and technology gradually replacing the rule of religion, forest become subject to rational planning and management for the national economy and loose importance for subsistence.</p> <p>Forests are still acting as land reserve in the areas with fertile soils. In regions with poorer soils, heathland and so-called “lost grounds” are forested. Deforestation for agriculture, industry, housing: some intermediary reforestation around 1900, and for industrial use (poplar, pine).</p> <p>Rationalization of forestry started under the Austrian reign (until 1794), further developed under the French authority (1794-1815).</p> <p>Following the French revolution, and France reigning Belgian territories (1794-1815), abbeys and parishes lost all the forests they owned.</p>	<p>Forest management practices; spiritual activities</p> <p>Forest science, forest planning and management, trees remain important accompanying Christian symbols</p>	<p>Socio-cultural: enlightenment; transformation to industrial society; “rational” use of the natural resources; dominant role of science and technology, urbanization</p> <p>Socio-cultural (religion): enlightenment; increasing shift away from religion (secularization), but with increasing respect and conservation of cultural heritage related to spiritual values of trees and roadside ornaments</p> <p>Technology (development): natural science and technology rapidly advancing with new possibilities to plan and use forests: creation of “scientific forestry”; industrialization, intensification of agriculture</p> <p>Economic (economic dependency): Importance of forests for local livelihood decrease/ “forest based” agriculture becomes unprofitable; forests split from agriculture, wood production becomes essential, “monofunctionalization” of forest management (until 1970s)</p> <p>Environmental: shift from broad leaf species to conifers on poor soils, and poplars in valleys; more recent: increased attention towards biodiversity, multifunctionality, reforestation</p> <p>Political: shifting governance arrangements, but share is advancement for science and technology-based decision making and professional bureaucracies</p> <p>Main way of thinking: optimized rational use of natural resources for economic growth and physical well-being.</p>
<p>4. Re-Spiritualization (since 1820s)</p> <p>Forests become subject of non-material societal demands in increasingly urbanizing societies (recreation but also cultural – such as aesthetics - and spiritual)</p> <p>1. Romantic period (ca 1820-1914)</p>	<p>Media, art literature</p> <p>Trees and forests play important role in poetry, music and fairytales (romantic period and today), today also science (conservation science) and media (Wohlleben and Shinrin Yoku phenomena)</p> <p>Visitors to sites; Spiritual activities Tourism connected to nature amenities develops (romantic</p>	<p>Socio-cultural: post-industrial, information society and “leisure society”</p> <p>Socio-cultural (new attitudes and behavioral change; urbanization): relative increase in “non-material” demands towards forests (response to industrialization and urbanization); increased attention towards</p> <p>Socio-cultural (religion/spirituality/secularity): diminishing influence of the church as institution, increased secularity and finding spiritual fulfilment in nature</p>

<p>2. Environmentalism and later postmaterialism/postmodernity (in waves between 1880 and today)</p> <p>From the 1970s, increased environmental awareness led to increased attention towards forests: forests were seen as nature, and not any longer uniquely as a source for wood and a land reserve.</p> <p>This increased awareness has led to a limited resurgence of attention towards nature religions and non-religious spiritual values related to forests and trees. However, it was rather marginal and limited to specific sub-cultures.</p> <p>More recent (since 2005), with a general increased attention towards mental health aspects (including mindfulness, meditation, and oriental practices), there is a new interest in spiritual values related to forests. This interest is mainly not religious (in the traditional sense).</p>	<p>period) and becomes a mass phenomenon (post war),</p> <p>Economic/business innovations: this increased attention leads to an increase in number of businesses connected to the spiritual use of forests (forest bathing, forest mindfulness, yoga, counselling, etc.) in recent decade. However, entrepreneurs indicate that businesses have difficulties to become profitable and provide sufficient income.</p>	<p>Socio-cultural (affluent society): people losing knowledge on the origin of resources for day-to-day equipment (paper, wood), leading to “romanization” of forestry</p> <p>Environmental: re-discovery of medicinal, health or therapeutic uses of the forests (herbs, therapy, well-being, etc.).</p> <p>Technology (Information society): increasing knowledge available and possibility to practice spirituality outside the established societal venues, also globalization (influence of other cultures); increased opportunities to be engaged in “spiritual networks” outside churches or religious organizations; influence of social media (“instagramization”).</p> <p>Economics (economic dependency): decreasing importance of material functions of forests for economy, and increasing demand/markets for non-material services (re-multifunctionalization of forest management,</p> <p>Environmental (Public awareness): Environmentalism and environmental problems since the 1970s, perspective on forests as an environmental good develops and increases in importance (biodiversity, climate, also esthetics); forests as common goods</p> <p>Environmental (Land use change): increased defragmentation of forests, loss of urban and peri-urban green space</p> <p>Political (Political conflicts)/ Socio-cultural new attitudes and behavioral change): rapid changes, globalization, increasing freedom for the individual, new forms of governance emerging; increasing role of democracy and civil society</p> <p>Main way of thinking: emerging awareness of ecological limits and complexities</p>
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Stage and description	Indicator and description	Drivers
1. Spiritual forest Pre-Christianity period with nature religion (tree cult)	Sites; spiritual activities Forests have traditionally been linked to many folk traditions, customs and events and have been	Socio-cultural (Religion and Cultural identity/tradition): religious and cultural use: huge old trees often with very peculiar habitus and forests as magnificent places,

<p>Nature as representation of Slavic gods; trees specially worshipped, it was banned to cut or damage such trees, any damages were considered as bringing diseases and illnesses for human being; forest as place of all types of mystic creatures.</p> <p>Ca. before 500-800 A.D.</p>	<p>considered as a place of ghosts and other fairy-tale creatures since ancient times.</p>	<p>Technology (available knowledge and development): limited abilities to manage nature and exchange information</p> <p>Economic (Economic dependency): direct dependence on forests for livelihoods</p> <p>Environmental: omnipresence of forests</p> <p>Political (multi-level governance): rather decentralized rule by clans, tribes</p> <p>Main way of thinking: forests worshipped as sacred; people have very limited control over nature, fear of nature</p>
<p>2. Cultural landscape</p> <p>Christianity and feudal state systems</p> <p>The Czech Republic in that time significantly influenced by the Austrian-Hungarian cultural area.</p> <p>Nature to be used by human beings, significant deforestation due to agriculture, mining and metallurgy</p> <p>Ca. 800-1800 A.D</p>	<p>Policy and legislation; Sites; spiritual activities; Media, art, literature.</p> <p>Locally forest area dramatically decreasing due to exploitation. Christian tradition is dominant which results in using forests for spiritual purposes. Forests used for pilgriming to sacred places with Christian symbols. Churches, chapels, wayside crosses were built in forest areas often used for pilgrims. Some spots in forests bear local names coming from religious tradition, such “By the Cross”, “Holy hill”, etc. Religious ceremonies took place under sacred trees.</p> <p>Trees were inherently imbedded in folk legends and tales and remain still worshipped as sacred.</p>	<p>Socio-cultural (Religion and Cultural identity/tradition): nature to be tamed and used by people with (one) God’s help</p> <p>Technology (available knowledge and development): limited but growing abilities to manage nature and exchange information</p> <p>Economic (economic dependency): decreasing dependency on forests for livelihoods, but forests remain important for many products and services (wood, hunting, non-wood products)</p> <p>Environmental: forest area decreasing, forest goods and services become (locally) scarce</p> <p>Political (multi-level governance): the government is centralized under monarchy and local aristocratic families</p> <p>Main way of thinking: Nature is created by God to the sake of a man (to serve to human being and fulfil his needs)</p>
<p>3. Rational land management</p> <p>Enlightenment/rationalization and industrialization period</p> <p>The intensification of the forest use for production purposes increased. New methods of forest management were created aimed for maximum timber production. During this period, two significant changes affected the forest perception. Firstly, the large area of forests (originally belong to the monarchy) was confiscated by state after year 1918 and managed by newly established forest state enterprise. Secondly, all private forest properties were confiscated by the communist government again after 1948. Together with the state pressure for reducing the church and religion influence, there was a gradual detachment of people from forests and nature in general.</p> <p>Dominant since ca. 1800 - present</p>	<p>Forest management and planning approaches, harvest technologies, growth of the wood processing industry</p>	<p>Socio-cultural: people perceive forests and nature just as a source of raw materials, less as a place of recreation. The spiritual significance of forests has been completely lost with the minimization of the number of believers</p> <p>Technology: Technology development opportunities, new materials and energy sources enable more intensive use of forests</p> <p>Economic: People are not economically dependent on forest products, the main (industrial) raw material becomes timber. Various other non - timber forest products are of only marginal economic interest, and if so, in a very intensive form (e.g., blueberry forest farms, etc.)</p> <p>Environmental: The area of forest is slowly increasing or stagnant, but the tree species composition is totally changed (even-aged spruce monocultures are established)</p> <p>Political: Since 1918, the Czech Republic has been a republic in various forms. The period between 1948-1991 (centralized communist government; since 1968 under direct influence of Soviet Union) can be considered the most important era both in terms of the intensification of forestry and the violent rupture of religion in the Czech lands in general, which further accelerated de-spiritualization.</p>

		Main way of thinking: Forests are a matter of course and one needs technology for a successful future. Man turns away from God, technology and technological progress become God.
<p>4. Re-Spiritualization</p> <p>Similar to other Central and West European countries, there were several waves of re-spiritualization (like romantic era); however, the perception of forests as spiritual places and places for personal psycho-hygiene is growing mainly in the last 10-15 years with a growing number of city citizens who suffer from significant stress and overwork and seek peace and relaxation in nature, places of rest and self-discovery.</p>	<p>Increasing number of companies and individuals offering forest bathing, increasing number of forest kindergarten and different education programs for children and adults. Increasing number of nature trails in forests but also renovation of church places and buildings in the forests and landscape</p>	<p>Socio-cultural: There is a growing group of economically and politically strong groups of people in cities who are willing to spend money on all the ecosystem services of the forest and spend their free time in nature. At the same time, they do not want to be disturbed by normal forestry activities, so the number of conflicts is growing at the same time.</p> <p>Technology: IT, remote sensing and mobile technologies enables sophisticated mapping and evaluating different ecosystem services as well as spiritualization and recreation activities.</p> <p>Economic: The economic power of society is increasing and they are willing to spend the money for different recreation activities as forest bathing etc.</p> <p>Environmental: Last catastrophic events in the forest caused by climate change, bark beetle and other disturbances, showed the significance of forest for society</p> <p>Political: The democratic regimes of the current state system allow to all stakeholders to express their interests at the national and local levels. At the same time, freedom of information is slowly increasing people's awareness of forests and their significance as a multifunctional element of the landscape. However, the disadvantage of this system is often the political and professional fragmentation of opinion, which ultimately confuses the society.</p> <p>Main way of thinking: Forests are slowly becoming a spiritual and religious place for many people. However, their importance as a source of valuable renewable raw material, which acts as a CO2 sink, is also growing.</p>

