




Trust and the potential for bottom-up change in forest management in Sweden

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ABSTRACT

To learn about the potential for bottom-up forest management change, this study examined how trust in the forest sector, i.e., internal trust, and trust in the news media, reflecting trust in an external source, are associated with private forest owners' acceptance of alternative management (i.e., practices used by a minority of owners). Measures of acceptance included beliefs reflecting the extent to which more and less production oriented alternative forestry practices align with the owners' management goals and intention to engage in collaborative forest planning for ecological and social values. A survey of a random sample of forest owners in Sweden ($n = 1763$) revealed that close-to-nature practices (e.g., no clear-cuts) were believed to be more aligned with management goals than intensive forestry practices (e.g., fertilization). Yet around 25% of the owners believed that the close-to-nature practices were neither aligned nor non-aligned with their goals, and the share of owners being unsure was 20% or higher for the individual practices. Linear regression models revealed that trust was significantly related to acceptance of alternative management strategies when controlling for covariates. Whereas internal trust was positively associated with intensive forestry beliefs, news media trust was positively associated with both intensive forestry beliefs and close-to-nature beliefs. Moreover, higher news media trust in combination with lower internal trust was associated with stronger close-to-nature beliefs and intention to engage in collaborative planning. The study confirms interactions between different forms of trust and highlights the importance of external trust to reinforce diverse alternative management.

1. Introduction

Calls for change in the management of forests are derived from an increased risk of forest damage associated with climate change, extensive biodiversity loss, and climate change mitigation (e.g., substituting fossil products with biobased ones) (Jandl et al., 2019; Felton et al., 2024; Giffen et al., 2025). To increase the ecological resilience of forests, often with an emphasis on multifunctional landscapes, stand structures and species composition need to be diversified and the use of uneven aged management increase (Keenan, 2015; Kuuluvainen et al., 2021; Dufflot et al., 2022; Felton et al., 2024). Top-down processes such as new policy (e.g., the nature restoration law, European Commission, 2022), but also bottom-up processes, including public support and increased interest among forest owners may encourage a greater use of such management (Kiisel and Remm, 2022; Dawson et al., 2025; Siiskonen et al., 2025). Barriers to the adoption of alternatives to even aged management system, including economic and institutional factors, socio-cultural norms, industrial networks and advisory services

supporting the status quo, but also knowledge gaps (Hertog et al., 2022; Kiisel and Remm, 2022; Mason et al., 2022; Angelstam and Dawson, 2025; Dawson et al., 2025). Climate mitigation and adaptation measures also include intensive forestry practices such as shortening of rotations to mitigate damage, and the utilization of improved forest reproductive material to increase forest growth (Jandl et al., 2019; Kauppi et al., 2022; Roitsch et al., 2023). However, these practices are more aligned with the production logics of current mainstream management in countries with a significant forest industry, such as Sweden and Finland (Andersson and Kesitalo, 2018; Hertog et al., 2022; Takala et al., 2023).

Private forest owners is an important stakeholder group in the management of forest in the United States of America (US) and Northern Europe, yet influenced by regulations, policy, the decision support system, and forestry social networks (Lawrence et al., 2020; Stoettner and Ní Dhubáin, 2019). In addition, external sources such as the mass media contribute to narratives of forest management (Mack et al., 2023). Hence, social interactions, and ultimately trust, built through experience and linked to perceptions of competence and value similarity (Earle, 2010) may play a role for management decisions. Trust reflects the

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willingness of a trustor to depend on another part, i.e., the trustee, to make decisions or take action in relation to a trust object (Rousseau et al., 1998; Cvetkovitz and Winter, 2003; Earle, 2010; Schilke et al., 2021). In addition to a general trustee (often labelled social trust), trust in science, technology, media, institutions or a specific agency have been examined (Cvetkovitz and Winter, 2003; Devine and Valgardsson, 2024; Das et al., 2025; Ejaz et al., 2025; Guo et al., 2025; Srivastava et al., 2025; Douglas, 2026). Among forest owners, trust in managers and organizational trust have been found to be important for knowledge exchange and various forms of collaborations (Pöllumäe et al., 2016; Boakye-Danquah and Reed, 2019; Górriz-Mifsud et al., 2019; Stoettner and Ní Dhubáin, 2019; Karlsson et al., 2024; Loch and Kleinschmidt, 2025). However, different forms of trust (different trustees) may interact and are not always associated with management in the same way (Vainio et al., 2018; Tan et al., 2025). Hence, how trust may have implications for management decisions needs additional attention.

To explore the potential for bottom-up management change varying in alignment with the rationale underlying current practices, the present study examines the role of trust in the forest sector and trust in news media (two trustees) in connection with forest issues (the trust object) for acceptance of alternative management among private forest owners (the trustor) in Sweden. Forest owners are part of the forest sector and trust in the forest sector thereby represents a form of internal trust, while trust in news media encompasses trust in an external source in this context. Acceptance of alternative management was examined in terms of goal-related management beliefs reflecting the extent to which more or less production oriented practices align with the owners' management goals, and intention to engage in collaborative forest planning for ecological and social values.

