

**Table S2: Bavarian criteria catalog of recreational and therapeutic forests, BayKK KuH**

Requirements for the certification of recreational and therapeutic forests based on the Bavarian BayKK KuH [19]		
A. General requirements		
Literature: German Spas Association and German Tourism Association 2018, European Commission 2002, Hintzsche 2014, Hintzsche & Heinrichs 2017, Lupp et al. 2016, McGeeny 2016, Robl 2020, Stölb 2015, World Health Organization 2018, Zhang et al. 2021		
A1. Forest size		
Basic requirement	Certified recreational forest	Certified therapeutic forest
<ul style="list-style-type: none"><li>Contiguous forest area with a quite zone and an activity zone</li></ul>	<ul style="list-style-type: none"><li>Size quiet zone and activity zone: 6 to 12+ ha</li><li>Quiet zone: 2 to 4+ ha</li><li>Correspondingly more surface area in the case of disruptive influences from the environment</li></ul>	
<b>Optimal/further development:</b> larger core zone with larger total area (depending on the intensity of use), inclusion of classified terrain trails, additional forest area		
A2. Assessability		
Basic requirement	Certified recreational forest	Certified therapeutic forest
<ul style="list-style-type: none"><li>Reachability by foot or different transportation options</li><li>Assembly point/meeting place at forest edge</li></ul>	<ul style="list-style-type: none"><li>Attractive footpath connection to the recreational forest</li><li>Shuttle/public transport or mountain railway</li></ul>	<ul style="list-style-type: none"><li>Short connections on foot or shuttle transportation</li></ul>
A3. Topography/terrain		
Basic requirement	Certified recreational forest	Certified therapeutic forest
<ul style="list-style-type: none"><li>Small-scale changing topography</li><li>Terrain as varied as possible</li></ul>	<ul style="list-style-type: none"><li>Areas with moving relief</li><li>Different terrain gradient</li></ul>	<ul style="list-style-type: none"><li>Accessible forest areas on largely flat or slightly sloping surfaces</li><li>Sub-areas with max. 2% gradient</li><li>Partially barrier-free subareas</li></ul>
A4. Tranquility in the forest stand		
Basic requirement	Certified recreational forest	Certified therapeutic forest
<ul style="list-style-type: none"><li>Orienting sound level values of anthropogenic noise immission</li></ul>	<ul style="list-style-type: none"><li>Quiet zone ≤ 35 dB(A) and activity zone ≤ 40 dB(A)</li></ul>	<ul style="list-style-type: none"><li>In the entire forest area ≤ 35 dB</li></ul>

**Optimal/further development:** empirical assessment of noise exposure (psychoacoustic approach, soundwalks), noise-reducing design of the forest edge, measures for traffic calming or reduction of environmental noise, designation as "quiet area" according to EU Environmental Noise Directive

#### A5. Air purity in the forest stand

Basic requirements	Certified recreational forest	Certified therapeutic forest
<ul style="list-style-type: none"> <li>In compliance with the guideline values for air quality in German health resorts</li> </ul>	<ul style="list-style-type: none"> <li>Forest location in an environment with the cleanest air possible</li> </ul>	

**Optimal/further development:** measurement of air pollutants (NO<sub>x</sub>, ozone, fine dust, particle matters PM 10, PM2.5), BVOCs/phytonzides, forest microbiome in soil and air, mould spores

#### B. Forest-specific requirements

Literature: Bernasconi & Schroff 2008, Brämer 2008, 2010, Cervinka et al. 2020, Ciesielski & Stereńczak 2018, Coch 2002, Edwards et al. 2012, Grahn et al. 2010, Lupp et al. 2016, Stigsdotter et al. 2017, Stölz 2015

#### B1. Tree population

Basic requirements	Certified recreational forest	Certified therapeutic forest
<ul style="list-style-type: none"> <li>Varied forest (deciduous forest, mixed forest, coniferous forest) with alternation of different tree species</li> <li>Change of different age groups</li> <li>Predominantly closed canopy</li> <li>Varied light conditions in the stand</li> <li>High biodiversity</li> </ul>	<ul style="list-style-type: none"> <li>See basic requirements</li> </ul>	<ul style="list-style-type: none"> <li>Therapy of respiratory tract diseases: Coniferous wood area with high amount of BVOC emission</li> <li>Development of partial areas with park-like design</li> </ul>