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TABLE 4 (A2.4): FINLAND

Stage and description	Indicator and description	Drivers
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<p>1. Spiritual forest</p> <p>Prior to Christianization Finland had paganisms as a polytheistic religion worshipping a number of different deities in nature. Finnish paganism shows many similarities with the religious practices of related cultures, such as Sami and other Uralic paganisms as well as shares some features with Baltic and Germanic paganisms.</p> <p>Until 1200 century</p>	<p>Visitors to sites; Spiritual activities Forests had a specific god called Tapio.</p> <p>The paganistic traditions in Finland included also worshipping sacred trees and, for example, mountain aspens (<i>Sorbus aucuparia</i>) were also planted in yards to bring safety and happiness. Important tradition was to dedicate old spruce or pine tree for the dead person located between the burial site and the village.</p>	<p>Socio-cultural: Rural area sparsely populated, tribes had their own cultural practices: Sami in the north, Carelians in the east and Savo tribes in central parts of the country.</p> <p>Technology: hunting and gathering and shifting cultivation common in the rural areas</p> <p>Economic: very few economic drivers, trade took place in the Baltic Sea coast towns.</p> <p>Environmental: Abundant forest areas available</p> <p>Political: prehistoric time with little written documentation</p> <p>Main way of thinking: "Nature gives and nature takes". One has to be humble and respect nature and be thankful of its gifts to humans such as game and fish, berries etc. Serving and respecting gods in nature was important to be able cope with nature's changing and somewhat harsh conditions.</p>
<p>2. Cultural landscape</p> <p>The paganistic tradition was sidelined due to Christianization starting from ca. 12th century and finally broken by modernization latest by early 20th century, when folk magic and oral traditions went extinct. For a long period, the main agricultural practice was shifting cultivation (slash-and-burn cultivation) where forests were cut and burned for growing agricultural crop. Although cultivation of permanent fields started in southern coast in Middle Ages, shifting cultivation was extensive in inland regions, in particular in central and eastern parts and continued until the turn of the 20th century. Finns developed specific systems to cycle cultivation in different type of forests (young deciduous and old coniferous forests) The practice resulted in forest destruction of in South- and East Finland. Moreover, tar burning from pines was extensive in western and northern parts of Finland with its peak in 1860s. leading also to deterioration of the forests.</p> <p>1200- late 1800 A.D.</p>	<p>Visitors to sites; Spiritual activities Paganistic practices were not accepted due to Christianization. Cemeteries in rural areas were established in pine forests and managed as "forested parks". In eastern part of the country, people were traditionally buried in forest cemeteries that were maintained in their natural state. Forests were used as a refuge to hide from the enemy.</p> <p>Art and literature: National epic Kalevala describing Finnish myths and tales was published 1835.</p> <p>Artists, painters, poets and composers used wilderness forest landscapes as valuable source for inspiration and the grounds for national identity.</p>	<p>Socio-cultural: Populations was concentrated on south and the west coast and some areas in the inland. Poor, uneducated people practiced still their cultural traditions in the countryside. Elite educated people started to find national values in primeval forests and used is as source for national ideology and grounds for Finnish nationalism.</p> <p>Technology: Forest industry started to develop in Finland in 1600s, timber values were still low, shifting cultivation and tar burning were extensive and labor intensive.</p> <p>Economic: Tar was the main export product due to the growth of shipbuilding industry in Europe with a peak in 1800s. Rural people had low-income levels and many worked as tenant farmers.</p> <p>Environmental: Abundant forests were largely exploited for growing agricultural crop.</p> <p>Political: Finland was governed by Sweden (end 1200s until 1809) and Russian (1809-1917) and boarder between these nations changed many times.</p> <p>Main way of thinking: Large share population struggled with poor living conditions and collected food from forests for winter and fodder for animals. Cultural traditions and myths attached to forests still living and practiced among rural populations. Elite started to build romantic image of forests through arts describing life of Finns and nature in their works</p>
<p>3. Rational land management</p> <p>Forest became valuable through industrialization and rapid growth of forest industry, in particular sawmill industry before the I World War.</p> <p>Rational planning of forests started in the 1910s and selective cutting was prohibited by in 1948. Intensive forestry aiming at maximizing timber production started in 1950s, and forest industry enlarged and production was diversified.</p> <p>Large scale plantation forestry and drainage of peatlands changed landscapes and reforested unproductive lands.</p> <p>From late 1800s onwards</p>	<p>Land-use: First national parks were established 1918 preserving natural landscapes.</p> <p>Media, art literature: Finnish national romantic movement flourished in the early years of 20th century and architecture, painting and music and drew inspiration of Kalevala, the Finnish national epic and Finnish nature.</p> <p>Visitors to sites: Hunting, mushroom and berry picking important for supporting rural people's subsistence, but these visits also maintained nature connectedness.</p>	<p>Socio-cultural: Raised standard of living, population growth, first big wave of urbanization in 1960 and 1970s.</p> <p>Technology: National forest science and education was established 1917. Rapid industrial development, many technological innovations in forest industry (sawmill, pulp, paper, plywood etc.)</p> <p>Economic: Steady economic growth. Poor forest management practices were abandoned (such as selective cutting). Timber values raised globally providing jobs and income for growing number of people.</p> <p>Environmental: Forests were in poor state in the beginning of 1900s</p> <p>Political: Russian governance (1809-1917), Finnish independence in 1917 started democratic development of the society. Civil war 1917-1918 that divided society to left and right wing for decades.</p>

		Main way of thinking: Forests were the green gold of Finland and technological innovations in forestry practices and industry increased profitability and factories provided large number of jobs. Forest industry strengthened its role as the main export sector.
<p>4. Re-Spiritualization</p> <p>Cultural and social values of forests have become more important due to urbanization and raised standard of living since 1970s. Outdoor recreation has been nationally monitored since 2000 and health & well-being from forest increasingly acknowledged since 2010s.</p> <p>Since 1980s-</p>	<p>Visitors to sites; Spiritual activities: Visits to national parks have significantly increased during the past 20 years.</p> <p>Nature-based tourism (NBT) has been in a strong growth face since 2010 and health and well-being from forests one of the key trends in Finnish NBT.</p> <p>Science: Significant growth in scientific studies regarding health and well-being from forests.</p> <p>Media, arts and literature” Health and social benefits from forests widely discussed in different media.</p> <p>Forests and nature continue to play important role in arts and musical as well as for many citizens in their everyday life. Nature connectedness and forest relationship widely discussed in the media.</p> <p>The Finns’ forest relationship was among the first to be included in the National Inventory of Living Heritage. In 2020 Finns forest relationship suggested to be included in UNESCO world heritage list.</p>	<p>Socio-cultural: Most people live in urban areas, non-material values, downshifting, health & well-being are increasingly valued and demanded by citizens. In general, more emphasis on social and cultural values are attached to forests.</p> <p>Significant decrease in the influence of the Lutheran church on people’s everyday life. More people find well-being, spiritual values and perspective to everyday life challenges from nature. Growing number of “forest churches” that are actively used for religious services, wedding and other family events.</p> <p>Technology: Scientific information regarding amenity benefits of nature increased in Finland.</p> <p>Economic: Increasing demand/markets for non-material services from forests, outdoor recreation and nature-based tourism provide important number of jobs.</p> <p>Environmental: Environmental degradation and biodiversity loss raise also interest to protect nature and puts forward also its benefits to humans. Connections between healthy ecosystems and healthy people increasingly understood (e.g. Healthy Parks Healthy People Initiative at Metsähallitus (state) protected areas).</p> <p>Political: forest policies aim at reinforcing cultural ecosystem values along with timber production, needs for adaptations in forest management practices largely discussed in order to meet ecological and socio-economic sustainability.</p> <p>Main way of thinking: Multiple use forestry is reinforced, more attention is paid to cultural ecosystems services,</p>

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TABLE 5 (A2.5): GERMANY		
Stage and description	Indicator and description	Drivers

<p>1. Spiritual forest</p> <p>Pre-Christianity period with nature religion/Paganism:</p> <p>Nature as representation of Germanic gods; forest as place of all types of mystic creatures, deforestation begins</p> <p>Ca. before 500-800 A.D</p>	<p>Sites; spiritual activities</p> <p>Sacred groves/trees worship (e.g., “Donar Oak”); Germanic myths with plenty of good and evil forest creatures</p>	<p>Socio-cultural (Religion and Cultural identity/tradition): religious and cultural use: huge trees and forests as magnificent/fearful places,</p> <p>Technology (available knowledge and development): limited abilities to manage nature and exchange information</p> <p>Economic (Economic dependency): direct dependence on forests for livelihoods</p> <p>Environmental: omnipresence of forests</p> <p>Political (multi-level governance): rather decentralized rule by clans, tribes</p> <p>Main way of thinking: nature is powerful with limited human control and needs to be appeased</p>
<p>2. Cultural landscape</p> <p>Medieval period/dominance of Christianity and feudal state systems</p> <p>De-spiritualization of nature in a sense that nature becomes the creation of one god, but is not a representation of many gods; nature to be used by human beings, deforestation continues in waves (with spontaneous forest regrowth mostly connected to war and plagues), reaches maximum at about 1800</p> <p>Ca. 800-1800 A.D</p>	<p>Policy and legislation; Sites; spiritual activities; Media, art, literature;</p> <p>Sacred groves and worshipping trees banned but at the same time “tamed” big trees remain important accompanying Christian symbols (churches, churchyards, wayside crosses), fairy tales representing forests predominantly as dangerous place</p>	<p>Socio-cultural (Religion and Cultural identity/tradition): nature to be tamed and used by people with (one) god’s help</p> <p>Technology (available knowledge and development): limited but growing abilities to manage nature and exchange information</p> <p>Economic (economic dependency): decreasing dependency on forests for livelihoods, but forests remain important for many products and services (wood, hunting, non-wood products), also widespread agroforestry systems, and as land reserve</p> <p>Environmental: forest area decreasing, forest goods and services become (locally) scarce</p> <p>Political (multi-level governance): mostly monarchies and church rule, (semi) democratic system in some cities and territories</p> <p>Main way of thinking: nature can be tamed/used through hard work – this is the spiritual inspiration/expectation</p>
<p>3. Rational land management</p> <p>Enlightenment/rationalization and industrialization period</p> <p>Continued de-spiritualization of nature, science and technology gradually replacing the rule of religion, forest become subject to rational planning and management for the national economy and loose importance for subsistency and as land reserve (re-forestation begins)</p> <p>Dominant since ca. 1800 - present</p>	<p>Forest management practices; spiritual activities</p> <p>Forest science, forest planning and management, trees remain important accompanying Christian symbols</p>	<p>Socio-cultural (religion): enlightenment; shift from religious rule to rule of science and technology</p> <p>Technology (development): natural science and technology rapidly advancing with new possibilities to plan and use forests: creation of “scientific forestry”</p> <p>Economic (economic dependency): Importance of forests for local livelihood decrease/ “forest based” agriculture becomes unprofitable; forests split from agriculture, wood production becomes essential, “monofunctionalization” of forest management</p> <p>Environmental: re-afforestation, shift from broad leaf species to conifers in significant parts of the forest area</p> <p>Political: shifting governance arrangements, but share is advancement for science and technology-based decision making and professional bureaucracies</p> <p>Main way of thinking: science and technology can optimize nature’s management for the benefit of society</p>

<p>4. Re-Spiritualization</p> <p>Re-spiritualization of nature, forests become subject of non-material societal demands in increasingly urbanizing societies (recreation but also cultural and spiritual)</p> <ol style="list-style-type: none"> 1. Romantic period (ca 1820-1914) 2. Environmentalism and later postmaterialism/postmodernity (in waves between 1880 and today) 	<p>Media, art literature</p> <p>Trees and forests play important role in poetry, music and fairytales (romantic period and today), today also science (conservation science) and media (Wohlleben phenomena)</p> <p>Visitors to sites; Spiritual activities Tourism connected to nature amenities develops (romantic period) and becomes a mass phenomena (post war), strongly increasing number of business models connected to the spiritual use of forests (forest bathing and funeral forests) in recent decade</p>	<p>Socio-cultural (religion, new attitudes and behavioral change; urbanization): relative increase in “non-material” demands towards forests (response to industrialization and urbanization); religious and cultural: diminishing influence of the church as institution to regulate religion, secularity and finding spiritual fulfilment in nature,</p> <p>Technology (Information society): increasing knowledge available and possibility to practice spirituality outside the established societal venues, also globalization (influence of other cultures)</p> <p>Economics: decreasing importance of material functions of forests for economy, and increasing demand/markets for non-material services (re-multifunctionalization of forest management,</p> <p>Environmental: Environmentalism and environmental problems since the 1970s, perspective on forests as an environmental good develops and increases in importance (biodiversity, climate, also esthetics)</p> <p>Political (Political conflicts)/ Socio-cultural new attitudes and behavioral change): rapid changes, post war period democracy with increasing freedom for the individual</p> <p>Main way of thinking: control about nature reaches limits, desire to “re-unite” mankind and nature</p>
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TABLE 6 (A2.6): GREECE		
Stage and description	Indicator and description	Drivers

