

# Semi-natural grazing and sustainable use of “wild oaks”: a brighter future of abandoned feral landscapes and rural communities?

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Auxiliary materials, conference field session on September 18, 2025

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## Field visit programme

- Departure – from the car park in front of the conference venue 08:30
- Kolbuszowa State Forests superintendency (ca. 45 km NW from Rzeszów): characteristics of oak silviculture and features of cultivated oaks.
- The young “oakscape” developing on the abandoned farmland; characteristics of the “wild oaks”; a non-forest ancient woodland?
- “Lisia Góra”: the past, present, and future of the forest reserve in Rzeszów.
- Cattle grazing effect on feral post-agricultural landscape – “ecological intensification” (Borówki, ca. 15 km SE from Rzeszów).
- Developing mixed circular farming
- End at ca. 17:00

Further pages to be delivered in the field

Oak's major ecological features (oak-specific characteristics of regeneration niche - *sensu* Grubb 1977):

- Wide fundamental niche (range of acceptable climatic, edaphic, water conditions)
- Longevity and solid posture
- Shade-intolerance
- Energy-rich acorns
- Irregular mass-cropping (mast years)
- Seed predation
- Synzoochoric dispersal

The 'oakscape' refers to environmental (habitat) conditions corresponding to the oak's regeneration niche. **A landscape fostering oak regeneration, recruitment and long-lasting presence** (Bobiec et al. 2018).

Plasticity and limitations (translating into silvicultural challenges)

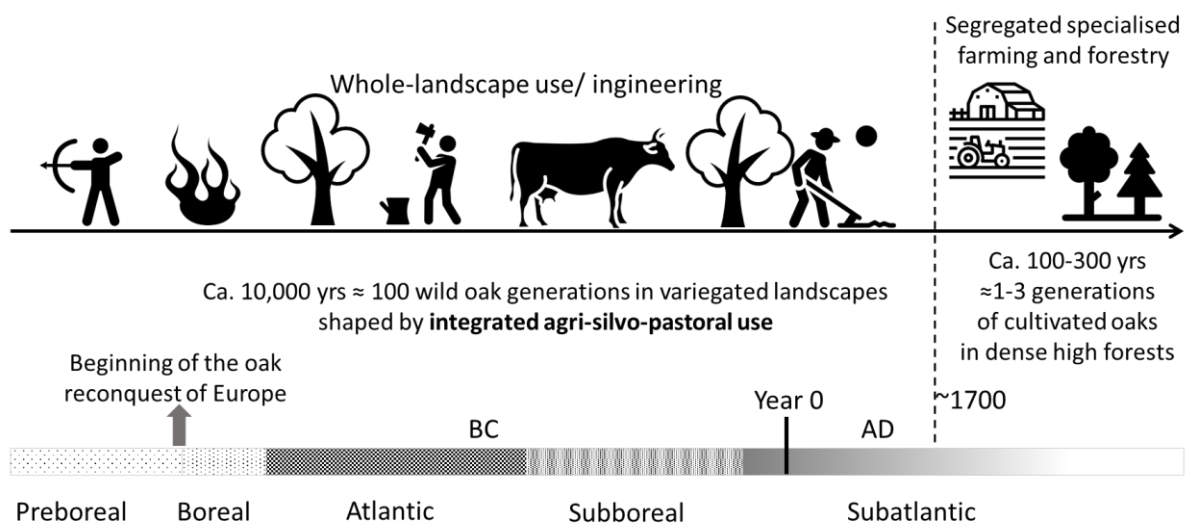


Fig. 1. A simplified Holocene history with regard of *Q. robur*/ *Q. petraea* "oakscape" in today's temperate Europe (author's own design; icons from Flaticon, [www.flaticon.com](http://www.flaticon.com))

