ATTRACTIVENESS OF FOREST LANDSCAPES UNDER CLOSE-TO-NATURE MANAGEMENT

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Abstract
This study examines how communication framing shapes the attractiveness of forest environments under close-to-nature management. In an experiment with a representative Czech sample, participants evaluated forest scenes under different management regimes with ecological, historical, or no labels. Attractiveness was mainly driven by perceived naturalness and complexity, with only minor differences between management types. Communication framing did not uniformly increase attractiveness but selectively altered interpretation of specific features.

Key words: Environmental perception, non-market forest functions, forest attractiveness, recreational preference, communication framing

Introduction

In recent years, the Czech public has increasingly had the opportunity to encounter the so-called innovative (or experimental) management practices such as coppicing or forest grazing (silvopasture). Once widespread, these practices shaped the structure of lowland broadleaved forests in Central Europe for centuries (Čížek et al., 2016; Slach et al., 2021). In the Czech lands, these traditional practices were gradually abandoned and replaced by intensive forest management characterized by closed canopies and long production cycles. This shift has had negative consequences for species directly associated with open forest ecosystems (Vild et al., 2024). Today, both coppicing and forest grazing are being reintroduced at selected sites to restore habitats for species threatened by the loss of these environments (Kozdasová et al., 2024).

Because these management practices have largely disappeared from public awareness, their acceptance by the public may be problematic. Coppice (or coppice-with-standards), for example, may not fit common expectations regarding forests (Kneifl et al., 2016), and the presence of grazing livestock in forests may evoke concern or fear. Apart from coppicing and silvopasture, we also focus on another close-to-nature management that has potential to evoke negative reactions: deadwood retention.

This study focuses on whether, and how, providing information that emphasizes (a) the ecological function of these practices, especially their role in supporting biodiversity, and (b) their historical and cultural value, may influence public perceptions of these management practices.

Material and methods

To address these questions, we conducted an experimental study involving visual representations of forest environments under specific managements. As a basis for visual stimuli, we used photographs of various locations characterised by the presence of the Pannonian oak-hornbeam forests and Euro-Siberian steppe oak woods vegetation types with a predominance of the pedunculate oak (*Quercus robur*) and the sessile oak (*Quercus petraea*), including Hodonínská dúbrava Natura 2000 – one of the focal sites for both coppice reintroduction and silvopasture.

The visual stimuli were designed in such a way that allowed for single-attribute manipulations. As a baseline image, an open-forest environment was chosen. From this image, the representations of management in question were created by changing a single attribute:

- baseline image + tree density → closed-canopy forest
- baseline image + early coppices → early stage of coppice-with-standards
- baseline image + old polycormones → late stage of coppice-with-standards
- baseline image + sheep → silvopasture
- baseline image + woody debris → forest with deadwood

Multiple rounds of testing were performed during the preparation of the stimulus set in order to ensure the validity of the visual representation and sensitivity of participants to manipulation.

The experiment also involved textual stimuli containing contextual information about the management practices. These texts (henceforth “labels”) were derived and adapted from texts on information signs present at the management sites. Labels were manipulated in terms of the information framing – either the ecological function of the management was emphasized, or its historical value.
Participants were presented with three stimuli: an open forest environment (presented as “thinning” in the label condition), a closed-canopy environment (“standard commercial forest”) and a representation of one of the specific managements: – coppice-with-standards, silvopasture and deadwood management. Additionally, we also included a representation of an old coppice forest (one that the public is more likely to encounter than the young coppices). Together with the images, participants answered a battery of questions related to perceived attributes of the environments. These included perceived naturalness, prospect, complexity, familiarity or stewardship. Overall attractiveness as well as recreational preference were rated on 7-point Likert scale (so were the perceived attributes). Two multi-item identity scales were also measured: environmental identity (based on Clayton et al., 2021) and cultural continuity scale (based on Sani et al., 2007). Experimental conditions differed in the presented forest management and in the presence of labels (ecological, historical or no label).

In this paper, we focus on the effects of visual attributes and labelling (information framing) on attractiveness.

We hypothesize that forest management affects attractiveness indirectly via perceived environmental characteristics, with naturalness, complexity, familiarity, stewardship, and historicity increasing attractiveness (Braun Kohlová et al., 2021; Tveit et al., 2006). Managements are expected to alter these perceptions. Contextual labels are expected to systematically shift perception – ecological labels affecting naturalness and historical labels affecting historicity – thereby influencing attractiveness. These effects are expected to be moderated by environmental and cultural identity, respectively.

Study design and hypotheses were preregistered at [https://osf.io/p63vf]. Data and analytical documentation is available at [https://osf.io/nq3ph].

Data from 2 200 participants were collected (1153 women, 1046 men, 1 undisclosed, mean age 50, age range [18; 86]). The sample was balanced in terms of education, socioeconomic status, region and other sociodemographic variables. Before the final analysis, data from 41 participants were discarded due to suspicious response uniformity.