<p>1. Spiritual forest</p> <p>Historically the landscape in Greece has always been the result of long-lasting interaction between ecological processes and anthropogenic influences. There is evidence of continuous feedback loops between the society and the natural environment since Pre-Christian civilization. All forest ecosystems of Greece have thus been exposed to some level of human influences, which transformed its vegetation structure (e.g., grazing, coppicing, shredding and pollarding trees). Anthropogenic impact on natural vegetation is thus long-lasting (i.e., in Epirus goes back the mid-6th millennium BC).</p> <p>From that period humans played a major role in the shaping of the landscape. Degradation of mixed oak forests at low and medium altitudes into macquis and pseudomacquis and downward movement of the mountain treeline at the highest altitudes were the most characteristic changes in natural vegetation.</p> <p>Before 500-600 A.D</p>	<p>Sites (e.g. sacred trees near oracles and pre-Christian churches)</p> <p>Trees were regarded as deities and temples and sacred groves as the first places of worship (e.g., Altis in Olympia dedicated to Zeus and established by Hercules according to the myth). Specific tree species became symbols of the divine being associated with metamorphoses of persons to trees (i.e., Daphne to laurel, Kyparissos to funeral cypress, Pitys to pine), tree nymphs (oak, ash, walnut) or being dedicated to deities (oak to Dioni and later to Zeus, laurel to Apollo etc.).</p> <p>Spiritual activities: Ancient tree worship is a major characteristic of the classical times. Vegetation and divinity are so interconnected that we could speak of plants as emblems of the divine.</p> <p>Art literature: Ancient Greek mythology has plenty of stories that associate trees to gods or spirits. Tree nymphs play a protagonist role.</p>	<p>Socio-cultural (Nature worship): Trees are conceptualized as gifts of the gods and are related to gods or nature spirits. These supernatural entities live in forests. Some of them like Pan are related to forests and the natural world creating a distance between Nature and people.</p> <p>Technology (development): Limited technology, land clearance was possible with the controlled use of the fire. Sacred forests were protected. The myth of Erysichon who cut the sacred oak of Demeter is characteristic of the supernatural punishment to sacrileges.</p> <p>Economic (economic dependency on other FES): Direct dependence on natural ecosystems.</p> <p>Environmental: Grazing is the main process in transforming the Mediterranean landscapes to more open ecosystems. This man-made landscape where forests were always scarce as in all the Mediterranean disappointed early European travelers who were expecting a lost Eden full of nymphs and impressive forests. Sacred forests were strictly protected and severe supernatural punishments (even death of trespassers) are associated with intents of cutting them.</p> <p>Political (multi-level governance): Rather decentralized rule of cities.</p> <p>Main way of thinking: In the ancient world Nature was seen as divine and trees and forests as sacred.</p>
<p>2. Cultural landscape</p> <p>Spirituality of the natural vegetation and especially ancient trees continued until modern times as ancient myths about nymphs and nature spirits survived in new stories about haunted trees. Christians directly countered or gave new meaning to earlier beliefs incorporating them in a modern concept.</p> <p>During the medieval times, many Christian Orthodox monastic communities were created in a close combination with natural forms, e.g., the Meteora rock pillars and the Mt Athos monastic community. The surrounding environment was usually managed with stewardships and sustainable preservation. Spirituality (also connected to the divine) was further expressed by smaller scale systems, such as outlying churches surrounded by a handful of huge ancient trees often marked with a carved cross in their barks or sacred forests.</p> <p>Sacred forests have existed in Epirus Region (NW Greece) since the Ottoman period (1479-1913), forming small forest patches embedded in active agricultural and farming landscapes. These forests provided several regulatory ecosystem services to their neighboring communities, such as protective wooded buffers above villages, reserves of essential resources in times of dire need and parallel aesthetic and spiritual values. Their</p>	<p>Sites (e.g., sacred trees near oracles and pre-Christian churches)</p> <p>During the Ottoman occupation sacred forests were protected with taboos under the fear of supernatural punishments. Outlined churches and their trees were conceptualized as interrelated figures in the rural Greek landscapes.</p> <p>Forest management practices: Every sacred forest has its own reasons of establishment, rules and history. Strict protection of vegetation and fauna is applied in few cases. In most sacred forests hunting and collection of fruits, mushrooms, greens and dead wood is allowed (sometimes ceremonially), in some cases grazing is allowed and in all cases, trees are protected. Community decisions could demand even the cut of part of the forest to provide timber for services essential for the community (e.g., construction of a church or school)</p> <p>Spiritual activities: During annual ceremonial litanies, the priest accompanied by the community would consecrate sacred trees and. These are called ψωμένα δέντρα [ypsoména dentra], literally elevated trees, and have a protective character for the as they serve as guardians of settlements against epidemics or evil</p>	<p>Socio-cultural: Trees are conceptualized as Virgin Mary's or Saints' property.</p> <p>Technology (development): Increasing exploitation of the natural environment for resources, early management practices start to be developed (e.g., in monastic communities).</p> <p>Economic (Economic dependency on other FES): Sacred forests as specially reserves could have an economic role providing fuelwood to teachers, doctors, priests paid by the communities and in few cases even timber for community works. Community and church councils were responsible for their management. Sacred forests acted as a sort of proto-ecosystem services providers</p> <p>Environmental (land-use change): Forests gave their place to more open landscapes in all the Mediterranean and Greece was not an exception. Only the 10% of the Mediterranean area is forested today, deforestation began 8000-6000 BC with up and downs following regional histories. In such an anthropogenic landscape where vegetation was mostly overgrazed sacred trees and forests were visible elements of the landscape.</p> <p>Political (formal and informal policies): During the Ottoman occupation clusters of villages e.g., Zagori (Epirus, NW Greece) gained a kind of privileges that conferred status and wealth augmented with remittances from male migration. Communities should manage social and economic issues and in that context excommunications, supernatural fears and religion were used to regulate issues of social or economic nature. Nor all regions share the same history: Greeks, Romans, Byzantines, Venetians, Ottomans left their special imprints in the landscape.</p> <p>Main way of thinking: Nature is not divine, sacred forests and trees still exist incorporated in Orthodox Christian Folk religion. Sacred forests and trees are protected</p>

<p>variety of services reflects the different ritual praxes for the forests' establishment carried out by the local communities (saints' dedication or protection via excommunication threats to potential trespassers and community decisions), which in turn lead to a variety of management regimes, ranging from strict protection to controlled management. It seems that protection through religion is a common phenomenon in all Greece, as we have surveyed places as such both in the mainland and in the islands.</p> <p>Ca. 600 A.D. -1821 (Greek War of Independence)</p>	<p>spirits. Celebrations were organized under the shade of mature trees in outlying churches inside forests.</p> <p>Policy and legislation: Sacred groves and worshipping trees of the Antiquity often banned by Christians. At the same time trees accompanying Christian churches were considered sacred. During the Ottoman occupation Dedication to a church or "excommunication" of potential trespassers was used as a tool to protect important forests. Church and community councils were responsible for such decisions.</p>	<p>through taboos and the fear of supernatural punishments. Sacred elements, e.g., churches or iconstands differentiate (in term of management) sacred forests from secular forests.</p>
<p>3. Rational land management</p> <p>A network of sacred forests and groves has been recently rediscovered in the mountainous communities of Epirus, NW Greece, and specifically in the local administrative units of Zagori and Konitsa municipalities.</p> <p>This is a mountainous area of scattered small villages that suffered from rural abandonment during several depopulation periods; becoming now one of the three most sparsely populated areas of Greece.</p> <p>Ca 1832-1913 (Establishment of Greek State) to present</p>	<p>Sites: Sacred forests exist in almost every village of the municipalities of Zagori and Konitsa (Epirus, NW Greece). So far we have discovered more than 90. These forests are small in size (10-117 ha), located close to villages and are often adjacent to their outermost houses. After 1960 and especially, due to demographic decline, urbanization process and a general abandonment of rural areas, regeneration of vegetation around the forests has homogenized the landscape into a continuous forest cover.</p> <p>Forest management practices: After the establishment of the Greek State (1832-1913; year depends to different parts of the country) communities' decisions and prohibition regimes were often mirrored in local Forestry Services ordinances, especially in the case of sacred protective forests.</p> <p>Spiritual activities: Annual celebrations in forests dedicated to churches are performed, especially when the honored saint is the village patron. In some villages, these ceremonies still play a central role in the communities' life.</p> <p>Policy and legislation: Reported conflicts between communities and the Forestry Service (responsible for forest management). Few forests belong to municipalities, most belong to the state. Monasteries' forests were managed as regular forests and profit was part of the institution economic activities.</p> <p>Research: As all over the world, modernity is a threat to old beliefs and ideas, thus they sometimes disappear. Nonetheless, remnants of the old beliefs still survive even hidden as superstitions.</p>	<p>Socio-cultural (secularity/rationalization; urbanization): In forestry, in general after the establishment of the nascent Greek kingdom we have a shift from multifunctional to industrial forestry for the protection of timber. In 1877 we have the establishment of the School of Forestry and in the same period the attempts of king Otto to organize the forest administration by employing educated Bavarian foresters and attempt, although unsuccessfully, the systematic exploitation of forests. At that time, some scientists are attracted to ancient tree spirits and tree worship as a way to push forward the conservation of the natural world. As mentioned in "sites", major socio-cultural changes take place from the beginning of the 20th century (demographic decline, urbanization process and a general abandonment of rural areas) with consequent changes in the vegetation layer.</p> <p>Technology (development): Establishment of scientific forestry, beginning of the motion of aesthetic forests, mainly pine plantations, for cities/towns/ even villages. Sacred forests coexist with all other activities.</p> <p>Economic (economic dependency on other FES): Change from multifunctional forestry and agroforestry systems to timber production. In some cases, oak shredded trees and grazed agro pastures were replaced by plantations of conifers. Depopulation from the beginning of the 20th c. but especially after WWII had as a result sacred forests to lose their value as reserves. Only protective, spiritual and aesthetic value remained stable.</p> <p>Environmental (land-use change, change in forest management): Land abandonment and natural regeneration of vegetation in old cereal fields, vineyards and pastoral land is the most severe change in the landscape, especially after WWII. Biodiversity conservation appear in the political agenda. After 1938 the first national forests were established in Greece.</p> <p>Political (multi-level governance; centralization): After the end of the Ottoman occupation (1832 -1913; year depends to different parts of the country) authority on forest passed from communities to the state and from regional to national level. Responsible for the management of forests are regional forestry services under the Ministry of rural development and after under the Ministry of environment.</p> <p>Main way of thinking: Elite flirts with Folklore and revival of ancient myths with the intention to build a new identity for the newly established Greek nation based on continuation of classical times characterizes part of Educated Greek official discourse.</p>
<p>4. Re-Spiritualization</p>	<p>Media, art literature</p>	<p>Socio-cultural (religion, new attitudes and behavioral change; urbanization, globalization): Relative increase in "non-material" demands towards forests (response to</p>