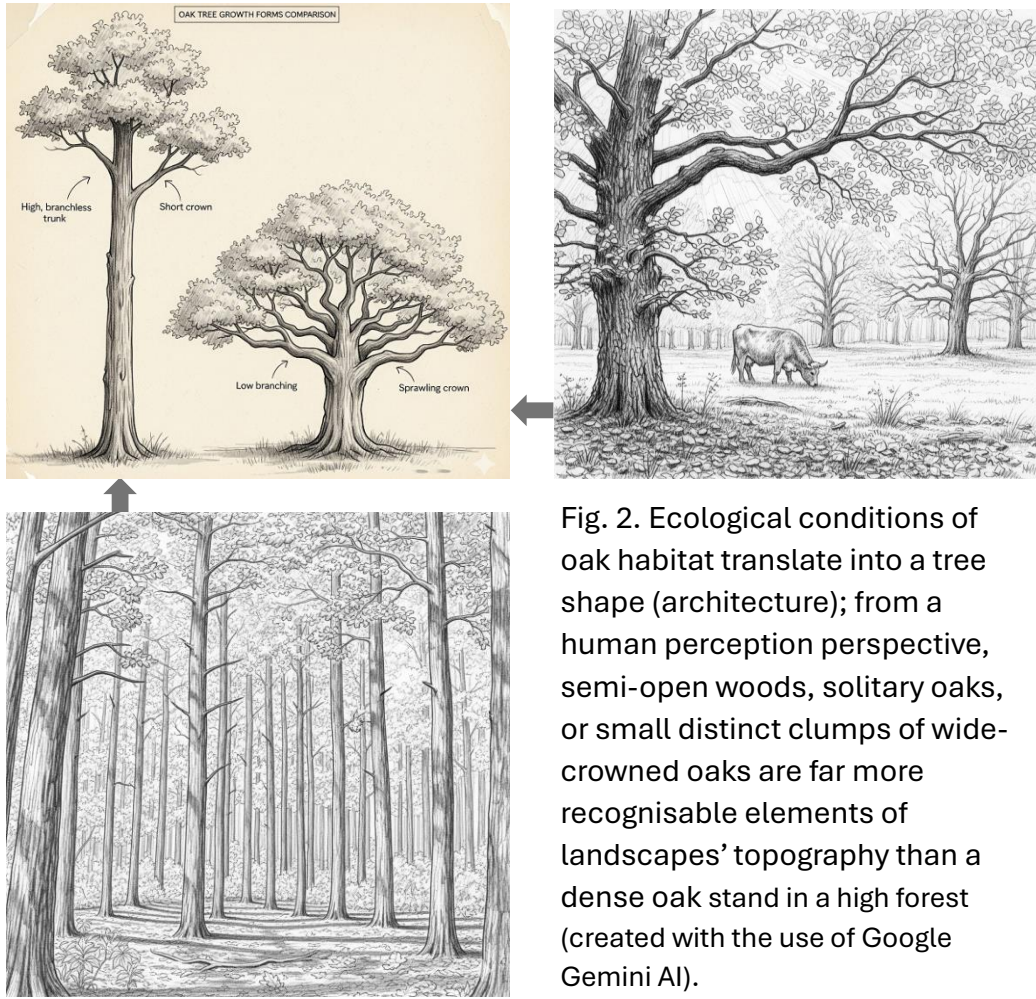


Fig. 2. Ecological conditions of oak habitat translate into a tree shape (architecture); from a human perception perspective, semi-open woods, solitary oaks, or small distinct clumps of wide-crowned oaks are far more recognisable elements of landscapes' topography than a dense oak stand in a high forest (created with the use of Google Gemini AI).