**Optimal/further development of contrasting forest areas:** promotion of different tree species (coniferous, hardwood areas), clearance of individual trees and groups of trees, preservation of old-growth forests, promotion of unusually shaped trees, preservation of individual dense areas development of varied forest inner and outer edges

#### B2. Forest floor

Basic requirements	Certified recreational forest	Certified therapeutic forest
<ul style="list-style-type: none"> <li>Varied forest floor with high structural diversity (roots, tree stumps)</li> </ul>	<ul style="list-style-type: none"> <li>Predominantly accessible areas</li> </ul>	<ul style="list-style-type: none"> <li>Accessible, easily walkable forest areas</li> <li>Areas with varied forest floor</li> </ul>

<ul style="list-style-type: none"><li>Haptically interesting elements (e.g. moss cushion)</li></ul>		
<b>Optimal/further development:</b> waterbody/stream, sub-areas with high structural diversity, rocks, lying thick deadwood, rootstocks		
B3. Special features		
Basic requirements	Certified recreational forest	Certified therapeutic forest
<ul style="list-style-type: none"><li>Presence of natural highlights, e.g. special areas of old trees, water surface (stream, waterfall, etc.), forest clearing/ forest meadow, viewpoint, vista or visual axis in the forest stand, ground monument, rock(s), sunken path</li></ul>	<ul style="list-style-type: none"><li>At least one distinctive nature “highlight”</li></ul>	
<b>Optimal/further development:</b> additional prominent natural "highlights", contrast of highlight areas and normal forest image		
B4. Forest Images/Sensory Spaces		
Basic requirements	Certified recreational forest	Certified therapeutic forest
<ul style="list-style-type: none"><li>“Perceived Sensory rooms” in the forest for multi-sensory experiences</li></ul>	<ul style="list-style-type: none"><li>Presence of 2-3 different forest images/sensory spaces</li></ul>	<ul style="list-style-type: none"><li>4 or more different forest images/ sensory spaces</li><li>Development of a sequence of different sensory rooms for different therapeutic uses</li></ul>
B5. Forest environment		
Basic requirements	Certified recreational forest	Certified therapeutic forest
<ul style="list-style-type: none"><li>Buildings/infrastructure hardly noticeable from the forest area</li><li>Sufficient distance from power lines, mobile phone systems, wind turbines</li></ul>		
<b>Optimal/further development:</b> forest area surrounded by attractive open spaces (meadows, forest, orchards), view axes and views from the forest stand		
B6. Forest management		
Basic requirements	Certified recreational forest	Certified therapeutic forest

<ul style="list-style-type: none"> <li>• Little traces of management (e.g. no conspicuous skid trails)</li> <li>• Increased road safety</li> <li>• Obligation small-scale rejuvenation of the stands</li> </ul>	<ul style="list-style-type: none"> <li>• Ongoing inspection and removal of trees and tree limbs that pose a safety hazard, especially around pathways and therapy areas.</li> </ul>	<ul style="list-style-type: none"> <li>• Ongoing inspection and removal of trees and tree limbs that pose a safety hazard, especially around pathways and therapy areas.</li> </ul>
<b>Optimal/further development:</b> further development of the forest stand on the basis of the BayKK Therapy Forest and a long-term design concept.		
<b>C. Infrastructure</b>		
Literature: Brämer 2008, DIN 32984, DIN 18040-3, DIN 32975, Lupp et al. 2016, Marcus & Sachs 2014, Stölb 2015, Stigsdotter et al. 2018, Zhang et al. 2017.		
<b>C1. Trail network (hiking and forest trails)</b>		
<b>Basic requirements</b>	<b>Certified recreational forest</b>	<b>Certified therapeutic forest</b>
<ul style="list-style-type: none"> <li>• Network of trails/paths in different lengths</li> <li>• Unsealed, "near-natural" floor covering</li> <li>• </li> </ul>	<ul style="list-style-type: none"> <li>• Variation of trails/paths across the forest</li> <li>• Cycling and hiking trails only in the activity zone</li> </ul>	<ul style="list-style-type: none"> <li>• Barrier-free sections without stairs (see national regulation, e.g. German DIN 32984)</li> <li>• Hiking and terrain cure trails only in zone A</li> </ul>
<b>Optimal/further development:</b> narrow, winding, soft path (in forest stand), remove footpaths in the event of overdevelopment, visitor guidance concept, if applicable; specific therapy-supported design of individual pathways according to indications, indication of distance and route profile, floor indicators according to German regulation for visually impaired people (DIN 32984), design of barrier-free hiking trails		
<b>C2. Structural assets</b>		
<b>Basic requirements</b>	<b>Certified recreational forest</b>	<b>Certified therapeutic forest</b>
<ul style="list-style-type: none"> <li>• Selective nature-based infrastructure within the forest</li> </ul>	<ul style="list-style-type: none"> <li>• Wooden seating at special points and places</li> </ul>	<ul style="list-style-type: none"> <li>• Rest zone: natural unobtrusive therapeutic facilities</li> <li>• Activity zone: permanently installed therapeutic facilities possible such as wooden exercise elements, yoga platform</li> <li>• Covered seating area with tables</li> <li>• Resting and seating facilities in the sun and shade</li> </ul>
<b>Optimal/feature development:</b> community square, mobile loungers/seats, hiding points, info point, mobile WC at the edge of the forest, varied resting and seating facilities (loungers, forest elements), also in the sun		