<p>Re-spiritualization of nature; forests become subject of non-material societal demands in increasingly urbanizing societies (recreation but also cultural and spiritual). Romantic period and environmentalism have their influence on modern Greek society.</p> <p>In Greece educated elite reproduces myths and stories about nature spirits and trees worship in public awareness campaigns about the need of greening the overgrazed countryside, especially around the beginning of the 20th c. In villages some inhabitants still believe in taboos and sacred trees and forests related taboos, other neglect them as superstitions. The younger generation relearns about the sacred forests and reacts with respect to natural and cultural heritage.</p> <p>During the last decades, a large network of sacred forests has been rediscovered in Epirus and 16 of these have been studied in detail in the framework of the project THALIS-SAGE (Conservation through religion. The sacred groves of Epirus).</p> <p>As for many sacred forests around the world, Epirus sacred forests are facing cultural abandonment, as people moved out from rural areas favoring larger cities throughout the region, Athens or abroad. With people moving away from the rural environment, forest encroaching has also increased, on abandoned fields and pastureland in the forest's proximity.</p> <p>In 2015 the sacred forests of the villages of Zagori and Konitsa were included in the UNESCO's Intangible Cultural Heritage National Index. They also appear in the global Sacred Natural Sites network.</p> <p>Dominant since ca. 1910 - present</p>	<p>Trees and forests play important role in poetry, music and fairytales (romantic period and today). Today also conservation science and media play a relevant role.</p> <p>Art literature: Haunted trees protagonist in literature of most important Greek authors (e.g., A. Papadiamantis [1851-1911], Z. Papantoniou [1877-1940], tree worship was a beloved issue of the Greek Folklore, and such stories were reproduced in school books until the WWII.</p> <p>Visitors to sites; Spiritual activities celebrations in outlying churches have started to fade but still survive,</p> <p>slowly increasing number of business models connected to the spiritual use of forests (in recent decade).</p> <p>Municipalities of Zagori and Konitsa and the Northern Pindos National Park supported the Intangible Cultural Heritage proposal (2015) to the ministry of Culture with letters of intent. Main concern of municipalities was the potential of more prohibitions because of the designation. The forestry service is legally responsible for all forests management.</p> <p>We have conducted long-term ethnographic surveys on the sacred forests of Epirus that we try to expand in the rest of Greece. Through the THALIS SAGE project we have establish a research team that also studied the biodiversity conservation value of sacred forests.</p>	<p>industrialization and urbanization); religious and cultural: diminishing influence of the church as institution to regulate social issues, and increase of initiatives of finding spiritual fulfilment in nature. Inclusion of sacred forests of Zagori and Konitsa in the National Index of Intangible Cultural Heritage (2015) with the agreement of municipalities is important. This attempt emphasizes the recognition of sacred forests as past management systems. Cultural associations of local communities, National Park and other such institution welcomed the idea.</p> <p>Technology (information society): increasing knowledge available and possibility to practice spirituality outside the established societal venues under the influence of globalization has started to happen.</p> <p>Economics (demand-driven, diversification of the economy: Decreasing importance of industrial forests for economy, and increasing demand/markets for other services (re-multifunctionalization of forest management). Not only professional uses but also recreational e.g., mushroom picking or harvesting of wild fruits, aromatics, medicinal plants while spending time in the forest becomes more and more attractive for Greeks.</p> <p>Environmental (climate change and natural disasters), intrinsic nature of forests, land use changes): Environmentalism and environmental problems since the 1970s, perspective on forests as an environmental good develops and increases in importance (biodiversity, climate, aesthetics). Forest mega fires supported by land abandonment and climate change is a serious problem.</p> <p>Natural succession of vegetation in abandoned agricultural land in rural areas has created a tick impenetrable scrubland perceived positively from a distance as a green place (city inhabitants, tourists) but negatively from locals that they see it as burnable and they associate it with the past lost productive land.</p> <p>Political (political conflicts)/ socio-cultural new attitudes and behavioral change): In a manmade landscape greatest changes happen during the last 150 years. Energy works (wind turbines, gas drilling, gas pipeline) without the consensus of local communities is the most severe threat of our times.</p> <p>Main way of thinking: control about nature reaches limits, desire to “re-unite” mankind and nature exists but not as main steam. The Orthodox church and especially the Patriarchate starts to develop an environmental friendly view https://www.patriarchate.org/events/greenattica</p>
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TABLE 7 (A2.7): INDIA

Stage and description	Indicator and description	Drivers
<p>1. Spiritual forest</p> <p>Before settled agriculture started</p> <p>The origins of sacred groves are ancient, some of them going back to the Neolithic period (c. 6000-3500 BP).</p> <p>In some parts of India (where long-term data are available, e.g. Kodagu) forests were inhabited by hunter-gatherer tribes until around 1500 BP</p> <p>Some sacred groves might be more recent and there is evidence that these groves were protected to provide important ecosystem services (e.g. groundwater storage) at a time when water sources were drying out.</p>	<p>Sacred groves that might date back to the Neolithic period have prominent megaliths around which later built structures have been developed</p> <p>Long-term ecological data show that there was no fire (biomass burning on agricultural land) in Kodagu sacred groves until 1500 BP</p> <p>Sacred groves that are more recent may have been protected for their ecosystem services in response to environmental drivers (such as the Little Ice Age) that dried out streams and waterbodies around 500 BP.</p>	<p>Socio-cultural: A more ‘active’ interaction with land appears to have started around 1500 BP in Kodagu, prior to which forest was possibly seen as a ‘dark place’ to be feared. (Elsewhere in India the ‘active’ interaction with land started sooner than 1500BP)</p> <p>Technology: The onset of farming technology around 1500 BP in Kodagu was a key factor in landscape development</p> <p>Economic: For the ruling dynasties in Kodagu economic factors were important (e.g. strict demarcation of land boundaries for tax collection). This might have had unintended benefits for forest protection with authorities able to enforce boundaries of sacred forests more easily</p> <p>Environmental: Environmental factors such as the onset of the Little Ice Age around 500BP may have been an important factor that triggered the protection of sacred forests in Kodagu</p> <p>Political: It is possible that during the pre-history when “conservation” was not a widely accepted concept, sacred groves were the “selling point” for forest protection to deliver provisioning, regulating and supporting services that were vital to agriculture on which many communities in ancient India were dependent. As such, the ruling dynasties or local chieftains may have exploited sacredness to ensure the continuing provision of services</p> <p>Main way of thinking: Forests were used by sparsely populated hunter-gatherer tribes who may have practiced animistic worship until 1500BP when more settled forms of agriculture may have begun. A combination of environmental, economic and political factors led to the protection of sacred forests from c. 500BP</p>
<p>2. Cultural landscape</p> <p>From the start of settled agriculture</p> <p>For example, in Kodagu, India (where long-term data are available) fires start around 1500 BP until 500 BP. These</p>	<p>Long-term ecological data show that fire (biomass burning on agricultural land) starts in Kodagu around 1500 BP and continues until 500 BP</p>	<p>Socio-cultural: Kodava people are believed to have migrated to Kodagu and started farming around 1500BP, replacing the predominantly hunter-gatherer populations (Elsewhere in India, settled agriculture started sooner and the cultural landscapes date further back in time)</p>

<p>fires may have shaped the agricultural landscape in places where sacred groves are found</p>		<p>Technology: Fire, farming technology, and farm animals might have been responsible for the development of cultural landscapes</p> <p>Economic: The economy transitioned from hunting gathering to settled agriculture and the hunter-gatherers were pushed back into the forest hinterlands whereas the agriculturalists occupied ‘prime’ land which was more fertile</p> <p>Environmental: The clearance of forest and use of fire altered the environment significantly from a predominantly tree-covered landscape to landscape with large openings in forest</p> <p>Political: The time period between 1500 and 500 in Kodagu was marked by a number of significant political transitions with the successive dynasties wielding different influences on the development of the cultural landscape</p> <p>Main way of thinking: Land/biomass burning created mixed landscape mosaics composed of tree-covered and open landscapes. This was primarily driven by the agriculturalists’ way of thinking – land clearance was the main tool to develop a landscape suitable for human habitation</p>
<p>3. Rational land management</p> <p>Formal land management through the demarcation of land boundaries for the purpose of tax collection</p> <p>For example, in Kodagu, India (where long-term data are available) formal land management with the purpose of tax collection started around 500 BP</p>	<p>Long-term ecological data show that fire (biomass burning on agricultural land) stopped from around 500 BP in Kodagu</p>	<p>Socio-cultural: The importance of forest conservation was reinforced by sacred traditions</p> <p>Technology: Deep trenches were dug in Kodagu to demarcate land boundaries which also helped reinforce sacred forest protection alongside providing a tool for tax collection</p> <p>Economic: The strictly defined land boundaries enabled the ruling dynasties and local chieftains to collect taxes</p> <p>Environmental: The onset of the Little Ice age dried out waterbodies and water supply to agriculture which might have highlighted the importance of forest protection to provide the ecosystem service of water storage</p> <p>Political: The ruling dynasty was supportive of reinforcement of sacred traditions</p> <p>Main way of thinking: Land boundaries were enforced to demarcate agricultural land to family farmers. The main shift in thinking around this time was the recognition of ecosystem services from forests</p>
<p>4. Re-Spiritualization</p> <p>Formal land management through the demarcation of land boundaries for the protection of sacred forests</p> <p>For example, in Kodagu, India (where long-term data are available) formal land management that started around 500 BP also set the scene for sacred forest protection</p> <p>The British colonial period brought commercial crops such as coffee and tea to Kodagu, but despite more commercially-focused agriculture the protection of sacred groves continued.</p>	<p>Long-term ecological data – evidence of no fire (biomass burning on agricultural land) from around 500 BP when sacred forest groves ‘emerge’ through active protection in Kodagu</p> <p>The protection of sacred forests then continues despite a shift from cereal-based agriculture to commercial crops such as coffee and tea starting from around 200BP</p> <p>More recently, in post-Independence India, there is a trend of ‘Sanskritization’ of forests as evidenced by more elaborate temple constructions in place of simple forest shrines</p>	<p>Socio-cultural: Once the sacred groves ‘emerged’ in Kodagu the socio-cultural apparatus from 500BP onwards has contributed to their protection to date. However, the process of ‘Sanskritization’ has perhaps rendered temples more important than forests</p> <p>Technology: The farming technology improved and farming was intensified progressively from 500 until today without any significant impact on the protection of sacred groves.</p> <p>Economic: The introduction of commercial crops such as coffee and tea changed the economic set up, but the protection of sacred groves continued</p> <p>Environmental: The change in agriculture changed the environmental conditions in the wider landscape but sacred groves continued to be protected</p> <p>Political: Since 500BP Kodagu underwent a number of political changes which do not seem to have affected sacred groves in any significant way. However, the influence of</p>

More recently, the animistic deities have been ‘converted’ to mainstream Hindu deities a process described as ‘Sanskritization’

mainstream Hinduism has had an impact on where emphasis is placed in the protection of forest vis a vis temple.

Main way of thinking: Awareness of ‘ecosystem services’ from forests also led to forest protection on land ‘spared’ from agriculture on a local scale. Although the protection of forest continued the process of Sanskritization put a greater emphasis on temple and built structures as opposed to forest

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TABLE 8 (A2.8): IRAN

Stage and description	Indicator and description	Drivers
<p>1. Spiritual forest</p> <p>Pre-Muslim period with strong religion-nature connection (Mithraism and Zoroastrianism)</p> <p>Creation of plants had been seen as the fourth step of creation of universe by God.</p>	<p>Sites; spiritual activities</p> <p>sacred groves/sacred trees/ sacred natural sites (e.g., “4000 year-old Abarkouh cypress”; Old myths about good and evil forest creatures</p>	<p>Socio-cultural (Religion and Cultural identity/tradition): religious and cultural use: wood was the only source for keeping the sacred fire alive in every household, livelihood of many people depended on oak trees (e.g. to obtain leaf-fodder).</p> <p>Technology (available knowledge and development):</p> <p>low ability to manage forest and limited efficiency in exchanging and transferring information.</p> <p>Economic (Economic dependency): direct dependence on forests for livelihoods</p> <p>Environmental: limited forest resources</p> <p>Political (multi-level governance): depended on power of the kings, delegate authority to local powers as a kind of feudal-state system.</p> <p>Main way of thinking: nature is creation of God and needs to be respected, trees are sacred (e.g. fathers have to plant and maintain a tree for each new-born babies).</p>