2. Theory and previous research

2.1. Systemic and enabling approaches to transitions

Transition is a process of change (Child and Breyer, 2017) which in the forest context may occur at different levels (e.g., stand, estate, and landscape) (Keenan, 2015) and may vary in purposefulness, timing (reactive or proactive), scope (incremental or transformational), and goals (e.g., resistance, transition, or resilience) (Fischer, 2019). The multi-level perspective (MLP), a systemic approach for explaining major transitions, suggests that the mainstream regime level ensures system stability while change is commonly initiated in local niches or following rapid or long-term changes in the socio-technical landscape (Geels, 2002, 2010). In forest management transitions, niche level actors may bolster change through articulations of visions and informal networking, while the prevailing regime actors (e.g., forest companies) uphold current practices and norms, and resist change (Hertog et al., 2022). Incremental change, which is more common than transformational change (Eriksson, 2018; Schattman et al., 2024; Dawson et al., 2025), may nevertheless be supported by the regime level (Luhás et al., 2021). In the MLP, media is seen as a stage for external influence where different groups express and argue for diverse viewpoints in support of or contradicting a transition (Geels, 2019).

Alongside systemic approaches, the capacities and agency in e.g., networks and among grassroots needed to enabling change may also explain transitions (Scoones et al., 2020; Riggs et al., 2025). Building agency individually or collectively refers to learning, empowerment, and removing barriers for actions (Pahl-Wostl, 2009; Cinner et al., 2018). In enabling approaches, emphasis is placed on how smaller actions can together and across time contribute to a transition aligned with the values of those involved (Scoones et al., 2020). In addition, consideration is given to how marginalized groups contribute to and are affected by transitions thereby emphasizing just transitions (Smith and Sterling, 2018). The landscape and regime levels in MLP are used to frame this study with the forest sector representing the regime level endorsing system stability, and the media as an external source of

influence with a more diverse set of viewpoints represented. In line with enabling approaches emphasizing the importance of considering groups' values and beliefs in transitions, the broad group of private forest owners was examined. Specifically, this study explored how the potential for bottom-up change is contingent on linkages between a grassroots group and systemic factors relevant for a transition.

2.2. Trust and acceptance of change

Research suggests that closer bonds with the mainstream forest sector is associated with stronger endorsement of current management and practices aligned with underlying logics. For example, in Sweden where forestry is important, forest owners' trust in forest sector actors was important for intention to plant improved birch, an alternative practice to improve the growth and quality of birch (Eriksson and Rapp, 2025). High trust among actors within a forestry network in the Finnish forestry context have further been found to be associated with a restricted influence from external actors and support for business-as-usual approaches (Korhonen et al., 2018). In contrast, sources outside the forest sector may contribute to capacities needed for increasing the acceptance of alternatives diverging from current practices. In support of this argument, close bonds with other groups than the ones the individual belong to (i.e., bridging rather than bonding ties) have been shown to be associated with being open to novelties (Bodin and Crona, 2009), indicating that interactions with external sources may be important for new insights and change. More specifically, higher trust in traditional media, i.e., newspapers, television, radio (but not social media) has been found to be positively associated with prioritizing collective (rather than personal) benefits in the climate change context (Sivonen et al., 2025). Although previous studies support the relevance of internal trust and news media trust for attitudes and decision making related to change, direct evidence of how diverse forms of trust may prevent or facilitate management change is lacking.

2.3. Hypotheses and the present study

Forest owners in Scandinavia have been found to be interested in increasing the share of mixed and/or broadleaved forest and to some extent uneven aged management (Juutinen et al., 2020, 2021; Eriksson and Sandström, 2022; Eriksson and Rapp, 2025; Haltia et al., 2025). When comparisons have been made with production-oriented changes, owners tend to prefer more nature-oriented changes, but the strongest preference is for continuing with current management (Juutinen et al., 2020, 2021). Based on the premises that trust plays a role for how novel practices are evaluated and willingness to engage in these practices (Hooda et al., 2022; Mehdizadeh et al., 2024; Eriksson and Rapp, 2025), three hypotheses depicting relationships between trust and acceptance of alternative management were developed.

With the production dominated forest sector in Sweden (Anderson and Kesitalo, 2018), owners with higher internal trust, may be more likely to believe that alternative management strategies aligning with the underlying rationale of the sector are more acceptable (Korhonen et al., 2018). In contrast, trust in news media represents a relationship with a source outside of the forest sector. Higher news media trust has been found to be associated with supporting collective actions such as acting pro-environmentally (Ejaz et al., 2025; Sivonen et al., 2025). Hence, news media trust may be associated with acceptance of alternative management strategies that are less aligned with current production rationale. I therefore proposed the following hypotheses:

H1a. Higher internal trust is associated with higher acceptance of production focused alternative management.

H1b. Lower news media trust is associated with higher acceptance of production focused alternative management.

There is also a need to empirically assess whether the opposite holds for less production focused alternative management. Thus, the following hypotheses were formulated:

H2a. Lower internal trust is associated with higher acceptance of less production focused alternative management.

H2b. Higher news media trust is associated with higher acceptance of less production focused alternative management.

Departing from results presented by Korhonen et al. (2018), the impact of different forms of trust may also be conditional on each other (also supported by interactions found by Tan et al., 2025) suggesting that the impact of news media trust may not only play a role independently but also depend on the level of internal trust. Hence, the following hypothesis was proposed:

H3. Internal trust and news media trust interact in determining acceptance of alternative management.