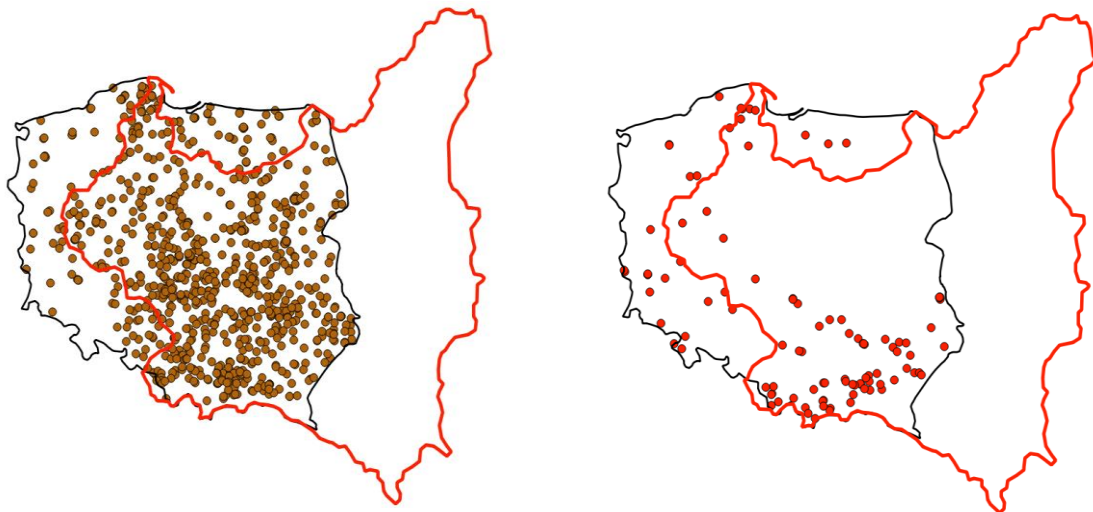


Fig. 3. An indirect evidence of the “wild oak”-dominated historical rural landscape of Poland: oak-related (left) toponyms on the map of Poland; red line – the state border contour between 1920 and 1939; for comparison, beech-related toponyms on the right (author’s own query and design with Quantum GIS)

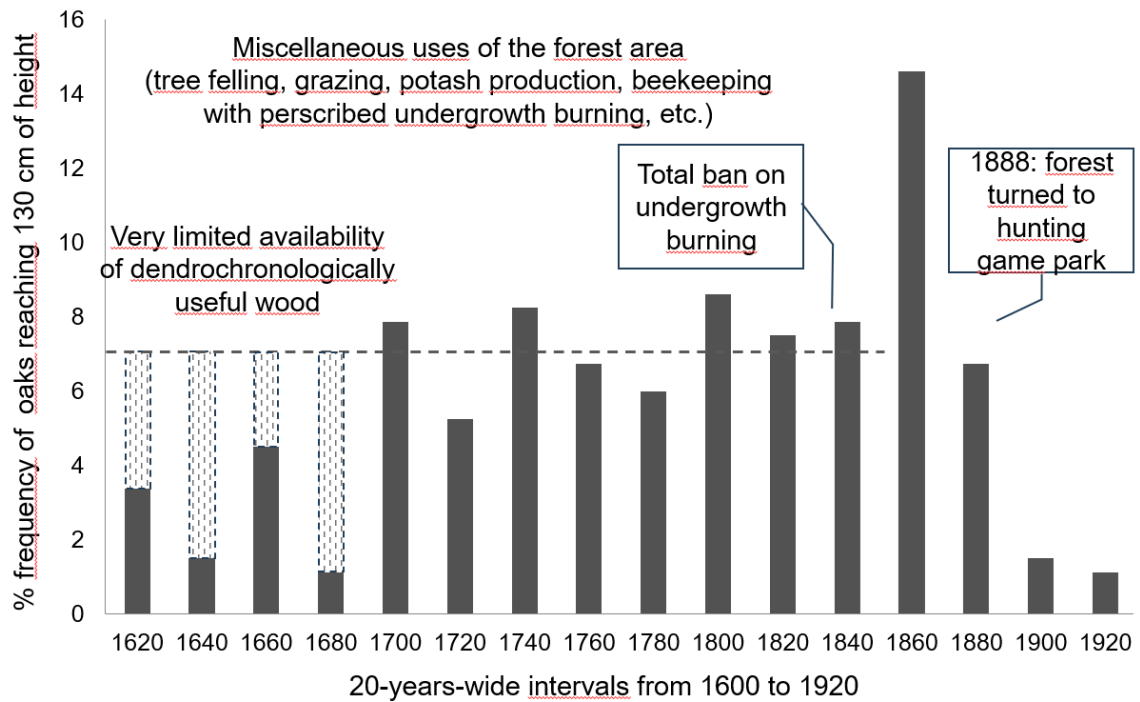


Fig. 4. A 300-year history of the oak recruitment dynamics in the area of today's strict reserve of the Białowieża National Park: 1600-1840 probable stable recruitment levels; 1840-1860 short-term increase as a reaction to the ban on burning; 1880-1920 sharp decrease, possibly due to heavy browsing and the termination of historic forms of forest use (1888); after 1920 negligible level (1921 – establishment of nature reserve, the future national park) – author's own design based on A. Bobiec unpublished data, Niklasson et al. 2010, Samojlik et al. 2020