<p>2. Cultural landscape</p> <p>Dominance of Islam (since 700 A.D.)</p> <p>Nature was seen as creation of God to serve human; therefore, deforestation and land-use change increased.</p>	<p>Policy and legislation; Sites; spiritual activities; Media, art, literature; Sacred groves and sacred trees venerated from pre-Muslim communities and preserved their importance as religious/cultural symbols, but many pre-Muslim myth and elements changed and attributed to Islamic elements</p>	<p>Socio-cultural (Religion and Cultural identity/tradition): nature to be tamed and used by people with (one) god's help</p> <p>Technology (available knowledge and development): limited but growing abilities to manage nature (especially agroforestry systems) and exchange information</p> <p>Economic (economic dependency): high dependency on forests for livelihoods as the main source of many products and services (charcoal, wood, hunting, non-wood products).</p> <p>Environmental: forest area decreasing, forest goods and services become (locally) scarce</p> <p>Political (multi-level governance): feudal-state system</p> <p>Main way of thinking: nature must be tamed to serve human and God. Based on Islamic rules anyone who can establish agriculture in forest or rangelands can claim the land and if someone leave the land for more than five successive years he will lose the ownership right and another one who re-established agriculture can claim the land. Livelihood is the main spiritual driver but SNS, SG, and sacred trees still exist.</p>
<p>3. Rational land management</p> <p>Rationalization and industrialization period</p> <p>Start with nationalization of forest and rangelands in 1961. Science and technology replace the rule of religion, and wood became the main product of forest which must be harvested only from forests with management plans. forest become subject to rational planning and management for the national economy and loose importance for subsistence</p>	<p>Forest management practices; spiritual activities</p> <p>Forest science, forest planning and management, sacred groves and sacred trees remain important only around sacred sites, shrines and other religious elements</p>	<p>Socio-cultural (religion): challenge; shift from religious and traditional rules to rule of science and technology was not accepted by people (i.e., especially people who their subsistence was dependent to forest).</p> <p>Technology (development): natural science and technology advanced gradually, applying the European models of forest management on Iranian forest ecosystems (i.e., many of them failed due to mismatch between method and socio-ecological environment).</p> <p>Economic (economic dependency): forests were still an important livelihood resource for local people (unofficially) / government tried to split forest from agriculture, wood production becomes essential for forest management.</p> <p>Environmental: re-afforestation, shift from broad leave species to conifers in small-scale in some parts of the forest area.</p> <p>Political: top-down governance arrangements, with no share of local people and low to moderate share of science and technology-based decision making.</p> <p>Main way of thinking: top-down: science and technology can optimize nature's management for the benefit of society.</p> <p>Bottom-up (local people): forest must be used to fulfill their livelihood needs</p>
<p>4. Re-Spiritualization</p> <p>Re-spiritualization of nature, forests become subject of non-material societal demands in increasingly urbanizing societies (conservation biodiversity, recreation but also cultural and spiritual). This growing demand from urban societies urged government to stop all harvesting plans from Iranian forests in 2015 and declare Iranian forests as conserved ecosystems.</p>	<p>Social media, science, art, literature</p> <p>Increasing awareness of society about natural disasters (e.g. flood, fire, dust storms) and its reflection in science, social media, art, and literature.</p> <p>Visitors to sites; Spiritual activities Tourism connected to nature amenities develops and becomes a general phenomenon, but business models</p>	<p>Socio-cultural (religion, new attitudes and behavioral change; urbanization):</p> <p>Increasing attitude toward conserving forests and relative increase in "non-material" demands. Despite the fact that local people are still dependent on forests for their subsistence, but they still have a strong spiritual connection with it. In response to modernization and globalization, the influence of religion diminishes between younger generations and replaced by naturalism in their attitude toward forest.</p> <p>Technology (Information society): increasing knowledge available, globalization, and possibility to transfer knowledge and experience.</p>

<p>Growing number of NGOs, environmentalism, and post-materialism.</p>	<p>connected to the spiritual use of forests is still missing.</p>	<p>Economics: increasing the hazard of de-forestation for economy of local and urban people, increasing demand for non-material services (e.g., recreation, water, oxygen, biodiversity conservation).</p> <p>Environmental: recent mass Oak-decline in Zagros forests, floods, fire, drying of lakes, and dust storms cause many environmental problems in Iran.</p> <p>Political (Political conflicts)/ Socio-cultural new attitudes and behavioral change): Conflict between people and government, rapid changes in society.</p> <p>Main way of thinking: growing attitude toward the idea that controlling nature reaches to its limit so it's time to re-unite with nature</p>
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TABLE 9 (A2.9): ITALY

Stage and description	Indicator and description	Drivers
<p>1. Spiritual forest</p> <p>Roman and pre-roman period/ Etruscan civilization (IX – I century BC):</p> <p>Forests and nature in general as the place of gods and spirits, both good and evil creatures. Forests as places of mystery, magic and full of life. Forests are also places of abundance, thus livelihood provision activities were allowed.</p> <p>Along the entire history in the rural culture traditions, spirits and tales survived.</p>	<p>Sites, spiritual activities, forest management practices, art, literature:</p> <p>Numerous sacred forests and groves all over the country, some of them are still present in toponymy; altars, statues and temples; historical and literature testimonies (in Plinio the elder, Polibio, Livio); Etruscan funeral forests (e.g., Martoranum Forest)</p>	<p>Socio-cultural: good and evil creatures live in the woods (in Etruscan = Luk Eri the sacred woods dedicated to Voltumna; in Roman period = Lucus or Nemus, to be distinguished by silva=common forest). Sacred forests were instituted to protect temples, altars, graves and water springs (lucus Feroniae, dedicated to Feronia that became the Virgin Mary in Christian period). Rites and celebrations are held in sacred woods which represent the only few untouched forests already at that time (I century BC.). Some livelihood activities as hunting, picking wild products and later some agriculture activities were allowed. Nevertheless, the permission must be asked to the gods.</p> <p>Technology: there are testimonies of silvicultural operations especially in lowlands and presence of silvo-pastoral systems responsible of visible changes in the forest composition and structure. Efforts to protect the sacred forests.</p> <p>Economic: Sacred forests were managed by the priest, in Roman period hosting big celebrations. Priests were allowed to rent part of the sacred forest for 5 years. With the arrival of Romans forests becomes places of economic activities, origins of the “forestry sector”</p>

		<p>Environmental: sacred forests are intangible for preserving their intrinsic values; great presence of forests especially in mountainous areas, valleys and lowlands were modified by men.</p> <p>Political: decentralized rules by clans, later increasing centralization of power with Roman Empire. Lex Luci Spoletina (ca. III century BC) the first written law banishing cuts and productive use of spiritual forests (death sentence)</p> <p>Main way of thinking: people live in close relationship with the forest, both spiritual and economic dependency. Forests are extremely lively and respected. There is written and unwritten laws for protecting sacred forests as places precious for the spiritual and social collective values.</p>
<p>2. Cultural landscape</p> <p>From forests as places of gods and deities to bad spirits and evil presences; expansion of Roman Empire, deforestation and fragmentation; dominance of Christianity; Medieval period and development of regional centers of power; (ca. 1000 AD.) Monasticism was crucial in the development of rural society and landscape also establishing forest management practices (synergy between production and spiritual uses)</p>	<p>Policy and legislation; Sites; visitors; spiritual activities; art, literature</p> <p>Laws and regulations (also through inquisition) to ban forest cults, meanwhile single trees for spiritual or symbolic values are preserved; Presence of rock temples, shrines and altars; Sacred forests linked to Catholic religion (Monasteries, Hermitages); Forest Code of Camaldolesi Monks; forests are present in literature, paintings and traditional tales.</p>	<p>Socio-cultural: With Romans the forest landscape is starting to be tamed and in etymology there is an equivalence between the words “forest” and pasture . Christianity spread the idea that everything is made by God for Mankind, de facto erasing life from the woods and every form of holiness. San Martino (315-397 DC.) was one of the most effective persecutors of forest cults. Evil and scary presences remain in the forest. Monastic tradition started to establish monasteries in the woods changing from lucus to silva Benedicta, fist in a desacralization effort, then creating vast rural properties to be managed changing the rural landscape. Nevertheless, La Regola della vita eremitica by Paolo Giustiniani in 1520 DC, might represent the basis for today sustainable forest management practice using spiritual values for conservation purposes.</p> <p>Technology: agricultural expansion, forest management evolves (with low technology level), particular importance in shaping the landscape also with the practice of debbio (clearings with fire).</p> <p>Economic (development): dependency from forest for livelihood decrease but increase the use for infrastructure and energy; demand of resources for construction of boats for civilian, commercial and for military uses.</p> <p>Environmental (land use change): forest ecosystems start to be fragmented; mountain ecosystem started to be used for extractive purposes; sacred forests preserved as natural, quiet, peaceful spaces and also establishing synergies with productive uses (prevalence of fir for extracting essential oils).</p> <p>Political: political conflicts and limitation of religious freedom. A law of 111 BC. allow to cut and occupy public land for agricultural purposes, deforestation started. In the era of secularization of the power we can cite in 292 a.C.an edict of emperor Teodosio abolish the cult of trees (dendrolatria); Concilium of Arles (452 AC.) and Nantes (568 AC.) definitively abolish forest cults. Republics with independences (Maritime Republics)</p> <p>Main way of thinking: Starting from the expansion of Roman empire, nature can be shaped by men, it is an economic resource; forests can be cut to leave space for infrastructure and agriculture. Spirituality became more and more concentrated in physical and well determined places (associated sacred forests); Christianity is dominant, with the consequence that gods moves from nature to human-made places, leaving mostly bad spirits in the wild. Christianity used to attribute spiritual values to some forests as a mean of conservation and sustainable management.</p>

<p>3. Rational land management</p> <p>De-spiritualization at its climax. Forests as resources to be used for economic and commercial expansion. Science and technology at the service of maximizing profits.</p> <p>Enlightenment (during the 1770-1830 a.C.) and the origins of science of Nature.</p> <p>From ca. 1869 with the foundation of the Italian Forest School in Vallombrosa a slow process of development of a scientific approach to the management of forest resources starts, mainly inspired to keep high level of wood provisioning services under the constraint of land erosion prevention</p>	<p>Forest management practices; spiritual activities; sites; art and literature</p> <p>Forest science, forest planning and management, trees attached to symbolic, religious and spiritual values in Catholicism, rural cultures and in art and literature</p>	<p>Socio-cultural: Forests shift from reserve to resources, they are converted to farmland under the pressure of an increasing rural population. High forests converted to coppices to produce fuelwood under difficult natural regeneration conditions. Overexploitation of forests for the need of the infrastructural development after reaching the unity of the country (railway: the “cura del ferro” of Prime Minister Cavour) and for the need of the second world and the colonial period. Land restoration and large-scale plantation during the Fascism.</p> <p>Technology (development): Agricultural techniques implemented also in forestry; soil erosion prevention and water cycle regulation function of the forest developed as a field of applied science; new species selection and test for plantations; forest planning and silviculture as applied forest sciences.</p> <p>Economic: Profit is the driver for the management and planning decisions (“Economic realism” defined by Ciancio 1991). In 1700-1800 demographic boom, increased demand for both domestic and industrial energy; wood used as building materials both in domestic and navy building sites;</p> <p>Environmental: The forest landscape is hyper-simplified following agronomic techniques; State Properties with mixed functions (production and protection)</p> <p>Political: Conflicts (war), numerous States towards the centralization of power. Creation of the State properties with mixed uses (production and protection) as for example in Venetian Republic and Granducato of Tuscany (Arsenal Reform 1782 AC. in the Venetian Republic; 1811 first Forest Law of Kingdom of Italy).</p> <p>Main way of thinking: Forests are resources to be used and modified according to human needs. Changes in ownership determines new dynamics of social control and pressure on the forest resources. Science and technology can help in maximizing profits, later to support multifunctionality</p>
<p>4. Re-Spiritualization</p> <p>Contemporarily with other stages, there is a comeback to forest as spiritual places (i.e. places of the soul, magic and inspiration) happening on one side in rural cultures absorbing spiritual values into Folklore, or on the other when noble/monastic class allow to look at forests without productive purposes. Later and until today, with urbanization process, forests become subject of new societal demands becoming a provider of cultural ecosystem services.</p> <ol style="list-style-type: none"> 1. Papal State with San Benedetto (with Camaldolese doctrine in Italy) and San Francesco D’Assisi from 1000 AC.; 2. During 1700 – 1800 AC with landscape painting (supported by Gran Tour) later with en plain air. 3. Art Nouveau (stile moderno) ca.1910 and Naturalism and Realism (nature and countryside are 	<p>Sites; visitors; spiritual practices;</p> <p>Woodlands devoted for cultural, heritage, artistic or spiritual use, single trees preserved for symbolic value (e.g. trees around monasteries, churches, cypresses in Tuscany). Tourism develops from pilgrimages through sacred woods and sacred trails (e.g. Via Francigena), to natural sites (eco-tourism) and forest outdoor museums or parks (e.g. Arte Sella, Sacro Bosco di Bomarzo). Today increasing number of business models connected to spiritual and cultural uses (from wellness to forest kindergarten)</p> <p>literature, art and media</p> <p>From religious texts to novels; inspiration for music, art movements, and media</p> <p>Policy and legislation; research; business innovation</p> <p>Research on spiritual values, both new and historical uses; wellness tourism, therapeutic and inclusion</p>	<p>Socio-cultural: Within Catholic church, monasticism (San Bernardo and Benedetto especially), forests and Nature are again the manifestation of God, forests are annexed to churches and monasteries, elected as privileged places where to meet the Divine and to know about the meaning of life. Religion, in the form of monasticism, represented both a technocratic approach to natural resource management, and the origins of multifunctionality with spiritual and cultural values of forests enhanced. Later, in upper/noble class, there was a rise of admiration for Nature and its spiritual, magic and alchemic powers. Urbanization process on one side allowed natural regeneration of forests in abandoned pastures/agricultural land, on the other side it pushes citizens to look for refuge from urban life in the woods. Diminished influence of the Catholic Church with cultural and religious globalization, enable increasing awareness and independence of spiritual practice</p> <p>Technology (information society): access to information and globalization</p> <p>Economic: Increasing societal demand for SES. Marketability of the spiritual values with environmental tourism and wellness tourism as powerful drivers, but also innovative business models. SES are often in synergies with other ES, and in the last decades SES happen to be more profitable than timber production alone. Indeed, traditional forest sector is declining as spiritual, cultural and recreational uses arises.</p> <p>Environmental: Rewilding of abandoned lands, multifunctionality, protection of biodiversity. Today there is a dualism between people supporting wilderness and strict</p>

