

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. Main way of thinking: use as a resource, besides with further traditional spiritual roles or also seen as dangerous and “uncultivated”.</p>

Austria can directly be compared with Germany.		
<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
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<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 ψωμμένα δέντρα [ypsomená 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> <p>1. Papal State with San Benedetto (with Camaldolese doctrine in Italy) and San Francesco D’Assisi from 1000 AC.;</p> <p>2. During 1700 – 1800 AC with landscape painting (supported by Gran Tour) later with en plain air.</p> <p>3. Art Nouveau (stile moderno) ca.1910 and Naturalism and Realism (nature and countryside are</p>	<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</p> <p>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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