What is Ecological Forestry?

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For many foresters "ecological forestry" is good forestry. Ecological forestry has been called by many names, but there are consistent themes that cut across labels and even ideology. In a review of the history of ecological forestry, seven themes emerged: 1) forests have intrinsic value, 2) humans need to extract products from the forest, 3) silviculture should follow natural processes as much as possible, 4) foresters should plan for the long term, 5) forestry is implemented at the stand scale but must be in balance with the larger ecosystem, 6) the social and economic context matters, and 7) science and place-based experience should guide forestry.

Though currently in vogue and often used, the term "ecological forestry" is still an ill-defined concept with as many definitions as synonyms. The definition of ecological forestry is important for clarity within the profession and for public acceptance and comprehension. Companies already use the term ecological forestry to describe their management strategies (e.g. Hancock Land 2006) and some conservation easements require ecological forestry (e.g. Perschel 2006). This paper is a brief attempt to put ecological forestry into historical context, build a definition, and compare that definition to the Forest Guild's mission and principles.

Labels

Forestry and ecology have always been interwoven, though the practice of forestry preceded the first use of the term "ecology" (Haeckel 1866) by at least a century. Silviculture could not exist with out study and understanding of forested ecosystems (Hawley 1929), and is often called applied ecology (Minckler 1980 p 5, Smith et al. 1997). For example, one of the early forestry text books in the United States was titled "Foundations of Silviculture upon an Ecological Basis" (Toumey 1928). Although ecology has been important to forestry since its inception, the origin of the specific phrase "ecological forestry" is not clear. Spurr and Cline (1942) may have coined the phrase. Twight and Minckler expanded the concept in four reports on the ecological forestry for different regions of North America (Twight and Minckler 1972b, a, Twight 1973b, a). In 1999, Seymour and Hunter provided an in-depth discussion of the principles of ecological forestry and helped return the phrase to use. There are many other phrases that, if not synonymous are related to ecological forestry. "Conservative forestry" (Minckler 1974), "naturalistic silviculture" (Spurr and Barnes 1980), "soft silviculture" (Fred White, the Forestland Group, personal communication, 2006), "natural selection forestry" (Camp 1984), "ecosystem management" (Clark and Zaunbrecher 1987), "multiresource forest management" (Behan 1990), "holistic forestry" (Mlincék 1991), "restoration forestry" (Pilarski 1994), "sustainable forestry" (Aplet et al. 1993, Maser 1994), "ecologically based forestry" (Kotar 1997, Kimmins 2002), "ecoforestry" (Drengson and Taylor 1997), "conservation forestry" (Whitmore 1999), "natural" or "near-to-nature forestry" (Peterken 1999), and even "wild forestry" (Love 2000). Although restoration of forested ecosystems may not include removal of products from the woods, it can provide other ecosystem services for human benefit such as drinking water. Therefore, "restoration ecology" (Niering and Allen 1993), "ecological restoration" (Jordan 1999), "ecological forest restoration" (DellaSala et al. 2003) are part of the conceptual development of ecological forestry (Sarr et al. 2004). In contrast, "Multiple Use" forestry, as laid out in the Multiple Use Sustained-Yield Act of 1960, might in concept be similar to ecological forestry, but

in practice multiple use is associated with a bias toward timber production and so not in the ecological forestry lineage (Bengston 1994).

The terms "traditional", "commodity " or "industrial" forestry have been used in contrast to ecological forestry, though the difference is not always clear. For many environmental organizations, ecological forestry is "good" forestry while traditional forestry is "bad", e.g. ugly, neglectful of wildlife, damaging to ecosystem elements, or destructive of recreation and spiritual values. However, even the most intensive, industrial plantation maybe seen as ecological forestry in that plantations can reduce the pressure to extract timber from other, more ecologically sensitive forests (Seymour and Hunter 1999). Comparisons of traditional and ecological forestry can be one-sided, emphasizing both the failings of the past as well as the promise of the new paradigm (Bengston 1994, Drengson and Taylor 1997 p 27), however ecological forestry owes much to previous generations of foresters.

History

Some have argued that ecological forestry is a paradigm shift in the forestry profession (Franklin 1989, Behan 1990, Bengston 1994), while others make the case that ecological forestry is nothing more than a public relations gimmick (O'Keefe 1990). There is a current of ecological forestry throughout the conceptual history of forestry: custodial forestry, sustained-yield, multiple-use, ecosystem management (Seymour and Hunter 1999, Kimmins 2002). Long before the advent of silviculture, forests were protected for religious and environmental reasons, as is documented around the world from China to India to Rome (Floyd 2002). Ecological forestry could even be seen as a return to indigenous forest management (Bengston 2004).