The relationship between the outcome variables and the mediators was modelled using Bayesian multilevel modelling with the help of the ‘brms’ package (Bürkner, 2017) in R (R Core Team, 2026). Prior distributions were informed by results of the pilot study (regression analysis conducted on a sample of 142 participants).

Results

Attractiveness ratings were generally high across all conditions and showed minor but systematic variation between management types in the no-label condition with the thinning and early coppice having the lowest average rating (5.23 and 5.32) and late coppice and closed-canopy the highest (5.69), showing that participants favoured the less open environments.

Separate models were fit for the conditions with no label, and for ecological and historical labels. Figure 1 below shows the mediation effects of perceived characteristics on the overall attractiveness (without label).

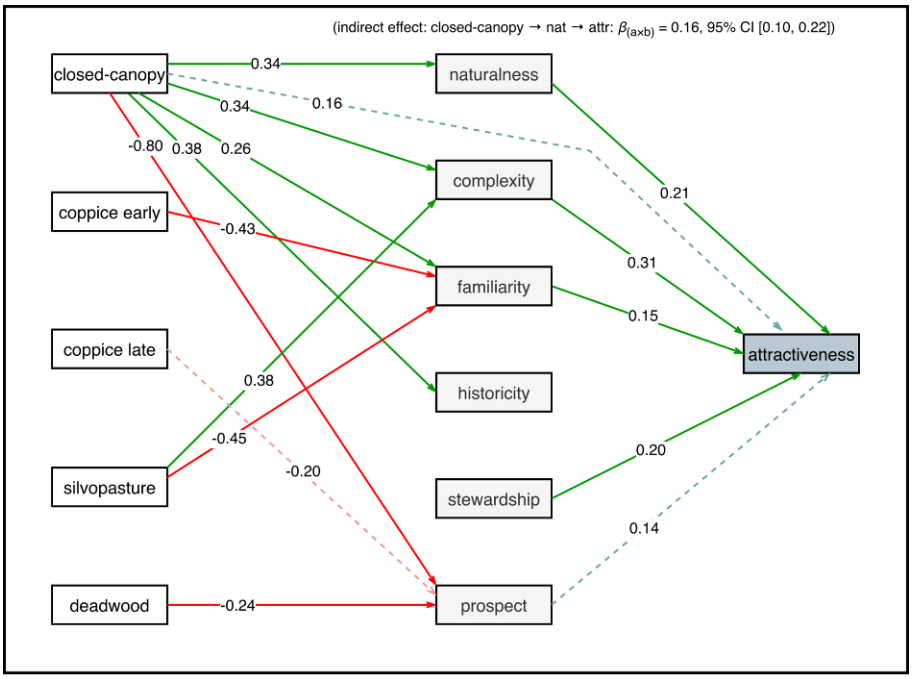

Fig. 1: Path diagram: no-label condition
Lines represent directional paths with standardized coefficients (β). Solid lines indicate effects whose 95% highest density interval (HDI) lies entirely outside the region of practical equivalence (ROPE; [-0.1, 0.1]). Dashed lines indicate effects for which up to 10% of the HDI overlaps the ROPE.

We can see that the higher attractiveness of closed-canopy forest is driven by higher perceived naturalness, complexity, familiarity and even historicity (although this environment represents in fact, the "modern" type of forest). Does this perception pattern change by introducing contextual information?

Figure 2 shows the posterior distributions for naturalness parameters in different management conditions without and with an ecological label.

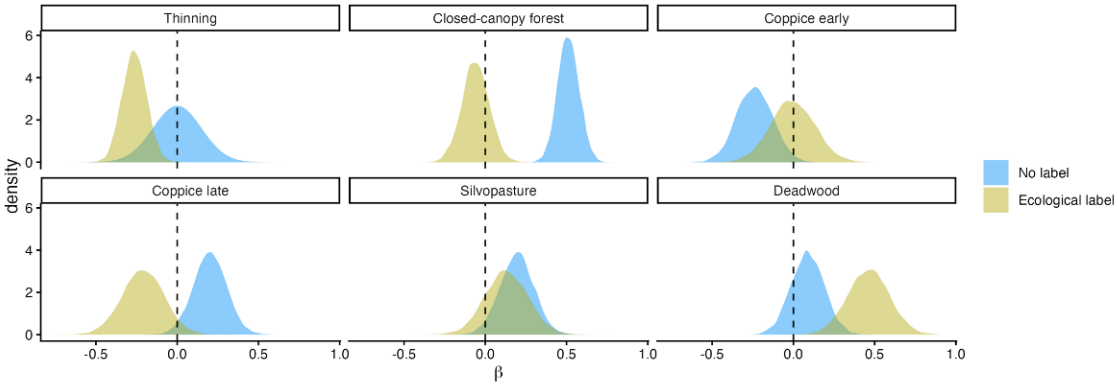

Fig. 2: posterior distributions: management*label → naturalness

The effect of ecological framing is not straightforward. For closed-canopy forest, labelled as management that can negatively affect biodiversity, the label decreases naturalness, although this is not reflected in the total indirect effect on attractiveness (Figure 3). As hypothesized, for deadwood, the effect is opposite and there is an indirect effect on attractiveness. Expected change of naturalness occurs also in early coppice condition, but without a positive effect on attractiveness. The negative impact of ecological framing on thinning is likely related to participants focusing on the "human intervention" side of the label and not necessarily the ecological upsides and thus rating the forest as less natural. Early coppices, on the other hand, are viewed as more natural when ecologically framed, but the overall attractiveness remains low: unfamiliarity might be the major driver here – despite contextualization, coppicing remains a rather alien phenomenon.