In this study, acceptance of alternative management practices was examined in terms of the owner's goal-related management beliefs reflecting the extent to which alternative management methods are believed to fulfil their management goals, and intention to engage in collaborative forest planning for ecological and social values. Forest owners' goals have been found to be important for management (Petucco et al., 2015), but alignment between goals and alternative management practices has not been examined. In addition, despite the need for integration of landscape perspectives in management to ensure for example biodiversity values (Angelstam et al., 2020), studies of joint planning have largely focused on participation in forest owner organizations (Górris-Mifsud et al., 2019; Pöllumäe et al., 2016). Owners' interest in more informal collaborative planning has largely been ignored. Furthermore, associations between ecosystem service (ESS) beliefs and both goal-related management beliefs and intention to engage in collaborative planning for other than production purposes were analyzed illustrating connections between ecosystem services on the one hand and management on the other, from the owners' perspective. To ensure that the effect of trust is not due to confounding variables, the hypotheses were examined while controlling for a set of variables known to be relevant for trust (e.g., education, Charron and Rothstein, 2016; Mosier and Rixton, 2021) and forest management decisions (e.g., gender, age, size of forest, owner membership, forest ownership motivation, beliefs, emotions, Husa and Kosenius, 2021; Eriksson and Sandström, 2022; Tiebel et al., 2024; Eriksson and Rapp, 2025).

3. Methods

3.1. Study context

Almost 70% of the land are covered by forests in Sweden with the large majority being conifer dominated productive forest, mainly Norway Spruce (*Picea abies*) and Scots Pine (*Pinus sylvestris*). Broadleaved forest and mixtures comprise only 8% and 7% of the productive forest, respectively (Swedish University of Agricultural Sciences (SLU) 2023). Clear-cutting is the dominant management system and no clear-cut methods, such as selection cutting, are only used on a few percentages of the land (Mason et al., 2022; Swedish Forest Agency (SFA), 2022; Brunner et al., 2025; Scherpenhuijzer et al., 2025). Several practices aiming to increase growth are also implemented on a minority of forest land, for example extraction of logging residue is implemented on about 30% of the clear-cuts (SFA, 2022). Moreover, lodgepole pine, the most common non-native conifer, is used on less than 2% and fertilization on less than 1% of the productive land (SLU, 2023; SFA, 2025). This suggests that these practices are also alternative practices yet aligned with a production rationale. Just under 310 000 individual private forest owners own almost half of the productive forests in Sweden (SFA, 2024). Since 1993, the production and environmental goals are equally important in the forest policy, and while conservation is given greater emphasis in recent policy formulations, production is important (Andersson and Keskitalo, 2018) and some studies even suggest that intensive forestry is expected to increase in Sweden (Konczal et al., 2025). Whereas management is not highly regulated and ownership rights are emphasized, the owner's decisions are dependent on their

network, including advice from private actors such as timber buyers, owner organizations, and private companies (Lawrence et al., 2020).

3.2. Study design and respondents

In 2024, a randomly selected sample of individual private forest owners (20–80 years) in Sweden owning more than 5 ha of forest land were invited to participate in a survey (n = 5000, net sample = 4976). Data collection followed the ethical guidelines outlined in the 1964 Declaration of Helsinki and was made by a commercial survey company (Kvalitetsindikator AB). The owners were informed about the aim of the study as well as the handling of personal information. They were also assured that participation is voluntary. Data was pseudonymized before analyses. Given that no sensitive personal information was collected according to Swedish legislation (the Ethics Review Act 2003:460), no ethical permit was required.

The response rate was 36% (n = 1763) following five contacts (postal invitation, paper questionnaire, text reminder, and two postal reminders). Mean age was 71 years (SD = 12), the share of women was 35% and 44% had a university degree. There was an even distribution of respondents across the country and approximately one third lived on their property. The majority of the owners owned forest properties between 5 and 200 hectares (5–20 ha: 32%, 21–50 ha: 25%, 51–200 ha: 33%, >201 ha: 11%). Since the sample was older than the population of forest owners, contained a slightly larger share of men, and fewer owners owned a small estate (Population statistics for 2023: Mean age 61 years, 38% women, 5–20 ha: 44%, 21–50 ha: 29%, 51–200 ha: 23%, >200: 4%) (SFA 2024), data was weighted on gender, age, and size of forest land (n = 1686). Unweighted and weighed data descriptives are available in Supplementary material (Table S1). After imputation of missing values (see 3.4. Statistical analyses) the weighted data descriptives remained the same.

3.3. Measures

Alternative management covered practices and strategies currently not part of how the majority of Swedish forest owners manage their forest, including close-to-nature and more intensive forest management practices. Information about size of forest land was taken from the register. An interdisciplinary team of researchers, practitioners, and government representatives participated in developing the questionnaire. In this study, questions about trust, alternative management and ESS beliefs were asked, as were questions about socio-demographic and forest variables. The handling of missing values and don't know answers is described in 3.4. Statistical analyses.

3.3.1. Trust

Trust was assessed using the following question: "How much trust do you have in the following with regards to forest issues, e.g., forest management?". Internal trust was assessed using four items, including forest owner association, forest companies, smaller forest businesses/forest networks for advice, and the Swedish Forest Agency (cf. Eriksson and Rapp, 2025), and news media trust was assessed by the item: Massmedia (e.g., daily newspaper, TV). Responses were provided on a five-point scale ("No trust at all" to "A lot of trust") with the possibility to answer "NA/don't know". Different actors in the forest sector are often clustered together (Korhonen et al., 2018; Bergquist et al., 2025) and averaging the means of the items reflecting different forest sector actors resulted in an internal trust measure with good reliability ($\alpha = 0.83$).

