Concept Note

Thinking about nature: the relationship between forestry and the natural environment

Abstract

Research in forestry has always engaged with environmental issues and challenges, but it has rarely addressed the concept of nature itself; that is, scholars have seldom paused to question what is actually meant by “nature”. Yet the ways in which private and public forest owners, enterprises and organizations perceive nature directly shape what they consider important, measurable, manageable and morally relevant. By recognizing the forest as a complex living system with intrinsic value, systemic silviculture anticipated several key themes that now underpin broader discussions on human–nature relationships. This note revisits that perspective in light of current debates and explores its implications for the forest research agenda.

Keywords: human–nature relationships, forest research, forest management, silviculture.

Why what we mean by nature matters

Nature does not have a single, universal meaning. It is a plural, contested, culturally situated concept, and one that is charged with values. It is especially interesting to observe how the concept of nature's intrinsic value is currently spreading and how relational conceptions of nature have progressively inspired legal and institutional innovations (Arreaga-Vicuña et al. 2026).

Research in forestry has long addressed environmental issues and challenges, and foresters have historically sought a “model” of forest naturalness to guide forest management (Nocentini 2024). Yet the concept of nature itself has rarely been the object of critical reflection. Scholars have seldom paused to ask what we really mean by “nature”. This lack of reflection has conventionally favored an orientation in which nature is fragmented into measurable categories, such as e.g. the so-called ecosystem services. This type of approach also underpins the most recent advancements for forestry, such as e.g. "closer-to-nature silviculture" or "integrated forest management", which explicitly aim at integrating biodiversity conservation and global-change adaptation into forestry for the sustainable provision of multiple ecosystem services (Vitali et al. 2026). This kind of orientations has made environmentally relevant forestry issues visible and manageable, but they still confine the meaning of nature to a set of output-oriented technical references, namely the sustainable provision of ecosystem services, with the risk of losing sight of the complexity, relational value and ethical dimension of forest itself. The spiritual, identity-related, relational and community values of nature may be excluded from decision-making processes: for example, a forest may be assessed in terms of sequestered carbon or hosted biodiversity, but not always in terms of its symbolic, historical, spiritual or existence value.

More than two decades before these recent developments, the concept of systemic silviculture was proposed as a fundamentally different approach to forestry (Ciancio and Nocentini 1996, Nocentini et al. 2017, 2021). Rooted explicitly in the principles of complexity and ethics, it challenged the reductionist, output-oriented paradigm of forest management by recognizing the forest as a complex living system with intrinsic value. In many respects, this perspective anticipated the key themes that now underpin broader debates on human–nature relationships. An interesting recent contribution by Panwar et al. (2026) on business–nature relationships provides an opportunity to revisit this perspective in light of current debates and to explore its implications for the related forest research agenda.

Conventional vs. systemic management orientation

The way in which private/public forest owners/enterprises/organizations "see" nature directly influences what they consider important, measurable, manageable and morally relevant (Corona et al. 2025). If nature is treated only as a resource or a risk, managerial responses will tend to be technical, compensatory or defensive. If, instead, nature is recognized as a living and relational system, the strategic questions also change: no longer only "how can we reduce impact?", but "how can we contribute to the regeneration of ecosystems?".

From a managerial perspective we can distinguish between two typical orientations in forestry: conventional and systemic. These are not rigid categories and, in practice, forest managers sometimes combine elements of both. Nevertheless, the contrast helps to show two profoundly different ways of conceiving the relationship between forestry and nature (Tab. 1).

Here Table 1

In the conventional business orientation, nature is above all a resource and a risk to be managed. Managers ask how to protect their activities from resource scarcity, climatic events, environmental regulations or reputational pressures. Nature is seen as something external to the organization, something that can threaten performance or create compliance obligations.

The systemic orientation regards organizations not as external actors that manage nature, but as participants embedded in living systems. From this perspective, forestry does not simply operate "on the environment" or "in relation to the environment", but within ecological, social, and cultural networks on which it depends and which it helps to transform. The aim is not only to reduce damage or make the organization more resilient, but to contribute actively to ecosystem regeneration. Success is not measured only in economic terms (*sensu lato*), but also in relation to social, ecological and multispecies well-being.

The difference between the two orientations has important managerial consequences. From a conventional perspective, managerial responsibility tends to be delimited by the boundaries of the organization: resources consumed, waste generated, direct damage, and so on. The manager seeks to reduce, offset or report these impacts. From a systemic perspective, responsibility is defined by broader ecological boundaries: watersheds, landscapes, habitats, chains of interdependence and human and non-human communities. Forestry becomes responsible not only for what it may directly damage, but also for the role it plays in maintaining or degrading living systems.

Managerial research agenda

A systemic orientation to the relationship between forestry and the natural environment places four fundamental areas at the center of research agendas in this field.