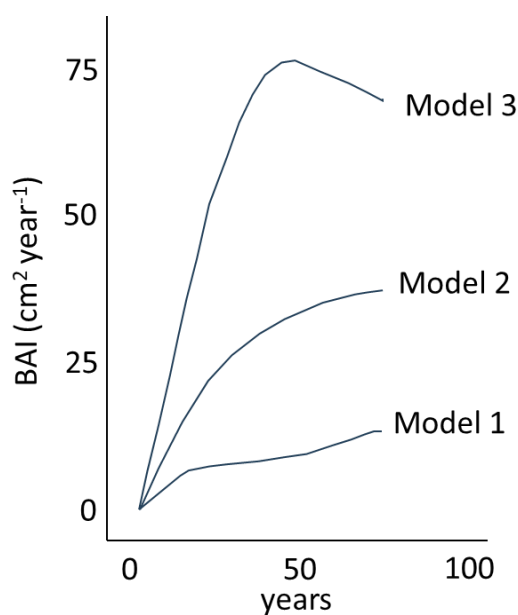


Fig. 5. Three distinct models of BAI (basal area increment) during oak's first sixty years of life, based on 762 oaks sampled in thirty stands occurring between Białowieża and Transylvania. While most of stands were represented by a mixture of three models, the stands of the Białowieża National Park strict reserve were totally dominated by Model 1. Models developed by R. Podlaski (Bobiec et al. in print).

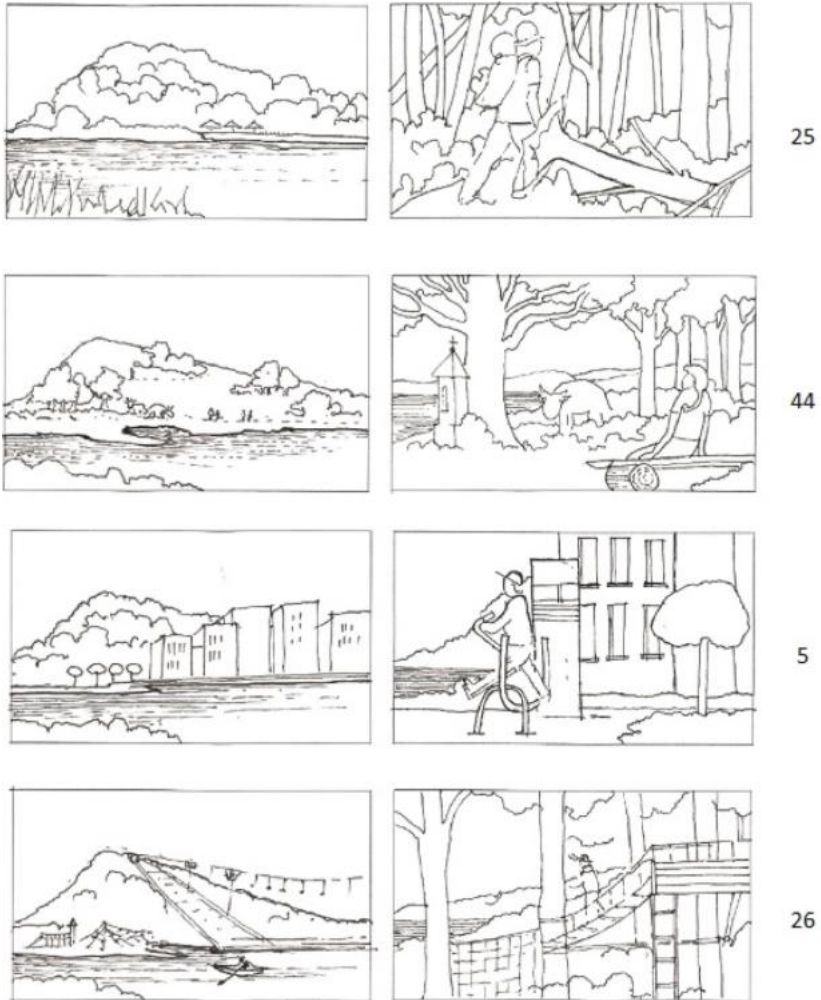


Fig. 6. Lisia Góra nature reserve: four alternative management ways and visitors' % preferences (from Bobiec et al. 2024)