3.3.2. Questions about alternative management

Goal-related beliefs about alternative management practices were assessed using the question: "To what extent do you believe that the following ways to manage the forest can contribute to you reaching your forest management goals?": 1) Gap cutting (clearcut free forestry), 2) Selective felling (clearcut free forestry), 3) Shelterwood (clearcut free

forestry), 4) Increase the share of mixed forest with conifers and broadleaves, 5) Increase the share of broadleaved forest with trivial broadleaves such as birch, and 6) Longer rotation (i.e., close-to-nature practices), and 7) Increase the share of fast-growing broadleaves such as improved birch, hybrid aspen, aspen, 8) Increase the share of introduced conifer trees such as contorta, 9) Fertilization, 10) Shorter rotation, and 11) Logging residue extraction (i.e., intensive forestry practices). Responses were provided on a five-point response scale (“Not at all” to “To a great extent”) including the option “don’t know”. A principal component factor analysis with varimax rotation confirmed two factors of more general strategies with eigenvalues over 1 (4.12 and 2.54), labelled close-to-nature beliefs ($\alpha = 0.88$) and intensive forestry beliefs ($\alpha = 0.76$), respectively (less versus more aligned with a production rationale), explaining 61% of the variance. Intention to engage in collaborative forest planning for ecological and social values was examined using the question: “How likely is it that you would participate in the following if you were asked to? 1) To jointly with the owner of a neighboring property plan for certain measures for nature values (e.g., around water courses), 2) To jointly with the owner of a neighboring property plan for certain measures for recreational values (e.g., around hiking trails), 3) To participate in the planning of forest management over larger areas to facilitate e.g., nature values, recreation or reindeer herding.” The answers were provided on a five-point response scale (“Not at all likely” to “Very likely”). The items were combined into an index with good reliability ($\alpha = 0.90$). Finally, to further assess potential for change, the owners were asked to tick a box if they never test new management methods resulting in two groups of owners with and without inclination to test new methods.

3.3.3. Ecosystem service beliefs

Ecosystem service (ESS) beliefs were assessed using the question “How important is it for you that your forest contributes to the following?” Diversity of species (e.g., plants, insects and birds), preservation of red listed species, carbon storage, beautiful nature, possibilities to pick berries and mushroom for all, hunting (i.e., ecological and social ESS) and production of timber, production of pulp, biomass for energy or renewable materials (e.g., textiles, biochar), economic yield for you (economic production ESS) with answers provided on a five-point scale (“Not at all important” to “Very important”) (cf. Eriksson and Rapp, 2025). A factor analysis confirmed two factors with eigenvalues over 1 (3.16 and 2.98). Since hunting displayed a loading under 0.4 on both factors it was excluded. The remaining items were used to create two index variables labelled ecological social ESS ($\alpha = 0.80$) and production economic ESS ($\alpha = 0.87$), respectively, explaining 61% of the variance.

3.3.4. Socio-demographic and forest variables

The owners were asked about gender, age, and education, as well as whether they live on their property (resident or non-resident owner), are members of a forest owner organization (e.g., Södra, Mellanskog, Norra), and whether they have certified forest according to FSC (Forest Stewardship Council) and PEFC (Programme for the Endorsement of Forest Certification). In addition, they were asked about how much revenue forestry provides in relation to their total yearly income on a seven-point response scale (“An insignificant share” to “Broadly everything”).

3.4. Statistical analyses

Analyses were conducted using SPSS version 29. Weighted data was used in all analyses. In the descriptive analyses, the owners’ goal-related beliefs of alternative management practices and intention to engage in collaborative planning for ecological and social ecosystem values were analyzed using frequencies (also considering don’t know answers) and a repeated measure ANOVA was used to compare beliefs about the different practices. The share stating that they try new methods was further assessed in relation to the goal-related beliefs. Before conducting

further analyses, missing values were handled systematically. Missing values on individual variables ranged from 0 to 14% with the majority below or around 10%. In addition, respondents had the possibility to answer don’t know on the measures of trust and goal-related beliefs. Instead of using listwise deletion for missing values, a maximum likelihood method, the EM algorithm, was used to impute missing values, including don’t know answers to reduce bias in correlational and regression analyses (Newman, 2014). While the missing value analysis revealed that the little MCAR test was significant, indicating that the missing values are not missing completely at random, there is some support for missing at random (MAR) since the sample deviated in a systematic way from population statistics. Together with study variables, socio-demographics (gender, age, education) and forest variables (size of forest area, residence, member in forest owner association, FSC and PEFC certification, income from forestry) were used when conducting the imputation to reduce errors and bias.

To provide insights into the extent to which the alternative management strategies correspond with a production rationale among owners, bivariate correlations (Pearson r) between the ESS beliefs on the one hand and close-to-nature beliefs, intensive forestry beliefs and intention to engage in collaborative planning on the other were analyzed. In addition, the characteristics of owners with different levels of trust were analyzed. Respondents were divided into groups depending on level of internal trust and trust in news media contrasting low trust (1, 2 = low trust) from higher levels of trust (3–5 = medium/high trust). The groups were subsequently compared regarding socio-demographics (gender, age, education), forest related variables (size of forest, residence, membership in forest owner association, certification (FSC, PEFC), importance of income from forestry) and psychological variables (ESS beliefs). To examine the hypotheses, three linear regression models with internal trust, news media trust, and the interaction term (multiplying the two measures of trust) were entered as independent variables (mean centered to avoid problems with collinearity). Intensive forestry beliefs (i.e., production focused alternative management), close-to-nature beliefs and intention to engage in collaborative planning for ecological and social values (i.e., less production focused alternative management) were included as dependent variables. Covariates in the models included gender, age, education, size of forest land, residence, member in forest owner organization, certification (FSC and PEFC), income from forestry, and ESS beliefs. The Variance Inflation Factor (VIF) was calculated to assess multicollinearity. To interpret the significant interactions, interaction plots with low values plotted at -1 and high values at 1 were utilized based on Excel templates (<https://www.jeremydawson.co.uk/> based on procedures proposed by Aiken and West (1991), Dawson (2014) and Dawson and Richter (2006)).