<p>privileged scenery e.g. Verga) the for nature as inspiration and a realm worth of intellectual attention</p> <p>4. After the II World War also with environmentalism (1970 ca.), until today</p>	<p>initiatives, educational activities in the forest, land and outdoor museums and concerts</p>	<p>conservation (which are demonizing forest management) and active forest management for conservation and multifunctionality of the forests.</p> <p>Political: Papal State (until 1870) had strict limitation for the use of forest resources; From Monarchy to Republic, passing through two World Wars towards an increased consideration for public goods and increased spiritual and social freedom for the individual. Still conflicting policies between conservation and provision of SES and profit driven policies (agriculture, infrastructure, etc.). Testo Unico Forestale (DL 3rd of April 2018 n.34) art.16 and under Codice dei beni culturali e del paesaggio (DL 4272004) art.142 NS 156 and National Forest Strategy (2020), explicitly mention and protect recreational and cultural services of the forests</p> <p>Main way of thinking:</p> <p>Forests as complex and mysterious places that arouse intellectual curiosity (as opposed to the rationalist period where nature is emptied of its beauty and was attached to the idea of danger, hard work, subsistence). Nature takes back its individuality, expressing the need to reach a balance between exploitation and conservation. In Il Barone Rampante (1957) by Italo Calvino there is the seed of change from forests as places to be modified and exploited to places that are subject of Rights. From resources back to reserve. Today a profound need to connect with nature, and the idea of a socio-ecological system, are elements that drive personal, environmental and economic choices. Re-connection with Nature involves physical, and psychological wellbeing, environmental consciousness and spiritual awareness.</p>
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TABLE 10 (A2.10): JAPAN		
Stage and description	Indicator and description	Drivers
<p>1. Spiritual forest</p> <p>Animism/Shamanism</p> <p>Before Buddhism was introduced</p> <p>All the deities, Nature as existing in objects</p> <p>Forests as deity, place of fears worships</p>	<p>Frequency/Nr of reference in poetries, stories, ornaments, art works</p> <p>Records of spiritual forest lands</p> <p>Remaining Literature of ancient time</p> <p>Chinju no mori, Forest as deity (Shintaisan), Fusui</p>	<p>Socio-cultural: Worshipping Animism/Shamanism</p> <p>Technology: Use of stone tools</p> <p>Economic: Gathering and hunting, later rice cropping</p> <p>Environmental: Less than 1 million population (Kito, 2000); Omnipresence of forests, forests conversions are limited</p>

<p>Fusui (meaning wind-water, similar to Feng shui in China) and their influence on forest management</p> <p>(Emphasis on directions, locations of human settlements, water [rice paddy fields] and secondary nature including satoyama-like forests and deep forests). Fusui is based on the idea of energy manipulation through placement of certain elements to create harmony in the environment. Satoyama refers to the nature bordering zone surrounding arable land. Sato meaning village, yama meaning hill or mountain.</p> <p>BC until 6th century</p>	<p>Number of Shrines, Temples with forests (roughly 600 each in contemporary Japan)</p> <p>(Sacred) Trees, stones, living creatures, folklores Diverse representations of gods (Yorozu-no-Kami; literally translated, large number of gods)</p>	<p>Political: Villages; later Gemeinschaft-like society</p> <p>Main way of thinking: Forests have their own spirits.</p> <p>Sacred, fear, god-like</p> <p>Number of folklores refer to “Kamikakushi” (Gods or demons can let children or person disappear without trace.</p> <p>Mixture of human use, (not institutionalized) religion, influence from China (also via current Korean kingdoms)</p>
<p>2. Cultural landscape</p> <p>Compromise with central/ regional powers and religious authorities</p> <p>Limited de-spiritualization by central or regional political powers or/and religious authorities; infusion of state Shintoism and Buddhism practices with spiritual values of forests; forests are harvested under the sanctions of these powers and authorities at large scales; customs of respecting trees and forests at local levels are prevalent</p> <p>7th to 19th centuries</p>	<p>Forest management practices</p> <p>Cases of large-scale timber harvesting by powers and authorities to build Buddhist temples and Shinto shrines starting from the 7th century</p> <p>Cases of creating Buddha’s statutes from sacred wood in the 6th century</p> <p>Spiritual activities</p> <p>Permission was ceremonially obtained from “Yama no Kami (god of mountains)” on harvesting logs from remote forests to build Todaiji Temple in 759</p> <p>Local customs respecting trees and forests such as “Yama no Kami (god of mountains)” and taboos related to forests (Naumann, 1994; Fukuda, et al., 2000; “Yama no Kami” entry: 746-747)</p> <p>Policy and legislation</p> <p>(No signs of oppression of spiritual values)</p>	<p>Socio-cultural: state Shinto established out of ancient Shinto; Buddhism introduced mainly from China</p> <p>Technology: wide use of iron tools</p> <p>Economic: dependency on rice cropping with irrigation, need for protecting forests for the purpose of water provision</p> <p>Environmental: population is small (from approximately 5 to 30 million) omnipresence of forests, and later accessible forests were degraded</p> <p>Political: unification of Japan by the Imperial Court, later feudal governance (manors, Daimyo)</p> <p>Main way of thinking: forests can be utilized for social elites and people, but certain areas or spheres are sacred and should be respected and protected.</p>
<p>3. Rational land management</p> <p>State nation building era; spirituality for national goals</p> <p>Local practices related to spirituality are weakened by social changes and policies, scientific thinking guides forest management, spirituality is mobilized for national goals</p> <p>Late 19th to 20th century</p>	<p>Policy and legislation (signs of scientific and formal forestry)</p> <p>First national Forest Act in 1897</p> <p>Bureau of Forests (Sanrinkyoku) established in 1879</p> <p>School of Forestry (Tokyo School of Forestry) first established in 1882</p> <p>Sites (signs of mobilization)</p> <p>Forest for the shrine commemorating Emperor Meiji, the first modern-era emperor, (Yoyogi-no-mori) in Tokyo, memorial tree planting by schools and other institutions, tree planting commemorating the victory</p>	<p>Socio-cultural: introduction of the Western sciences and technologies as well as institutions and ideologies</p> <p>Technology: energy from fossil fuel used extensively</p> <p>Economic: capitalist industrialization, large amounts of wood needed for economic growth as fuel, construction and building materials</p> <p>Environmental: population increased (approximately 30 million to 120 million) and large areas of forests (5.0 million ha in 1951 to 10.3 million ha in 2000) turned into plantations.</p> <p>Political: modern central government</p> <p>Main way of thinking: the productivity of forests (mainly timber production) should be enhanced for the purpose of the national economic growth.</p>

	<p>of the Russo-Japanese War in 1905 resulted in approximately 40 thousand ha plantation</p> <p>Number of (mainly local and small) shrines decreased from about 190 thousand to 110 thousand due to the central government's policy of merging local and small shrines.</p>	
<p>4. Re-Spiritualization</p> <p>Backlash to rapid westernizations</p> <p>Re-discovering folklores (cf. Yanagida)</p> <p>Representations of nature in Sub-culture (animations, manga, etc.)</p> <p>Growing and diversifying urban demands on societal functions of forest, while declining timber production profitability (expanding gaps).</p> <ol style="list-style-type: none"> Sustainability focus Increasing cultural value related phenomena <p>Post-war period (since 1980s, 90s)</p>	<p>Centralized governance</p> <p>Media, art literature</p> <p>Representations of nature in Sub-culture (animations, manga, etc.)</p> <p>SNS postings on “power spots”</p> <p>Visitors to sites; Spiritual activities</p> <p>Health</p> <p>Interests in World Heritage or other heritage sites (after severe conflicts between preservation vs development in 1980'). Forest bathing/therapy and other Recreation, Health, Education related cultural activities utilizing forest spaces (1st boom in late 1980' and 2nd boom In 2020': forest service industry).</p>	<p>Socio-cultural: New generations of Japanese who emphasizes more personal, intimate issues (Shirake, Shinjinrui, Millenimum). Returning to country-side movements (Den'en kaiki/Immigrants(I-Turn/U-Turn), Lifestyle of living two places (urban and rural), or more recently, “Related Population of rural areas” (urban residents who are more than tourists for rural areas, but less than immigrants) Increasing number of Forest Volunteer (Groups), Aging Society, Nature Famine Society</p> <p>Technology: Digital technology. Disappointment with advanced technologies such as nuclear energy. Advances in bio-medical technologies.</p> <p>Economic: Low GDP growth. Decreasing timber economy/Increasing abandoned plantation areas (Forestry Agency, 2018), Increasing forest-related CSR/CSV activities, Growing Service economy</p> <p>Environmental: Increasing global initiatives' impact (such as UNFCCC, CBD, certification) Population is declining. ESD</p> <p>Political: Comprehensive Resort Area Development Law (1987)/Forest Health Function Enhancing Law (1988), Beginning of local initiatives; new political parties, increasing collaborative partnerships, Beneficiary Pay Principle/PES-like schemes such as Forest Environmental Taxes</p> <p>Main way of thinking: “We are attracted to forests somehow”.</p> <p>Exploring new relationships of man and nature. Forests are increasingly recognized as an ecosystem (natural capital). Post-corona new lifestyle</p>