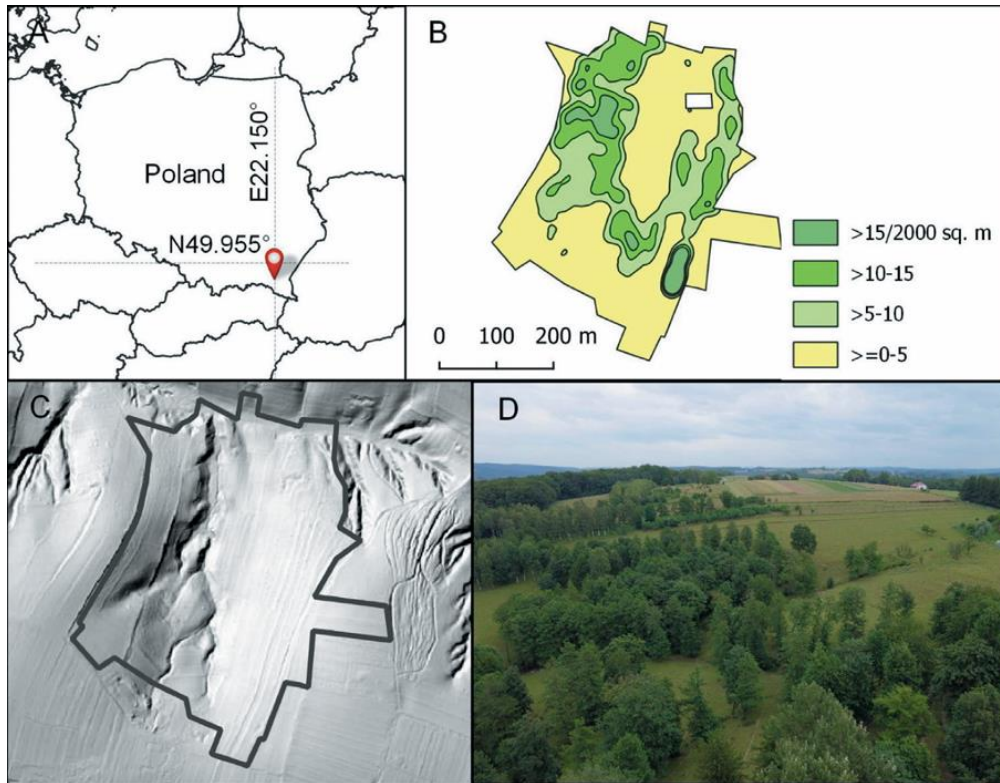


Fig. 7. Contemporary wood pasture developed in abandoned, post-agricultural feral landscape in Borówki near Rzeszów – a stabilising effect of intensive grazing, preventing the progress of succession; B – density of trees (from Bobiec et al. 2024)