4. Results

4.1. Goal-related management beliefs and intention to engage in collaborative planning

Beliefs about the goal alignment of different management practices are displayed in Fig. 1 (high alignment (4, 5), neither high nor low (3), low alignment (1,2), and don’t know). Between 21 and 37% stated that they didn’t know whether these methods align with their management goals, with the largest share being unsure about shorter and longer rotation. In addition, between 13 and 31% believed that alignment with different practices is neither low nor high. Results revealed the highest alignment with management goals for increasing mixed forest, followed by increasing the share of trivial broadleaves. Subsequently, the three no clear-cut methods together with longer rotation and extraction of logging residue followed. Lower alignment was found for fertilization and shorter rotation, which in turn was followed by increase in fast-growing broadleaves, and finally increase in non-native conifers. Even though higher alignment with management goals was found for the close-to-nature than intensive forestry practices, uncertainty was still high for

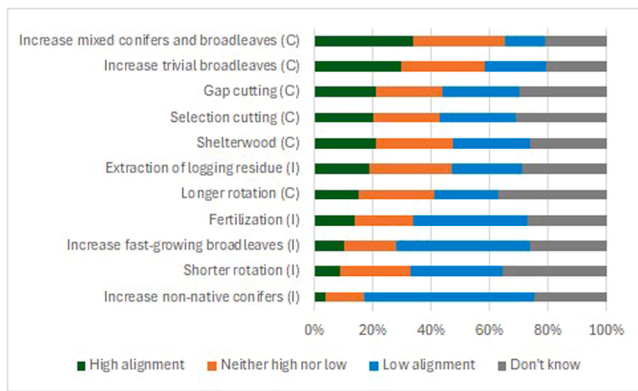


Fig. 1. Share of owners with beliefs reflecting high alignment with management goals (4,5, green), neither high nor low (3, orange), low alignment (1,2, blue), and don't know (grey) for each of the management methods, sorted from highest alignment at the top to lowest alignment at the bottom. Practices commonly classified as close-to-nature (C) and intensive forestry (I), respectively.

these practices. Moreover, among those believing that the different methods align with their management goals (answering 4 or 5 on the five-point scale) between 57 and 71% state that they try new methods, indicating that not all owners are likely to implement these practices even if they are believed to align with goals. The mean for intention to engage in collaborative planning was just below the middle of the scale (M = 2.74, SD = 1.29).

4.2. Beliefs about ecosystem services and alternative management strategies

Beliefs that close-to-nature forestry will fulfil management goals and intention to engage in collaborative planning for ecological and social values were positively associated with ecological and to some extent social ESS (Table 1). However, while close-to-nature beliefs were negatively associated with economic production ESS, intention to engage in collaborative planning was positively associated with timber & products, energy & renewable, and economic revenue, but not significantly associated with pulp. Intensive forestry beliefs were positively associated with economic production ESS, and weakly negatively correlated with diversity and redlisted species but weakly positively correlated with carbon storage. Overall, intensive forestry practices displayed positive correlations with production ESS (examined in H1) while close-to-nature beliefs and intention to engage in collaborative planning displayed either negative, non-significant or weak positive correlations with production ESS (examined in H2).

4.3. Trust and alternative management strategies

Comparisons of the groups with different levels of trust (Table 2) showed that the groups with higher internal trust and higher news media trust had higher education level and placed greater emphasis on all examined ESS beliefs compared to the respective low trust groups. In addition, the group with higher internal trust contained a higher share of women, non-resident owners, owner association members, owners with certified forest, and were more dependent on income from the forestry, than those with a low trust in the forest sector. Hence, internal trust was more closely associated with several of the forest variables.

Bivariate correlations between study variables and covariates are available in Table S2, Supplementary Material. Analyses of hypotheses are displayed in Table 3. Since no VIF values were above 1.60 there is no evidence of multicollinearity in the models. In support of H1a, results show that higher internal trust was associated with beliefs that intensive forestry can fulfil management goals, i.e., production focused

Table 1
Bivariate correlations between ecosystem service (ESS) beliefs on the one hand and close-to-nature beliefs, intensive forestry beliefs, and intention to engage in collaborative planning for ecological and social values, on the other.

	Ecological ESS				Social ESS				Economic Production ESS			
	Diversity	Red listed	Carbon	Beautiful	Berries & mushrooms	Hunt	Timber & products	Pulp	Energy & renewable	Revenue		
Means (SD)	3.78 (1.04)	3.59 (1.18)	2.90 (1.29)	3.95 (0.97)	3.63 (1.18)	3.58 (1.29)	3.05 (1.30)	2.85 (1.21)	2.57 (1.15)	3.04 (1.30)		
Close-to-nature	.42***	.39***	.26***	.33***	.24***	.00	-.010***	-.019***	-.06*	-.012***		
Intensive forestry	-.008***	-.008***	.10***	-.011***	-.004	.01	.29***	.35***	.35***	.36***		
Intention	.33***	.33***	.31***	.20***	.17***	.15***	.09***	-.001	.12***	.10***		

* p < .05, ** p < .01, *** p < .001.

