

**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>

#### LITERATURE CITED

- Almeida, I., C. Rösch, and S. Shaha. 2018. Comparison of ecosystem services from mixed and monospecific forests in Southwest Germany: A survey on public perception. *Forest* 9(10):627. <https://doi.org/10.3390/f9100627>
- Boller, F., M. Hunziker, M. Conedra, H. Elsasser, P. Krebs. 2010. Fascinating remoteness: The dilemma of hiking tourism development in peripheral mountain areas. *Mountain Research and Development* 30(4):320-331. <https://doi.org/10.1659/MRD-JOURNAL-D-10-00018.1>
- Cooper, N., E. Brady, H. Steen, R. Bryce. 2016. Aesthetic and spiritual values of ecosystems: Recognising the ontological and axiological plurality of cultural ecosystem 'services'. *Ecosystem Services* 21 (B):218–229. <https://doi.org/10.1016/j.ecoser.2016.07.014>
- Milcu, A. I., J. Hanspach, D. Abson, J. Fischer. 2013. Cultural ecosystem services: a literature review and prospects for future research. *Ecology and Society* 18(3):44.