D. Health promotional, preventive and therapeutic interventions		
Literature: Brüggemann 1980, Hupperts & Schatanek 2021, Schuh & Immich 2021, Schuh 2004, World Health Organization 2020		
	Certified recreational forest	Certified therapeutic forest
<b>D1. Specialized staff</b>	<ul style="list-style-type: none"> <li>Forest Health Trainer: health Promotion and Prevention programs</li> </ul>	<ul style="list-style-type: none"> <li>Forest Health Trainer: health Promotion and Prevention programs</li> <li>Forest Therapist: medical therapeutic interventions</li> </ul>
<b>D2. Area of use</b>	<ul style="list-style-type: none"> <li>Rest zone (Zone R)</li> <li>Activity zone (Zone A)</li> </ul>	<ul style="list-style-type: none"> <li>Rest zone (Zone R)</li> <li>Activity zone (Zone A)</li> <li>Various therapy places or therapy areas (Zone T)</li> </ul>
D3. Health promotional, preventive activities and therapeutic interventions		
a) Forest Health Training		Zone R
Basic requirements	Certified recreational forest	Certified therapeutic forest
<ul style="list-style-type: none"> <li>Different forest images/ sensory spaces according to B4.</li> <li>Screened off, not visible, forest areas (hardly any public traffic)</li> <li>Coniferous forest area for breathing exercises</li> </ul>	<ul style="list-style-type: none"> <li>Quiet area</li> </ul>	<ul style="list-style-type: none"> <li>Near-natural forest, special tranquility in the forest area</li> <li>Special privacy in the forest area</li> <li>Optional: Shady, sheltered seating</li> </ul>
b) Climatotherapy		
Climatic terrain cure		Zone A or terrain cure trail network
Basic requirements	Certified recreational forest	Certified therapeutic forest
<ul style="list-style-type: none"> <li>General path network (hiking and forest paths)</li> <li>Extended well signposted trails</li> <li>Varied, winding routes with beautiful views</li> <li>If applicable, ascending and descending routes (sections)</li> <li>Length specification</li> <li>Partial accessibility</li> </ul>	<ul style="list-style-type: none"> <li>See basic requirements</li> </ul>	<ul style="list-style-type: none"> <li>Certified terrain cure trail network with load levels, classification of performance-related and thermal load: geographical measurement according to length and gradient, determination of reference values for average load and expected walk time, assessment of climatic conditions and stimulus intensities, classification</li> </ul>