Ecological Ecosystem Services: Diversity = Diversity of species, Red listed = Red listed species, Carbon = Carbon storage. Social Ecosystem services: Beautiful = Beautiful forests, Berries & mushrooms = Picking berries and mushrooms. Hunt = Hunting. Economic production ecosystem services: Timber & products = Timber and improved products, Pulp = Pulp production, Energy & renewable = Biomass for energy or renewable material, Revenue = Economic revenue. Close-to nature = Close-to-nature beliefs, Intensive forestry = Intensive forestry beliefs, Intention to engage in collaborative planning for ecological and social values.

Table 2
Characteristics of the groups with low versus medium/high internal trust and news media trust, respectively.

	Internal trust		News media trust	
	Low 31% n = 517	Medium/high 69% n = 1169	Low 64% n = 1081	Medium/high 36% n = 605
Gender (women)	35%	43%**	41%	40%
Age (mean (SD))	63 years (15)	63 years (14)	62 years (14)	63 years (14)
Education (university)	42%	54%***	48%	55%**
Size of forest land (mean (SD))	58 ha (144)	67 ha (221)	65 ha (223)	63 ha (153)
Resident owner	30%	23%**	26%	24%
Member	29%	40%***	35%	39%
FSC	8%	14%***	12%	11%
PEFC	7%	15%***	12%	14%
Income from forestry (mean (SD)) ^a	1.43 (0.84)	1.57 (0.93)**	1.51 (0.94)	1.54 (0.83)
Ecological social ESS (mean (SD)) ^b	3.41 (1.00)	3.64 (0.76)***	3.46 (0.85)	3.76 (0.82)***
Production economic ESS (mean (SD)) ^b	2.35 (1.10)	3.12 (0.95)***	2.82 (1.06)	2.99 (1.04)**

* p < .05, ** p < .01, *** p < .001.

Ecological social ESS = Ecological social ecosystem service beliefs, Production economic ESS = Production Economic ecosystem service beliefs.

^a Scale 1–7 (a higher value denotes that a higher share of the income is from forestry).

^b Scale 1–5 (a higher value denotes that the category of ecosystem services is more important to the owner).

Table 3
Results from linear regression analyses with internal trust, news media trust, and the interaction as independent variables, including covariates (socio-demographics, forest variables, and ecosystem service beliefs), and intensive forestry beliefs, close-to-nature beliefs, and intention to engage in collaborative planning for ecological and social values as dependent variables.

	Intensive forestry beliefs			Close-to-nature beliefs			Intention to engage in collaborative planning		
	B(SE)	β	p	B(SE)	β	p	B(SE)	β	p
Constant	2.20(0.10)		.001	2.25(0.12)		.001	1.72(0.19)		.001
Gender (D)	−0.02(0.03)	−0.02	.438	−0.05(0.04)	−0.03	.198	−0.17(0.06)	−0.07	.003
Age	−0.01(0.00)	−0.12	.001	−0.01(0.00)	−0.08	.001	−0.02(0.00)	−0.19	.001
Education (D)	0.07(0.03)	0.05	.031	0.14(0.04)	0.09	.001	0.32(0.06)	0.13	.001
Resident owner (D)	−0.09(0.04)	−0.06	.010	0.00(0.04)	0.00	.927	−0.03(0.07)	−0.01	.620
Size of forest	0.00(0.00)	0.00	.993	0.00(0.00)	−0.01	.617	0.00(0.00)	0.02	.419
Member (D)	0.07(0.03)	0.05	.032	0.08(0.04)	0.05	.038	0.02(0.06)	0.01	.776
FSC (D)	−0.02(0.06)	−0.01	.726	−0.03(0.06)	−0.01	.662	0.13(0.11)	0.03	.233
PEFC (D)	0.04(0.06)	0.02	.460	−0.06(0.06)	−0.02	.371	0.07(0.10)	0.02	.510
Income from forestry	0.08(0.02)	0.10	.001	0.02(0.02)	0.03	.307	0.12 (0.03)	0.08	.001
Ecological social ESS	−0.09(0.02)	−0.11	.001	0.35(0.02)	0.39	.001	0.47(0.03)	0.32	.001
Production economic ESS	0.20(0.02)	0.32	.001	−0.11(0.02)	−0.15	.001	0.04(0.03)	0.04	.170
Internal trust	0.11(0.02)	0.13	.001	−0.04(0.02)	−0.04	.090	0.01(0.04)	0.00	.879
News media trust	0.07(0.02)	0.09	.001	0.11(0.02)	0.13	.001	0.05(0.03)	0.03	.179
Internal trust*News media trust	−0.03(0.02)	−0.04	.089	−0.09(0.02)	−0.11	.001	−0.14(0.03)	−0.10	.001
Adj R ²	.21			.25			.21		

D = Dummy. Ecological social ESS = Ecological social ecosystem service beliefs, Production economic ESS = Production Economic ecosystem service beliefs.