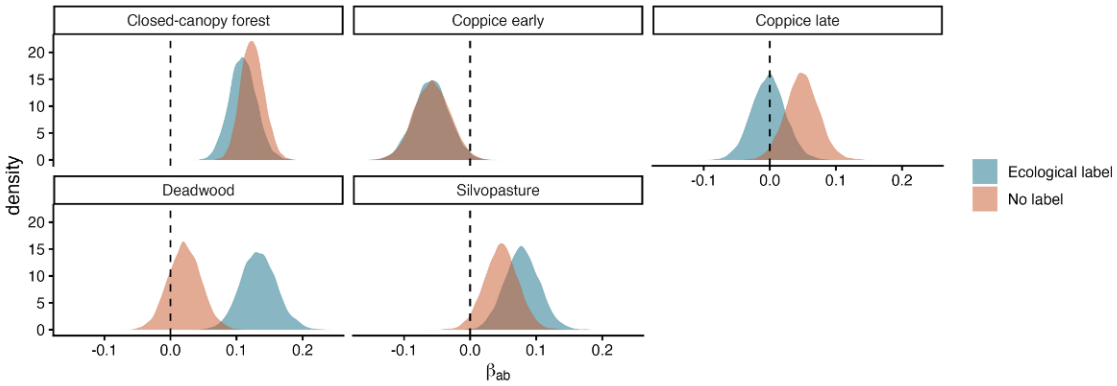

Fig. 3: posterior distributions: indirect effect management*label → naturalness → attractiveness

The mediation effect of perceived historicity on attractiveness was minor and so the boosting by historical labelling did not change the overall perception of the forests. Individual variables, including identity measures, did not considerably affect the overall pattern sketched here.

Discussion

Attractiveness is primarily driven by perceived naturalness and complexity, with additional contributions from stewardship and familiarity, and this structure remains stable across label conditions. Increased tree density (closed-canopy) consistently increases attractiveness through strong indirect effects of these perceptual dimensions, despite reducing visual openness of the scene. Labels do not have a general positive effect on attractiveness but instead selectively modify how specific forest features are interpreted, particularly enhancing the perceived naturalness of ambiguous elements such as woody debris. Further analysis should focus on management-specific effects of labels on other perceived characteristics that affect attractiveness, especially complexity.

Conclusion

We do not delve into detail in this paper, however, the overall picture is more complex, as different perceptual pathways can counterbalance each other and lead to relatively small differences in overall attractiveness. While certain management types influence specific perceived characteristics, these effects do not always translate into clear differences in attractiveness.

It is likely that the Czech public will encounter currently less-familiar forms of forest management more frequently in the future, driven by ongoing changes in forest policy and adaptation of forest management to climate change. Our results suggest that public perceptions of forestry practices are, among other aspects, grounded in how close to nature and how diverse (visually complex) the forests are. Perceptions are stable, but communication can draw attention to certain elements within forest scenes and thereby affect the overall attitude towards close-to-nature managements.

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Souhrn
Tato studie zkoumá, jak lesní hospodaření blízké přírodě ovlivňuje vnímanou atraktivitu a zda kontextové informace (informační cedule) toto vnímání mění. V rámci percepčního experimentu účastníci hodnotili vizuální znázornění lesních prostředí podléhajících různým režimům hospodaření, včetně lesů s uzavřeným porostem, mlácení (v rané a pozdní fázi), lesního pastvinářství a zachování mrtvého dřeva. Podmínky se lišily podle přítomnosti a typu informačních cedulí (ekologické, historické nebo žádné). Atraktivita byla modelována jako výsledek vnímaných environmentálních charakteristik s využitím bayesovských víceúrovňových mediačních modelů.
Napříč podmínkami byla atraktivita primárně ovlivněna vnímanou přirozeností a komplexností, s dodatečným přínosem ze strany známosti a správy. Při absenci štítků byly rozdíly mezi typy hospodaření relativně malé, ačkoli lesy s uzavřeným porostem a pozdní výmladkové lesy byly hodnoceny jako mírně atraktivnější než otevřenější nebo neznámá prostředí. Štítky neměly jednotný vliv na atraktivitu, ale ovlivňovaly vnímání určitých typů hospodaření. Ekologické rámcování zvýšilo vnímanou přirozenost a atraktivitu mrtvého dřeva, zvýšilo přirozenost raného mlázového porostu (aniž by to ovlivnilo celkovou atraktivitu) a zároveň snížilo vnímanou přirozenost lesů s uzavřeným porostem. Historické rámcování mělo celkově omezený vliv.

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