		into levels of difficulty, standardization of the performance transfer to bicycle ergometer load (Watt levels)
<b>Fresh air rest cure</b>		<b>Zone R and A</b>
<b>Basic requirements</b>	<b>Certified recreational forest</b>	<b>Certified therapeutic forest</b>
<ul style="list-style-type: none"> <li>Lying/sitting possibilities under trees</li> <li>Forest areas that are out of sight</li> </ul>	<ul style="list-style-type: none"> <li>Quite area</li> </ul>	<ul style="list-style-type: none"> <li>Quiet area</li> <li>Optional: wooden seats placed in the shade, blankets/shelters if necessary.</li> <li>Climate pavilion at the edge of the forest</li> </ul>
<b>Heliotherapy</b>		<b>Zone R and A</b>
<b>Basic requirements</b>	<b>Certified recreational forest</b>	<b>Certified therapeutic forest</b>
<ul style="list-style-type: none"> <li>Light/open area for dosed sunbathing</li> </ul>	<ul style="list-style-type: none"> <li>Optional: sun lounges in Zone A</li> </ul>	<ul style="list-style-type: none"> <li>Sun lounges</li> <li>Seating in different seat heights</li> </ul>
<b>c) Sport and exercise training/therapy</b>		<b>Zone A</b>
<b>Basic requirements</b>	<b>Certified recreational forest</b>	<b>Certified therapeutic forest</b>
<ul style="list-style-type: none"> <li>Flat open area for exercise units</li> <li>Soft, uneven forest floor</li> </ul>	<ul style="list-style-type: none"> <li>Optional: wooden exercise elements, e.g. floor installations made of wood (yoga platform)</li> <li>Timbers for strengthening training</li> </ul>	<ul style="list-style-type: none"> <li>Hiking trails</li> <li>Tracks with a varied ground profile</li> <li>Moss cushion/soft flooring</li> <li>Optional: barefoot path, sensorimotor path, natural training materials</li> </ul>
<b>d) Kneipp therapy</b>		<b>Zone A</b>
<b>Basic requirements</b>	<b>Certified recreational forest</b>	<b>Certified therapeutic forest</b>
<ul style="list-style-type: none"> <li>Water body with safe access, e.g. natural stream</li> </ul>	<ul style="list-style-type: none"> <li>Optional: Kneipp basin</li> </ul>	<ul style="list-style-type: none"> <li>Accessible stream</li> <li>Kneipp basin (in the cure garden)</li> <li>Different „sensory rooms“</li> <li>Moss cushion</li> <li>Optional: forest herbal patch</li> </ul>
<b>e) Body Mind Procedures (Tai Chi, Qigong, Yoga)</b>		<b>Zone A and T</b>

Basic requirements	Certified recreational forest	Certified therapeutic forest
<ul style="list-style-type: none"> <li>Flat open forest areas</li> <li>Stable forest floor</li> <li>Forest clearing</li> <li>Forest meadow</li> </ul>	<ul style="list-style-type: none"> <li>See basic requirements</li> </ul>	<ul style="list-style-type: none"> <li>Screened off, out of sight area</li> <li>Optional: wooden platform(s)</li> </ul>
<b>f) Psychotherapy</b>		<b>Zone R and T</b>
Basic requirements	Certified recreational forest	Certified therapeutic forest
<ul style="list-style-type: none"> <li>Mixed forest with high bio-diversity</li> </ul>	---	<ul style="list-style-type: none"> <li>Optional: orientation aids</li> </ul>
<b>g) Respiratory therapy</b>		<b>Zone A and R</b>
Basic requirements	Certified recreational forest	Certified therapeutic forest
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<b>h) Occupational therapy and physiotherapy</b>		<b>Zone A and T</b>
Basic requirements	Certified recreational forest	Certified therapeutic forest
<ul style="list-style-type: none"> <li>Mixed forest with different sensory spaces</li> <li>loose, natural materials</li> </ul>	---	<ul style="list-style-type: none"> <li>Optional: hut with tools and auxiliary materials</li> <li>Areas for handcraft work</li> <li>Table with benches</li> </ul>
<b>i) Art therapy</b>		<b>All zone</b>
Basic requirements	Certified recreational forest	Certified therapeutic forest
<ul style="list-style-type: none"> <li>Mixed forest with high biodiverse vegetation</li> <li>Different „sensory rooms“</li> </ul>	---	<ul style="list-style-type: none"> <li>Optional: protected individual places</li> <li>Hut with auxiliary materials Seating with tables</li> </ul>