alternative management. However, higher news media trust (not lower as stipulated in H1b) was associated with such beliefs, thereby failing to support H1b. Results revealed no support for that low internal trust is associated with higher acceptance of less production focused management (i.e., beliefs that close-to-nature management practices align with management goals and intention to engage in collaborative planning for ecological and social values), as stipulated in H2a. However, H2b stating that higher news media trust is associated with higher acceptance of less production focused management was partially supported, in relation to close-to-nature beliefs but not intention to engage in collaborative planning. Despite the lack of full support for H2a and H2b, the reasoning underlying these hypotheses seems to be valid since the interaction between internal trust and news media trust significantly predicted close-to-nature beliefs and intention to engage in collaborative planning. Such beliefs and the intention were stronger when internal trust was lower in combination with higher news media trust. H3 was therefore supported for acceptance of less production focused alternative management (Fig. 2). Hence, whereas higher internal trust and higher news media trust were both associated with stronger intensive forestry beliefs, higher news media trust in combination with lower internal trust were associated with stronger close-to-nature beliefs and intention to engage in collaborative planning. Among the covariates, age, education, and production economic ESS beliefs were significant in

all models. In relation to intensive forestry beliefs, ecological social ESS beliefs, residence, membership, and income from forestry were also significant, as was ecological social ESS beliefs and membership in relation to close-to-nature beliefs. Gender and income from forestry were also significant in relation to intention to engage in collaborative planning.

5. Discussion

In response to environmental and societal challenges (e.g., climate change), management change can be initiated top-down, through policy regulating or encouraging change, market mechanisms (e.g., certification) or bottom-up, derived from owners and other actors (e.g., advisors) directly involved in management decisions (Mason et al., 2022; Angelstam and Dawson, 2025; Dawson et al., 2025). Even with a large degree of freedom in management, forest owners are connected to actors and sources within and outside the forest sector, all of which may sustain or prevent change. This study confirms that such social connections have implications for management decisions, even after controlling for socio-demographics and beliefs.

Results revealed that internal trust, in terms of closer bonds with the forest sector, may enable change towards intensive forestry practices among forest owners. This result confirms the notion that owners with

close bonds with mainstream actors in the Swedish forest sector are more likely to pursue changes aligning with a production logic. Those with a higher internal trust were characterized by a larger share of members in forest owner associations, owners with certification, and more dependent on income from the forestry, but less likely to be resident owners, indicating that they are to a greater extent connected to the forestry context. However, not all owners with higher internal trust were part of these networks indicating that internal trust is developed also in other settings and through other interactions. News media trust on the other hand, as a form of external trust, was positively associated with both intensive forestry and close-to-nature beliefs, indicating that being open to information sources outside of the sector may not only boost collective solutions for societal benefits as highlighted in some studies (Ejaz et al., 2025; Sivonen et al., 2025) but diverse changes with both public and private gains. The study draws attention to the need to differentiate between different forms of trust (trustees) to further the understanding of the role of trust for the management of private forests, a distinction often overlooked in research on trust in this context (but see Vainio et al. 2018).

Interactions between different forms of trust have previously been found in relation to environmental protection (Tan et al., 2025) and in this study such interactions were confirmed for close-to-nature beliefs and intention to engage in collaborative planning for ecological and social values among forest owners. Higher news media trust was in combination with lower internal trust associated with stronger close-to-nature beliefs and intention to engage in collaborative planning. One interpretation is that internal trust may to some extent block the potential of external sources to boost practices that are not aligned with the rationale currently dominating the sector. Hence, internal trust may thus not only encourage practices that are in accordance with the main rationale but also restrict acceptance of less aligned practices, at least before or at the initial stages of a transition, which is the main focus of the present study. Whereas internal trust was not individually associated with acceptance of less production oriented alternative management, the significant interaction with news media trust suggests a more complex pattern than that high trust in institutions always benefits transitions in natural resource management (Otto et al., 2023; Gava et al., 2025). The actual implementation of alternative management is likely to require support from within the sector either from niches where alternative practices are encouraged (e.g., networks) or from mainstream actors adjusting towards a transition (cf. Hertog et al., 2022). Information, social models, and nudging are non-coercive strategies that may be used by the forest sector to encourage alternative management practices (Angelstam and Dawson, 2025; Dawson et al., 2025; Eriksson, 2025) with the aim to build agency as highlighted by enabling approaches to system change (Scoones et al., 2020). By encouraging diverse alternative management practices, internal trust may even increase among owners with low internal trust given their weaker emphasis on production economic ESS.

Results revealed that there is some potential for bottom-up changes among Swedish forest owners, more so in the direction towards close-to-nature forestry than intensive forestry. The owners emphasized the importance of ecological and social ESS, a result also found in other studies (Bergkvist et al., 2024; Westin et al., 2023). Furthermore, ecological and social ESS (except hunting) were associated with beliefs in close-to-nature practices while production economic ESS were associated with intensive forestry beliefs. This result corresponds to studies of forest owners in Finland (Juutinen et al., 2020, 2021). Nevertheless, the high share of owners that neither believed that the close-to-nature practices were aligned nor non-aligned with their goals, in addition to those being unsure and answering don't know, implies great uncertainty associated with such practices. Even if the alternative management aligns with management goals, not all of these owners stated that they try out new practices – which is a prerequisite for implementation – further indicating that the use of alternative practices may be distant. Since management change is likely to be a process, several stages remain