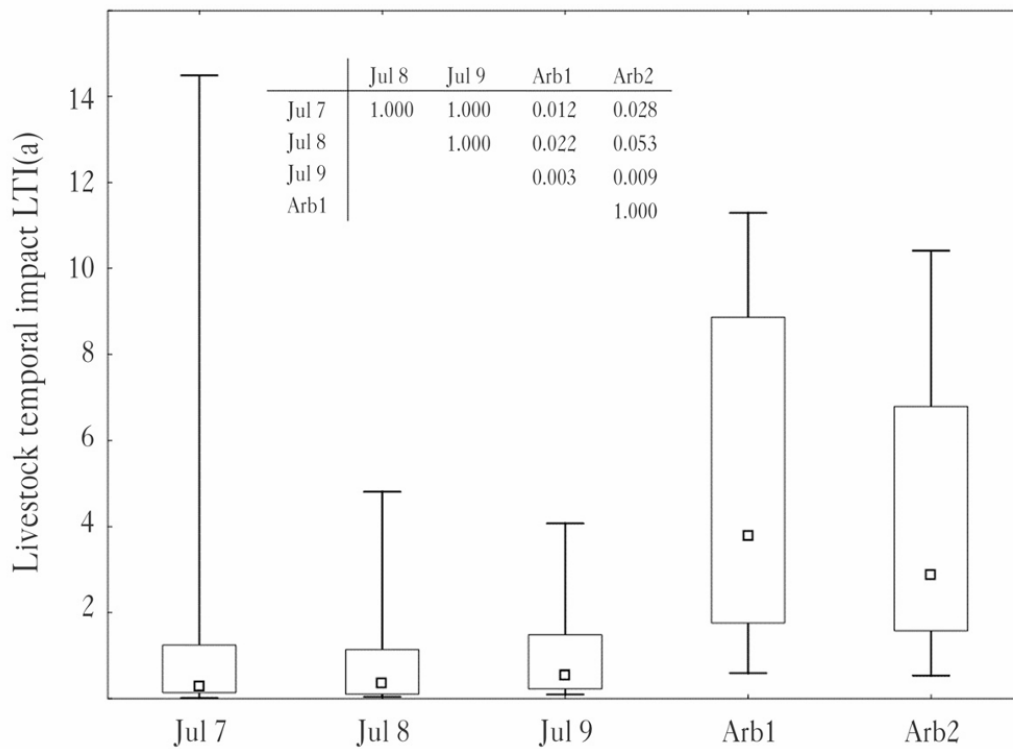


Fig. 8. A high cattle preference for tree hay (Arb, arboreal forage, leafage) as referred to short grass (from Bobiec et al. 2024)

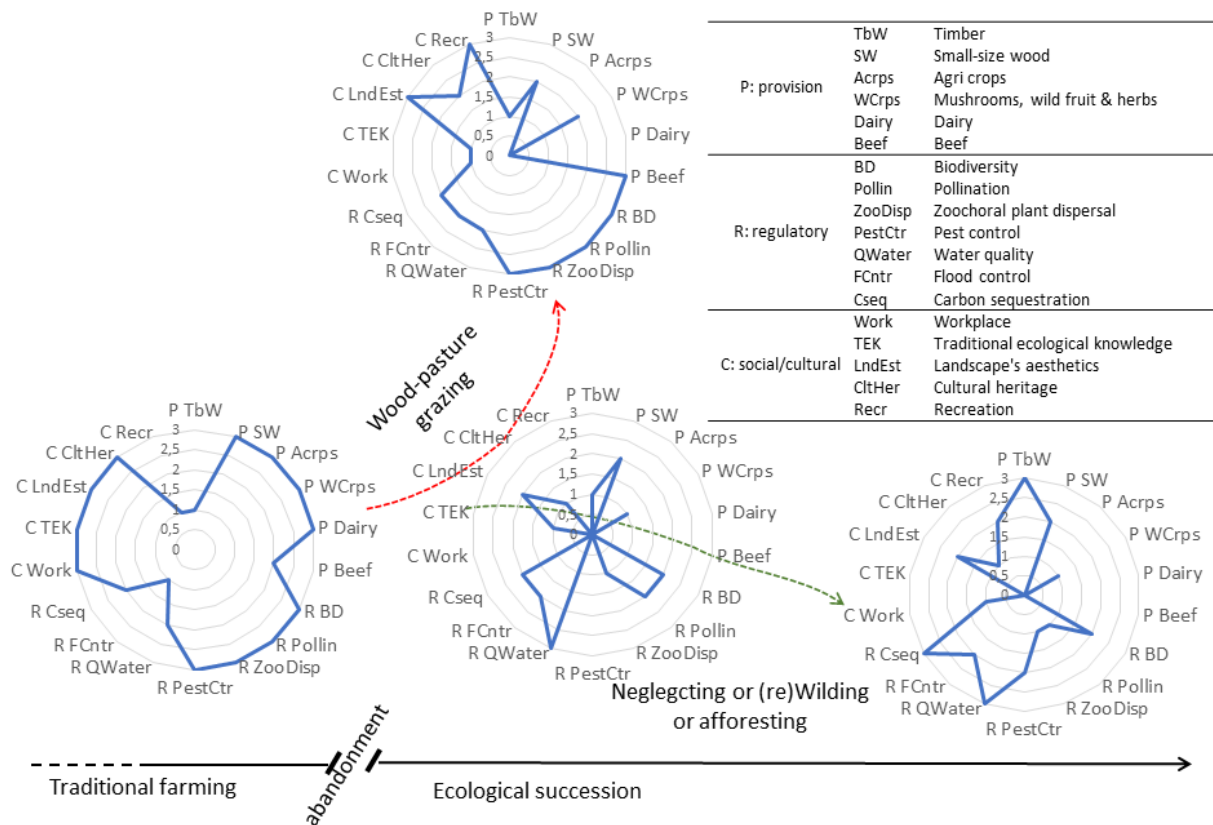


Fig. 9. Alternative land use/ landscape transformation pathways with respect to the structure of ecosystem services (Bobiec et al. 2024)