The first area concerns the way in which we conceive the forest itself. As mentioned, traditional theory tends to see management as a separate organization, oriented toward the creation of economic value (*sensu lato*) and multiple stakeholder satisfaction. In a systemic orientation, the organization is not external to the ecosystem, but a constitutive part of it. It is therefore proposed to deal with forestry activities as a node within complex socio-ecological networks (for example, the close interdependence between forestry and ecological and demographic transitions (Corona 2026). This implies rethinking the organization's identity, purpose and legitimacy. A forest manager should not be considered legitimate only because it produces profits or satisfies human stakeholders, but also because it contributes to the continuity of life and to ecosystem regeneration. Value is not only economic (*sensu lato*), but also regenerative, relational and vital, and the survival of the organization/enterprise also depends on the health of natural systems.

The second area concerns mechanisms of power, representation and responsibility. Alternative organizational forms, such as steward-owned enterprises, and models in which ownership is separated from control, can protect the ecological mission of the organization. This can make non-human interests visible in decision-making processes and introduce forms of institutional responsibility toward ecosystems. Here too, however, a degree of caution is needed: for example, instruments such as biodiversity credits or green bonds can help bridge the gap between finance and nature protection (IUFRO 2026), but they may also generate new forms of "green grabbing", especially if they turn living territories into financial assets.

The third area concerns uncertainty. A systemic understanding of the relationships between forestry and nature recognizes that forest structure and functioning are neither fully predictable nor entirely random. As complex systems, forests are shaped by multiple feedback mechanisms and strong sensitivity to initial conditions; consequently, the capacity for prediction is limited, while uncertainty remains high (Filotas et al. 2014, Messier et al. 2016). This perspective challenges the assumptions underpinning conventional forest management planning, which has historically relied on stable ecological baselines, long-term predictability and deterministic planning cycles. The increasing frequency and intensity of disturbances such as droughts, pest outbreaks and large-scale dieback along with changing socioeconomic conditions are progressively undermining these assumptions, creating conditions of persistent uncertainty and reducing the effectiveness of conventional planning approaches. In this context, one of the major contemporary challenges is to move from prediction-based management approaches to approaches centered on monitoring, evaluation and learning. Prediction-based approaches are rooted in the idea of anticipatory management, *sensu* Kay and Regier (2000), according to which, once all the information required for a scientific prediction has been collected, the “right” decision can be made. By contrast, adaptive approaches acknowledge that optimization models have only limited capacity to effectively support the management of renewable natural resources under conditions of uncertainty. It is therefore necessary to shift from strictly rule-based forest planning toward adaptive management (von Detten 2011, Nocentini et al. 2017): Bonin et al. (2026) provide a practical example of how such a transition may be feasible, showing that rigid, long-term planning can be replaced by adaptive planning based on shorter planning cycles, continuous monitoring through remote sensing and renewed governance arrangements that acknowledge the value of natural dynamics and that strengthen coordination both within forest administrations and with external stakeholders.

The fourth area concerns the day-to-day operational forest practices. Traditional corporate sustainability has often focused on efficiency: using less energy, fewer anthropogenic input, and generating less damage and waste. The systemic approach calls for moving beyond harm reduction toward regenerative processes. An important point is that transformation does not depend only on technologies or procedures, but on people. Socio-ecological skills are needed: the ability to think in systems, perceive ecological feedback, collaborate with local knowledge and act with humility toward the non-human world.

Concluding remark

There are no definitive solutions, but a paradigm shift is needed in the perceptions and values that shape the forestry vision of nature. The key challenge is to move beyond a purely technical approach to sustainability toward a more relational and transformative understanding. This implies embracing perspectives grounded in the theory of complex adaptive systems and in environmental ethics. Ultimately, the fundamental challenge concerns how forestry conceives of itself in relation to nature.

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Table 1: Distinctive orientations to forestry-nature relations (adapted from Nocentini et al. 2017, Panwar et al. 2026).

Dimension	*Conventional orientation*	*Systemic orientation*
Underlying logic	Forests are viewed as ecosystems to be managed through risk reduction, regulatory compliance, and organizational resilience. Management assumes a relatively high degree of predictability regarding the outcomes of interventions	Forests are understood as complex adaptive social–ecological systems. Ecosystem regeneration and multifunctionality emerge from dynamic interactions among ecological and social subsystems. Uncertainty is inherent and the outcomes of management interventions are only partially predictable
Ethics	Anthropocentric and utilitarian: forests are valued primarily for the benefits and services they provide to humans	Ecocentric and relational: forests possess intrinsic value; nature is regarded as a co-inhabitant and a moral subject. Human–forest relationships are understood as reciprocal, respectful and integrated
Managerial responses	Management relies on technical expertise, anticipatory approach, technological innovation, efficiency improvements, conservation measures, and compensation mechanisms. Planning is based on optimization models aimed at balancing multiple functions and objectives	Management is adaptive and transformative, emphasizing co-governance, regenerative design, and continuous learning. Social and ecological components are treated as inseparable and mutually constitutive elements of the system