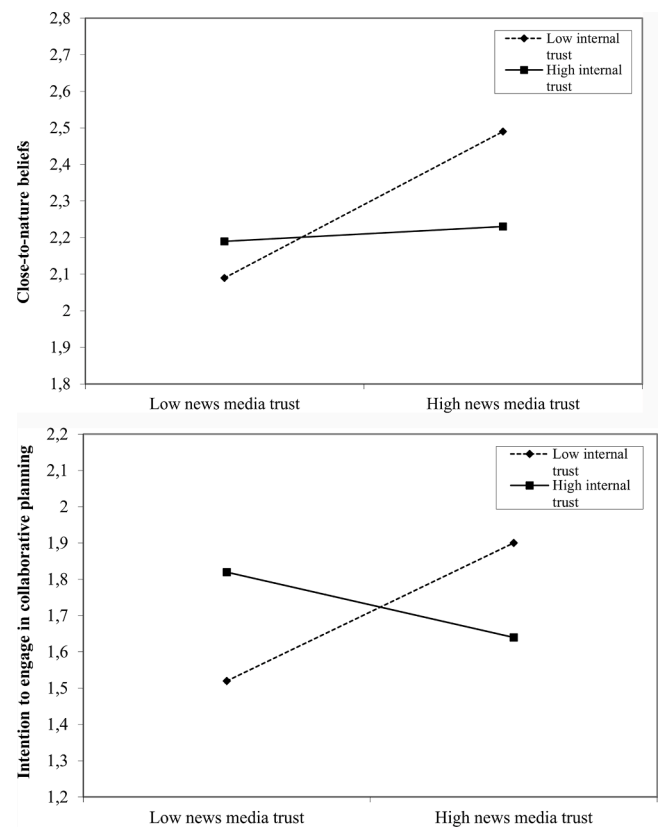


Fig. 2. Interest in alternative management practices as a function of internal trust and news media trust, with covariates. Panel a) Beliefs that close-to-nature practices align with management goals ($p < .001$). Panel b) Intention to engage in collaborative planning for ecological and social values ($p < .001$).

even after reaching a decision to change (e.g., related to the type of change strived for and planning) (Eriksson and Rapp, 2025) and during this process the owner may at any stage revert and decide not to change (Bamberg, 2013). It is furthermore noteworthy that forest owners do not find economic factors to be unimportant, and intention to engage in collaborative planning for other than production purposes was both associated with ecological and/or social outcomes, but also economic ones, albeit to a lesser extent, indicating that multifunctionality of forests is likely to be key to owners' management decisions. In addition, this study does not indicate that there is a strong contradiction between believing that biodiversity and preservation of red listed species are important and that intensive forestry practices can fulfil management goals, further highlighting the need to explore how specific management practices are believed to contribute to diverse ecosystem services. This may help to clarify how multifunctional goals can be realized in forestry in the future.

When interpreting results, limitations should be considered. Given that the focus of this study is on examining the potential for bottom-up changes it is important to highlight that understanding beliefs and intentions is just an initial indicator of such a behavioral change process. However, since the alternative practices examined in this study are uncommon, this focus is justified. While a representative sample of forest owners was invited to participate in this study, the sample was not entirely representative when considering socio-demographics and there were missing values. To address these weaknesses to the extent this is possible, missing values were replaced and sample weights were used in the analyses. In addition, covariates were used in the main analyses to control for confounding variables. Future studies should continue to explore factors enabling forest owners to change management aligning with their management objectives, while also fulfilling goals in the forest policy. Such research may consider the importance of supporting

owners' autonomy, competence, and relatedness, facilitating internally rather than externally regulated management decisions given the benefits associated with such motivations (e.g., Ryan and Deci, 2000, 2020).

6. Conclusions

This study confirms a link between the social system and the potential for bottom-up management change among forest owners. While ties with the forestry sector may encourage changes aligned with current rationales, external ties are more likely to be important for acceptance of more diverse alternative management practices. However, this study also shows that strong internal ties may prevent influences that contradict the sector's logic. Forestry in Sweden may be described as intensive, with frequent and/or large scale fellings, yet not very intensive characterized by large implementation of short-rotation forestry (Scherpenhuijzen et al., 2025). While some studies suggest that forest management in Sweden is likely to become more intensified (Konczal et al., 2025), the increased risk for forest damages associated with climate change and stricter environmental regulations may instead encourage a shift towards multifunctionality (Angelstam et al., 2022; Angelstam and Dawson, 2025). In this study, private forest owners were found to be more likely to sustain close-to-nature practices than intensive forestry, but there is a large degree of uncertainty associated with such changes being realized and instead, current practices (e.g., rotation forestry with clear-cuts) may be retained. The future trajectory for forest management is likely to develop through interactions between the ecological and social system (including policy, the market, forestry and non-forestry actors) but with distinct path dependency given the long timeframe for forestry.

Glossary

Private forest owners. A forest owner category also labelled family forest owners and non-industrial private forest (NIPF) owners, alongside other owner categories such as forest companies and the state.

Transition. A process of change. In the socio-technical research literature a transition constitutes a systemic shift from one socio-technical regime to another, which may occur via different processes. Enabling approaches to transitions emphasizes the capacities and agency in e.g., networks and among grassroots needed for change to take place.

Trustor. The person or group placing trust in someone else.

Trustee. The person, group, organization, or sphere, trust relates to, i.e., the trust target.

Trust object. The activity or domain that trust is concerned with.

CRediT authorship contribution statement

Louise Eriksson: Writing – review & editing, Writing – original draft, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization.

Declaration of competing interest

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests:

Louise Eriksson reports financial support was provided by Swedish Research Council Formas. If there are other authors, they declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.tfp.2026.101288.

Data availability

Data will be made available on request.

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