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### Oak silviculture vs. growing “wild oaks”: a comparative SWOT analysis

|           | "Oaks cultivated" in conventional forestry   | "Wild oaks" in variegated rural landscapes  |
|-----------|--|---|
| Strengths | <ul style="list-style-type: none"> <li>• Quality of raw material in accordance with applicable standards;</li> <li>• High production intensity and efficiency (due to high density of trees);</li> <li>• In the regions conducive to oak cultivation, there is a significant supply of oak stands entering the age of felling maturity or approaching such an age – the effect of systematic forest management.</li> <li>• With the exception of the cultivation and young stand stages, the time of forestry work, or specific situations of increased risk (e.g. drought periods), the commercial forest allows for recreational use throughout the year.</li> </ul> | <ul style="list-style-type: none"> <li>• Faster growth of trees in thickness, allowing for earlier felling of selected trees;</li> <li>• Oaks that grow quickly in thickness are characterized by harder woods due to a higher proportion of late wood;</li> <li>• "Wild oaks", thanks to their squat posture and strongly developed crown, are characterized by greater vitality, regenerative abilities and resistance to abiotic disorders;</li> <li>• A sustainable, continuous process of natural oak renewal leads to an uneven-age structure of stands, allowing sustainable, extensive exploitation of trees;</li> <li>• Light conditions allowing for the introduction of admixtures of other shade-intolerant tree species – including fruit trees;</li> <li>• High flexibility in the creation of the structure of trees – their density, spatial distribution, age structure, designation of "non-removable" trees (owners can have their decisions notarially guaranteed, e.g. as a part of a will);</li> <li>• Strongly branched, spreading trees play a very important biocenotic role in the landscape as nesting sites for numerous species of birds (including hollow and cavity birds) and mammals (including bats);</li> <li>• Minimum level of disturbance of undergrowth vegetation during felling - maintaining maximum biological activity of the soil in the rhizosphere layer;</li> <li>• Good light conditions conducive to the development of a lush and species-rich undergrowth;</li> </ul> |

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|            |  | <ul style="list-style-type: none"> <li>• Numerous wild flowering plants favour the richness of pollinator fauna;</li> <li>• Possibility of simultaneous use of the wooded landscape for grazing animals; grazing animals are an important factor in the dispersal of plant propagules and species diversity of entire communities;</li> <li>• The entire landscape of treed variegated cultural landscapes, thanks to a strong, significant share of semi-shaded and open, treeless habitats, shows a high degree of adaptation to progressive climate change, regardless of its direction;</li> <li>• Possibility of creating coppice stands with standards; short-stemmed coppiced or pollarded trees are a rich source of “tree hay” (leafage) - which has a very positive effect on the functioning of ungulates’ (including cattle) digestive system;</li> <li>• High aesthetic values of unevenly treed landscapes;</li> <li>• High optional value of a diverse landscape – both intensification of use (e.g. by creating typical production stands or arable use) or extensification (by reducing the grazing pressure) of use.</li> </ul> |
| Weaknesses | <ul style="list-style-type: none"> <li>• Relatively long period of capitalization of the stand (age of felling maturity from 120 to 140);</li> <li>• High tree density, low age differentiation and reduced canopy due to strong competition increase the risk of weakness and stress, and facilitate the transmission of infections; reduce regenerative capacity, increase the risk of premature trees and stands mortality.</li> <li>• The relatively homogeneous landscape structure of modern, dense forests is responsible for a relatively low degree of adaptability to progressive climate change;</li> <li>• Tree breeding requires high expenditure on the production of planting material (seedlings) and protection (by fencing) and care of plantations and young stands;</li> <li>• Slight age differentiation of forest stands;</li> <li>• Rigidity of the applicable statutory regulations and breeding rules, limiting the possibilities of</li> </ul> | <ul style="list-style-type: none"> <li>• Lower commercial quality of wood of short, strongly branched trees, often not corresponding to the norms applied in the present wood market;</li> <li>• Initially, (currently) a relatively small number of oaks suitable for felling - the result of many decades-long (in some regions much longer) segregation of agriculture (essentially free of trees) and forestry (limited to areas dominated by dense forest);</li> <li>• After reaching the target structure of non-forest trees, a relatively low level of harvest per unit area;</li> </ul>  |