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TABLE 11 (A2.11): POLAND		
Stage and description	Indicator and description	Drivers
<p>1. Spiritual forest</p> <p>Pre-Christianity period with nature religion</p> <p>Nature as a base for Slavic worship (celestial bodies, atmospheric phenomena, trees, mountains, water reservoirs). Tree worships as god or a manifestation of a supernatural power, offering sacrifices under the trees, graveyards in forests, sacred forests. Universe imagined as big oak (axis mundi). Forest as place of all types of mystic creatures.</p> <p>Deforestation begins</p> <p>Ca. until 1100 A.D. (in some places until 1400 A.D.)</p>	<p>Sites; Spiritual activities; Art</p> <p>Sacred trees, sacred forests, graveyards, Slavic mythology, demonology</p>	<p>Religion: use of forests/trees for worshipping (sacred groves)</p> <p>Cultural identity/tradition: forest a part of mythology, forest and trees present in art</p> <p>Technology and knowledge: limited abilities to manage nature and use it for utilitarian purposes</p> <p>Economic dependency: direct dependence on forests for livelihoods</p> <p>Environmental: Omnipresence of forests: the rules and circles of nature impact, shape and determined the human life</p> <p>Political: Multi-level governance: tribes and local, small units of organization</p> <p>Main way of thinking: Nature is powerful with limited human control. Nature is part of the sacred sphere</p>
<p>2. Cultural landscape</p> <p>Dominance of Christianity and feudal state system</p> <p>Redefinition of a role and place of nature with the introduction of the Christianity (‘de-spiritualization’ - nature becomes the creation of one god). Nature understood as made for human and as something what should be used and managed by people. Forest as a place related to demons and devil powers. Deforestation continues.</p> <p>Development of folk cultures and local traditions related to forest and its spiritual use (regional variations).</p> <p>Ca. 1100-1750 A.D</p>	<p>Sites; Spiritual activities; Policy and legislation; Media, art, literature</p> <p>Christian (catholic) church (together with that time secular authority) banned the old religions and practices related to them. Sacred forests and graveyards got destroyed. ‘Assimilation’ process – pagan believes adopted and adjusted by catholic church and its celebration and calendar (tree/forests practices were connected to Easter, Christmas, All Saints Day and other Christian tradition and events). Forests and trees present in literature, painting, and architecture. Forest motives become an inspiration for artists, also in the context of religion art.</p>	<p>Religion: religion hindering/prohibiting the use of forest for spiritual purposes</p> <p>Cultural identity/tradition: forest a part of regional identities. Forest as an inspiration for artists, forests and trees and an important motive in religious (Christian) art (literature, architecture, painting). Forest plants and forest associated with local history and local religious rituals and traditions.</p> <p>Technology and knowledge: still limited but growing technological tools for managing and exploring forests. Botanical knowledge and forest management related to Christian monasteries. Continuation of deforestation accelerated by the wood export starting from XVI century.</p> <p>Economic: Decreasing dependency on the forest products as a source of food; gathering of forest food as a supplementary source of food. Still crucial role of forest and its products for medication (medical plants). Dependency on wood as building material.</p> <p>Environmental: Character of forest cover and the percentage of forest area is changing. Slow process of ‘pushing’ forests to the periphery.</p> <p>Political: Changing situation with one strong monarchy or many local duchies and/or rules of monasteries/orders (e.g., Teutonic Knights), a few strong cities.</p> <p>Main way of thinking: Nature is a god creation; it should be used for the god glory and for human needs. There is no direct, embodied spirituality or sanctity in the forest (indirect one – by being a creation of a god).</p>
<p>3. Rational land management</p> <p>Rationalization and industrialization period</p>	<p>Forest management practices; Policy and legislation; Spiritual activities; Research</p> <p>Forest turned to the subject of rational management and source of resources of the state. Forests remind</p>	<p>Religion: Rationalization – rule of science and technology</p> <p>Urbanization – development of cities and related lifestyle</p>

<p>Growing division between secular and church authorities and secular and religious knowledge and perception of natural phenomena. Development of science related to the foundation of secular institutions. Rationalization, development of natural science, new experiments and discoveries support de-spiritualization of nature. With the development of the state and modern mode of governance forest become subject to rational planning and management for the national economy. Forest as a source of profit (wood).</p> <p>In the first phase (ca. until 1900) growing division between rural and urban way of thinking and living with forest; from ca. 1945 this division is becoming less important.</p> <p>Between 1790 and 1840 romantic period which proclaimed the ‘come back to the nature’, fascination for nature’s force and folk culture (as a source of true spirit of the nation).</p> <p>Ca. 1750 – present</p>	<p>important source of artistic inspiration and play a significant role for local communities.</p>	<p>Cultural identity – forest as a part of national identity (‘January uprising’ in 1863, myth about the “national nature”)</p> <p>Folk culture and local traditions – forest part of local identities</p> <p>Technology: Land management science and technology – forest a target of organized management, rationalization of the landscape, use of science and its development for more optimized use of forests</p> <p>Industrialization – societal demand for wood and wood products</p> <p>Economic: Importance of forest product for the national economy is growing (with the pick in the socialistic period 1945-1989)</p> <p>Local communities and local markets (especially of forested regions) still depend on forests and their products, but this dependency is decreasing and changing (e.g., from the dependency on food, via wood extrication to tourism)</p> <p>Environmental: Land use change – forest as ‘factories’, re-forestation, shift from broad leave species to conifers in significant parts of the forest area.</p> <p>Political conflicts (wars and invasions of neighboring states), interlaced with democratic rules and socialistic period, forest as a refuge during wars and invasions.</p> <p>Main way of thinking: Forest as a resource. Technology and science explain the role and the meaning of forest.</p>
<p>4. Re-Spiritualization</p> <p>Forests become subject of non-material societal demands. Shift to non-utilitarian perception of forests (forest/nature has internal value). Increasing social interest in forests. Growing feeling of consecutiveness with forests among urban population.</p> <p>Ca. after 1989 (with growing tendency starting from 2000)</p>	<p>Spiritual activities</p> <p>People visit forests for non-economic purposes, forests perceived as a place for rest and where one can better connect with self. Forests re-defined as a space which does not require human intervention (‘rights of nature’ to organize itself). Development of tourism based on forests and its ecosystem services.</p> <p>Media, art, literature; Research</p> <p>Growing body of information on forests, its non-economic meaning. Development of research on biodiversity and its importance for life. Return to pre-relational interpretation of forests and development of emotional relations with forests.</p>	<p>Religion – progressing secularization of society; shifting patterns of spirituality: Society moving away from religion and religious aspects, finding spiritual fulfilment through nature.</p> <p>Urbanization – and changes in demography (depopulation of some of the rural regions); increase in non-material demands towards forests and development of forest tourism.</p> <p>Societal changes – democratization of the society, development of the civil society, development of local initiative and local social activities (region, neighborhood, city, development of NGOs)</p> <p>Globalization – transfer of other cultural values and traditions (e.g., native religions and cosmologies and their interpretation of nature).</p> <p>Technology: Information society – growing access to the knowledge and information on forests, new possibilities provided by new media and technology for accessing forest and its use for non-economic purposes which lead to creation of new form of connections with forests.</p> <p>Economic: Decreasing dependency on forests products of local residents</p> <p>Development of new products and materials which shift the perception of wood and use of wood in economy</p> <p>Shift in forest management from resource-based forestry to sustainable forest management addressing economic, social and ecological functions</p> <p>New expectations and demands from society (ecological, organic, fair-trade, certificated products)</p>

		<p>Growing impact of forest tourism for local economies.</p> <p>Environmental: More attention is given to biodiversity and ecological functions of forests</p> <p>After 1989 attempt to shift from monoculture towards more biologically diverse forests</p> <p>Growing occurrence of forest disturbances (outbreaks, fires, storms etc.)</p> <p>Political: Transformation from socialism to more democratic system connected to development of civil society, and rise of bottom-up initiatives and form of governance</p> <p>Main way of thinking: Man is connected with nature, but he is not above her; rights of nature as equal to rights of man</p>
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TABLE 12 (A2.12): SPAIN		
Stage and description	Indicator and description	Drivers
<p>1. Spiritual forest</p> <p>Similarly to the rest of Europe, before and overlapping with the cultural Romanization of the Iberic Peninsula (3rd Century BC – 1st Century ac), people cults and religions were articulated around nature.</p>	<p>Sites; Media, art and literature</p> <p>Sacred groves and trees in the Atlantic region of the North of Spain.</p> <p>Tales and legends associated to forests.</p>	<p>Technology: Low impact on nature</p> <p>Economic: Total direct dependence on ecosystems</p> <p>Political: decentralized</p> <p>Main way of thinking: Nature rules human life</p>
<p>2. Cultural landscape</p> <p>Over the centuries, former pagan religious beliefs and practices were replaced by Christianity, although it would be more correct to say that they were assimilated and evolved in syncretic processes. For example, many sacred forests became the seats of monasteries, chapels and churches. Similarly, many ceremonies, taboos and beliefs associated to forests were incorporated in Christian rituals, becoming a part of the local folklore. In the Middle age there</p>	<p>Sites; spiritual activities</p> <p>Presence of Catholic religious buildings in well-preserved natural areas.</p> <p>Local religious festivities involving the forest or its resources (use of branches or fruits, pilgrimages, etc.)</p>	<p>Socio-cultural: feudal society</p> <p>Technology: Increased possibilities to modify landscapes</p> <p>Economic: Pre-industrial</p> <p>Environmental: Co-evolution of the landscape and the society living in it</p> <p>Political: monarchies/feudal system/monocratic state. Large importance of common land</p>

<p>was a great influence and exchange with Islam (particularly in the South of Spain), which was the dominant faith in large regions of Spain for centuries.</p> <p>Another important element is related to common land, which before modern times was the most habitual type of tenure regime of Spanish woodlands. Communal land has been very stable over the centuries in Spain, where almost every municipality held communal land and in many occasions, this land was covered by forest. The stability of the rights over the land, and the rules associated to the use and distribution of the resources, where in most cases supported by local traditions, in many cases of spiritual nature. These traditions were over the centuries the guarantee that supported the long-term forest-related resources conservation.</p>	<p>Policy and legislation; Forest management practices; Spiritual activities</p> <p>Associated to forest common land.</p>	<p>Main way of thinking: Nature as a resource</p>
<p>3. Rational land management</p> <p>Rationalization and privatization of forest land</p> <p>Two important parallel processes occurred during the 18th Century that dramatically changed the relation between communities and forest:</p> <p>A process of privatization of common and church-held land promoted by liberal policies. These policies (the main processes occurred in 1836-1837, and 1855) aimed for a redistribution of the land into many new small-forest owners. However, the process led to hoarding processes by a reduced number of big landowners.</p> <p>Rationalization of forest management, deeply influenced by the forestry schools.</p> <p>These 2 processes enhanced the de-spiritualization of the forests. A process that was accelerated in the 20th Century by rapid socio-economic changes and intense deforestation and afforestation processes that modified the cultural landscape. These dynamics led to a breakdown in the relation between forests and communities in relation to three dimensions: institutional (change in the way the land was governed), functional (changes and disappearance of traditional forest uses) and indentitary (de-coupling process).</p>	<p>Policies and management; Research</p> <p>Legislation and policies</p> <p>Creation of the school of forest engineers and academic texts</p>	<p>Socio-cultural: enlightenment and industrialization</p> <p>Technology: Increased capacities to modify landscapes at great scale</p> <p>Economic: Decreasing dependence on local resources.</p> <p>Environmental: Large processes of deforestation. In the mid- 20th Century massive process of afforestation</p> <p>Political: Shifting governance</p> <p>Main way of thinking: Total control over nature</p>
<p>4. Re-Spiritualization</p> <p>Recent social developments are leading to an increased demand demands for non-material benefits in Spanish forests, including spiritual values.</p>	<p>Media and art: Increased media attention and advertising campaigns promoting the use of the forest and its non-material values. Additionally, touristic campaigns of well-preserved forest areas home of tales and legends.</p> <p>Visitors to sites; Spiritual activities;</p> <p>Economic/business innovations: Similar to the rest of</p>	<p>Socio-cultural: post-modern society</p> <p>Technology: Information society</p> <p>Economic: Global economy</p>

Europe, new business models and initiatives are capitalizing the societal demands for non-material benefits.