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|               | <p>diversification of the structure of the stand and tree characteristics;</p> <ul style="list-style-type: none"> <li>• Relatively poor undergrowth, limited to shade-tolerant species; a small number of flowering plants – little richness of pollinator fauna;</li> <li>• Healthy trees, poorly branched, of low biocenotic importance;</li> <li>• Negligible effectiveness of natural oak renewal – preserving oak as a dominant species usually requires artificial renewal or self-seeding stimulated by partial pruning, supplemented with planting;</li> <li>• Landscape monotony;</li> </ul> |  |
| Possibilities | <ul style="list-style-type: none"> <li>• Possibility of converting stands of other species into oak stands in order to increase the potential of oak wood production;</li> <li>• Lowering the felling age due to increasing annual growth of trees (due to a warming climate, higher nitrogen content in the soil, and CO<sub>2</sub> in the atmosphere)</li> </ul>   | <ul style="list-style-type: none"> <li>• The possibility of cost-free growing "wild oaks" can be a valuable alternative for farmers, owners of agricultural land as a family "investment" for family farms;</li> <li>• Modern technologies used in wood processing allow the use of wood of poorer technical quality (e.g. from squat, spreading non-forest oaks) for the production of high-quality glued laminated timber.</li> <li>• Until the desired structure of oak pasture trees is achieved (allowing for permanent and sustainable harvesting of oaks), extensive grazing can be both a factor in shaping the structure of future trees and an important source of income for the owners;</li> <li>• Both livestock grazing and growing "wild oaks" will be conducive to the economic and social revitalization of rural areas: industrial and craft wood processing, furniture, local slaughterhouses, meat and dairies, vocational schools;</li> <li>• Promotion of products of oak pastures (food and products from "wild oaks") on the regional and national market, as the most desirable - their consumption guarantees the durability of beautiful landscapes, the biodiversity associated with them, has a positive impact on the demographic, social and economic situation of rural areas - creation of a strong, recognizable brand of "fruits of the native landscape".</li> </ul> |
| Threats       | <ul style="list-style-type: none"> <li>• Unfavourable environmental changes (droughts, decreasing groundwater level, mass development of insects - thermophilic organisms) can significantly weaken the resistance of</li> </ul>  | <ul style="list-style-type: none"> <li>• The lack of understanding and support of the state, regional, and local administration for the forest and pasture use of land; the rigidity of regulations and their blind</li> </ul>   |

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|  | <p>oak stands and accelerate the process of their death;</p> <ul style="list-style-type: none"> <li>• In conditions of weakening of dense oak stands, there is a higher probability of unfavourable mutations in the fungal biota accompanying oaks, which in turn may pose a threat to native oaks <i>Quercus robur</i> and <i>Q. petraea</i>;</li> <li>• The growing power of the conservationist lobby may impose the progressive reduction of the volume of harvest in oak stands, increasing the risk of losing the raw material</li> </ul> | <p>interpretation (e.g. in the field of tree felling outside the forest area or "animal welfare") poses a significant threat to the development of this agricultural industry;</p> <ul style="list-style-type: none"> <li>• Lack of adequate expertise needed to run a forestry and pasture farm;</li> <li>• The pressure from developers (both individual investors and development companies) will turn out to be stronger than long-term thinking about sustainable, permanent use of land;</li> <li>• Highly contagious animal diseases (e.g. foot-and-mouth disease or TB) can pose a serious threat to extensive grazing;</li> <li>• Disputes between neighbours, inability to cooperate – may limit the possibilities of developing silvopastoral management in conditions of highly fragmented land ownership.</li> </ul> |
|--|--|---|