Environmental: Increased environmental challenges associated to a dual process of intensification in some areas and abandonment in other. Large threats associated to wildfires

Main way of thinking: need of paradigm shift towards sustainable use of resources

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TABLE 13 (A2.13): SWITZERLAND

Stage and description	Indicator and description	Drivers
<p>1. Spiritual forest</p> <p>In the pre-Christian Iron Age (800-15 AD) the Celts had immigrated. The territory of present-day Switzerland was a focal point of the expansion of Celtic tribes (e.g. Helvetians, Bojer and Rauriker); CH stands for Confoederatio Helvetica, the confederation of the Helvetians. Many place and terrain names still have Celtic roots today. The Celts had many deities and worshipped nature. Druid means tree guide. The forest was the holy, place of gods and spirits.</p> <p>Ca. 800-15 BC</p>	<p>Sites; names of places</p> <p>Name of places or field names (the celtic had only oral traditions).</p>	<p>Socio-cultural (Religion and Cultural identity/tradition): religious and cultural practices and believe systems</p> <p>Technology (available knowledge and development): outstanding craftsmanship and distinctive trade</p> <p>Economic (Economic dependency): direct dependence on forests for livelihoods</p> <p>Environmental: omnipresence of forests</p> <p>Political (multi-level governance): The Celts were not a uniform or jointly organized people, but consisted of several different tribes</p> <p>Main way of thinking: Nature as the place of the deities, inexhaustible source for life</p>
<p>2. Cultural landscape</p> <p>Medieval period/dominance of Christianity and local aristocratic systems</p> <p>First and foremost, the forest is a bases for nutrients and energy, a resource essential for survival. In the Middle Ages and early modern times, forests were an integral part of the agricultural habitat and production area. Forest pasture, silviculture, fodder and litter extraction as well as the extraction of other domestic and secondary products such as resin, tanbark, wild herbs and berries were the main focus.</p> <p>400-1800 A.D</p>	<p>Policy and legislation; fairy tales and legends; art, literature;</p> <p>The forest plays a special role in many fairy tales and legends; it is also a place of fate and transformation.</p> <p>Since the 16th century the aesthetic effects of the forest are mentioned in literature for the first time (Renaissance and Baroque)</p>	<p>Socio-cultural (Religion and Cultural identity/tradition): The forest is cleared and transferred to other forms of land use; forest is seen as a resource for living. On the symbolic level a transformation of nature from the creative source of natural wealth to raw material took place.</p> <p>Technology (available knowledge and development): The first forms of regulation were introduced on a local basis.</p> <p>Economic (economic dependency): Wood and famine as a result of the shortage of grain and wood threatened pre-modern society for long periods of time.</p> <p>Environmental: forest area decreasing, specially in the alpine area the forests were overused and in a bad condition.</p> <p>Political (multi-level governance): Various noble families exercised the office of count in Switzerland as fiefdoms of the empire. In order to settle their landed property and for military protection, the local aristocratic families founded numerous towns throughout the Mittelland from the 12th century onwards, although not all of them developed successfully. Due to the extinction of some local count's families in the 13th century, the landed property of the high nobility became highly concentrated.</p>

<p>3. Rational land management</p> <p>Enlightenment/rationalization and industrialization period</p> <p>After its beginnings in the 18th century, sustainable wood production in the sense of the scientifically based forestry of the early modern age essentially developed between 1800 and 1900</p> <p>Dominant since ca. 1800 AD - present</p>	<p>Forest management practices</p> <p>Forest science, forest planning and management, trees become dominant; the basic understanding is the management of the different forest uses.</p> <p>Religious/spiritual values play a minor or no role at all. In the mountain area, people became aware of the great importance of the forest for protection against natural hazards. In the protection forest, silviculture was adapted. Later, the concept of SFM, which combines various objectives, was developed and applied.</p>	<p>Main way of thinking: nature is a resource for living</p> <p>Socio-cultural (religion): predominant is the rule of science and technology and economy; forest planning techniques organize the cutting and use of the forest.</p> <p>Technology (development): natural science and technology rapidly advancing with new possibilities to plan and use forests: creation of “scientific forestry”; the core disciplines silviculture and forest planning arise.</p> <p>Economic (economic dependency): There was now a clear separation between forest uses in the narrower sense (especially wood) and the other so-called secondary uses; the latter included, for example, the various agricultural forest uses, which were explicitly prohibited in many laws.</p> <p>Environmental: in the beginning of this stage many re-forestation took place in devastated areas; in the last century the principle of natural regeneration of the forest became predominant.</p> <p>Political: Many different regulatory systems have been implemented in Switzerland; the practice can best be explained by a broad-based mix of instruments and the multi-level governance system in which institutions at different levels negotiate sustainable solutions.</p> <p>Main way of thinking: science and technology are the main way of explanation; predominant economic thinking. Cultural values are rarely discussed in the different governance regulations.</p>
<p>4. Re-Spiritualization</p> <p>As a counter-trend to secularization, economization and technologization, spirituality is gaining importance in very different forms. Nature and the forest play an outstanding role. Spirituality is also seen as a dimension of a holistically understood health consciousness.</p> <p>Since ca. 1900 AD</p>	<p>Spiritual services and practices in the forest; visitors to spiritual sites</p> <p>Many offers in the area of recreation and tourism were associated with spiritual experiences at an early stage. Currently, there are a multitude of corresponding activities, including market-based offers such as further education training, health promotion offers or events (e.g. yoga in the forest, forest bathing, forest therapy and outdoor training in the forest).</p>	<p>Socio-cultural (religion, new attitudes and behavioral change; urbanization)): The need for spirituality in everyday life is also high in a modern, technology-driven and secularized society; here the forest plays a special role as an otherworld to normal life.</p> <p>Technology (Information society): social media as in important driver and distributor of knowledge and ideas. New technologies can lead to spontaneous hypes and movements.</p> <p>Economics: In Switzerland all forests are free accessible. Although most activities belonging to recreation and health may be for free, there exist an important number of market-based services in the domain of spiritual ecosystem services.</p> <p>Environmental: On the one hand, the appreciation of forest sites as spiritual places is accompanied by a certain protection (respect), but on the other hand it can also lead to sudden overexploitation in view of the new possibilities of modern technologies (see above).</p> <p>Political (Political conflicts)/ Socio-cultural new attitudes and behavioral change): The urban society temporarily overuses the forest. Behavior and expectations of the forest have changed considerably. In areas close to cities, the forest takes on a special significance as a place of peace and relaxation.</p> <p>Main way of thinking: Simultaneity of modernity and closeness to nature; search for a balance; increasing awareness of the importance of forests in the context of climate change.</p>

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Appendix 3 Table 1 (Table A3. 1) Extensive list of drivers of the transition of spiritual values of forests including sub-drivers, descriptions and examples.

Category	Driver	Sub-driver	Description
Socio-cultural	Religion/secularity	Religion / spirituality / reverence	<p>Use of forests/trees for worshipping (prescribed by religion) / pilgrimage (E.g., Sacred groves or trees)</p> <p>Searching for reverence/peacefulness in the forest (feeling the presence of a greater power in nature)</p> <p>Religious rules, regulations and practices promoting the conservation and use of forests</p> <p>Christianity and Islam - religious belief to be stewards of nature</p> <p>Religious taboos prohibiting damaging/disturbing certain trees/forests</p> <p>Religion hindering/prohibiting the use of forest for spiritual purposes</p> <p>Christianity replacing Paganism</p>
		Secularity	<p>Decreasing spirituality - Rule of science and technology/ enlightenment</p> <p>Shifting patterns of spirituality (e.g., away from formalized religion towards spiritual fulfilment through nature (feeling of transcendence))</p> <p>(E.g., “the spiritual has taken over from the religious” (Cooper et al 2016))</p> <p>(E.g., Funeral forest as alternative to traditional religious burial)</p>
	Affluent society		<p>Relying more on (tangible) economic values than on spiritual (intangible) values</p> <p>Re-spiritualization (intangible demands) in societies where material (tangible) demands are satisfied</p>
	Knowledge systems		<p>A dynamic and organized structure of ideas, observations and methods that are adhered to, whether formally or informally, and are routinely used to claim truth</p> <p>(E.g., Western scientific research, indigenous/local, traditional knowledge (see Diaz et al. 2015))</p>

	Cultural identity/tradition		<p>Cultural importance and meaning of forests</p> <p>Forests as part of the national/regional identity</p> <p>(E.g., Forests referred to in fairy tales, older literature, national myths)</p> <p>Tradition of visiting/using the forest (recreation, hunting, mushroom picking)</p>
	New attitudes and behavioral change	Health and well-being	<p>Lifestyles focusing on physical and mental health, and being interested in the role forests can play herein</p> <p>Recreational use of green spaces</p> <p>Research supported trend: link between natural/green areas and human health and well-being (physical and mental)</p>
	Globalization		<p>Influence of other cultures and spiritual values and practices relating to forests</p> <p>(E.g., Shinrin-yoku from Japan, now popular in Europe)</p> <p>Tourism targeting unique natural and culturally significant forest areas</p> <p>(E.g., Touristic interest in spiritual forest sites)</p>
	Urbanization		<p>Disconnection from nature use and reduced experience of (material) nature dependency</p> <p>The hustle of cities pushes people to reach back to nature for spiritual fulfilment</p>
Technological	Information society	Development of communication technology and access to information	<p>Ease of access of information through the internet, printed and social media</p> <p>(E.g., Most citizens have access to information on global trends, benefits and importance of nature, risks to nature, different uses of nature)</p>
	Development	Land management science and technology	<p>Use of science and technology in forest management/operations, partially transforming forests into a commodity</p> <p>(E.g., scientific knowledge on forest management and possibilities to optimize (sustained) forest exploitation)</p>

		Industrialization/ infrastructure development	<p>Demand from society and industry for space and resources, affecting the natural environment</p> <p>“Industrialized societies often value cultural ecosystem services ahead of other services” (Milcu et al 2013)</p> <p>Access to remote/isolated places</p> <p>(E.g., Tourists visiting remote areas seeking solitude and/or a touristic experience, which might threaten the quality which originally attracted the visitor (Boller et al. 2010)</p>
Economic	Economic attractiveness of different FES		<p>Other FES are more/less profitable/needed than investing in spiritual values</p> <p>Economic trade-offs and synergies with other ecosystem services</p> <p>Decreasing economic profitability of other FES (e.g. timber use), increased emphasis on multifunctionality of forests and its economic opportunities (increased profitability of spiritual values in comparison to other FES)</p> <p>(E.g., spiritual values in forests, and other CES, revived as an alternative to declining timber production, and vice versa)</p>
	Markets (diversification of the economy)	Market-based schemes for spiritual values	<p>Societal demand for spiritual values, and willingness to pay</p> <p>Marketability of spiritual values (alone or in combination with other CES such as tourism)</p> <p>Business models/innovations in place</p>
Environmental	Climate change and natural disasters	Impacting forest attributes	Affecting forest management, pressure to protect the forest and biodiversity
		Creating public awareness	

	Land use change	Land abandonment; deforestation; agricultural expansion; reforestation	Agricultural expansion (loss of “wild” nature and related spirituality) Reafforestation Rewilding of abandoned land
	Change in forest management	Forest management and conservation paradigms	Shift from largely unmanaged forests to (systematically) managed forests Shift from focus on timber production to multifunctionality or ecosystem services- based management approach Emphasis placed on biodiversity conservation/promotion and cultural aspects of sustainable forest management Trade-offs of in forest management and use (E.g., Establishment and protection of sacred groves)
	Intrinsic nature of forests		Species composition (Almeida et al. 2018) Green, quiet, peaceful space, nature sounds
Policy- governance	Political conflicts	Competing interests and ideologies/worldviews	Competing paradigms/worldviews and interests on forest use and conservation Clash of interests between different governance authorities (Political parties in government/ traditional or community leaders, religious leaders) (E.g., forces/outlaw cultural or spiritual practices; Religious versus secular government) More/less freedom of choice/movement/expression for society
	Multi-level governance	Sectoral policies/policy (dis)integration	Conflicting/contradicting policies and effects on spiritual values of forests
		Centralization vs devolution	Central government versus local government, community, religious and minority group leaders part of/ responsible for governance

			Bottom-up policy pressure: Community, minority or religious groups or societal needs leading to change in policy, acknowledging spiritual values
	Formal/informal policies	Policies (formal and informal) / rules / regulations recognizing/ prohibiting spiritual values	<p>Policies directly or indirectly supporting spiritual values</p> <p>(E.g., Policies targeted at biodiversity protection or cultural heritage, indirectly referring to/supporting spiritual values)</p> <p>(E.g., Religious/cultural taboos protecting forests/trees for their spiritual values)</p> <p>Clashes between formal and informal rules (e.g., the latter relating to spirituality)</p> <p>Regulations prohibiting or enabling spiritual practices (e.g., funeral forests)</p>
		Forest access rights	Access to forest lands (e.g., restricted access to private forests)
	Changing political ideologies		<p>Changing political ideologies (gradually or abruptly, e.g., through a regime shift)</p> <p>(E.g., Spiritual aspects of forests receive/lose attention through changes in the overall political ideology/discourse)</p>

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