Much of North American forestry came from Europe, although ideas of silviculture have developed around the world, for example a silvicultural text was published in Japan in 1668 (Totman 1989 p 117). In Europe, the first foresters began work about 1200 A.D. as laws controlling forests use became more common (Floyd 2002). By the 17th century, the idea that forests must be sustained for future generations appeared in works such as John Evelyn's (1664) "Silva, or a discourse on forest trees" or Colbert's (1669) "French Forest Ordinance" (Wiersum 1995). While early thoughts on sustainable forestry may have included an holistic view of forest ecosystems, the beginnings of modern forestry North America were based on a sustained yield of timber (Wiersum 1995). Timber was the most important forest product and drove most decisions about forest management (Floyd 2002). The expansion (or re-expansion) of forestry to include a wide array of human and environmental values is mirrored by the rise of the American environmental consciousness from John Muir to Rachel Carson to E. O. Wilson. Although, the central themes of ecological forestry have a long history, as a cohesive perspective on forest management it deserves a distinct label and definition.

Towards a definition of Ecological Forestry

There may never be a single definition of ecological forestry, but most definitions share some central themes. Seven elements that are consistent across definitions of ecological forestry (and perhaps all good forestry) are: 1) forests have intrinsic value, 2) humans need to extract products from the forest, 3) silviculture should follow natural processes as much as possible, 4) foresters should plan for the long term, 5) forestry is implemented at the stand scale but must be in

balance with the larger ecosystem, 6) the social and economic context matters, and 7) science and place-based experience should guide silviculture.

1) Forests have intrinsic value

The importance of forests for their own sake, i.e. for their spiritual value, is a reoccurring theme in ecological forestry. Writers have emphasized different aspects of the intrinsic value of forests from the quasi-religious to the functionalist. "…Wildness is a necessity; and that mountain parks and reservations are useful not only as fountains of timber and irrigating rivers, but as fountains of life," (Muir 1901 p 1). "If the land mechanism as a whole is good, then every part is good, whether we understand it or not," (Leopold 1948 p 146). Valuing forests for their own sake means management extends beyond trees in ecological forestry and recognizes the importance of non-timber species, wildlife, water, and even natural processes.

2) Humans need to extract products from the forest

Though ecological forestry acknowledges forest intrinsic value, it remains distinct from Muir's strict preservationist philosophy because ecological forestry recognizes the need for human extraction from the forest. For example, Spurr and Cline's 1942 call for ecological forestry is made on economic as well as biological grounds. Nearly five decades later Franklin (1989) called for a "new forestry" that "better accommodates ecological values, while allowing for the extraction of commodities." In the field of restoration ecology, silviculture can be entirely focused on rehabilitation of natural pattern and process with no thought to production of goods from forests. This type of ecological forestry may expand beyond the small scale of parks and preserves in the future as demand for extractive products decreases, but, at the present, producing goods from the forest is key part of ecological forestry.

3) Silviculture should follow natural processes as much as possible

Ecological forestry tends to emphasize silvicultural approaches that more closely resemble natural processes. "It is generally recognized that, in theory at least, silvicultural treatments should follow nature as far as possible. In practice, however, this maxim often has been forgotten or otherwise violated," (Spurr and Cline 1942). "What distinguishes ecological forestry, as we define it here, is the emphasis placed on natural patterns and processes" (Seymour and Hunter 1999 p 29). Silvicultural treatments in ecological forestry are analogs for natural disturbances and development, so the success of ecological forestry relies on an understanding of these processes. Therefore, silviculture has benefited greatly from study of disturbance regimes (e.g. White and Pickett 1985) and the process of forest stand development (e.g. Oliver and Larson 1996). By emulating natural processes ecological forestry should maintain (or even restore) natural forest patterns and structures.

4) Foresters should plan for the long term

A long time horizon is a consistent element across different visions of ecological forestry. "Conservative forestry is based on well established ecological principles with long-term objectives rather than practices predicated on high but often short-term values," (Minckler 1974). It is the obligation of foresters to negotiate between the short-term economic focus of loggers, and most of society, and the long term benefits of the forest (Smith 1972). A long term management view is consistent with the idea of sustainable, i.e. maintaining resources for future generations as per the Brundtland Report's definition: "Sustainable development is development

that meets the needs of the present without compromising the ability of future generations to meet their own needs" (World Commission on Environment and Development 1987).

5) Forestry is implemented at the stand scale but must be in balance with the larger ecosystem
In addition to recognition of the long-term consequences of forestry, ecological forestry takes into account the landscape context of stand level operations. Early expressions of the importance of a larger context for management come from Muir "When we try to pick out anything by itself, we find it hitched to everything else in the Universe," (Muir 1911). The idea of ecosystem integrity became encoded in federal management under the name "ecosystem management". Ecosystem management calls for foresters to include multiple levels of biological organization from gene through stands to landscapes in their management (Grumbine 1994). This multi-scale perspective forces managers to move beyond ownership borders and consider ecological boundaries (Grumbine 1994). The extreme extension of interconnected ecosystems is Lovelock's Gaia hypothesis (Lovelock and Epton 1975).

6) The social and economic context matters
The social context is as important as the spatial context in ecological forestry. Ecological forestry includes participation of forest stakeholders instead of reserving forest management decisions for experts (Bengston 1994). A goal of ecological forestry is consensus about forest management among constituents, or at least reduced conflict. For example Romm (1994) includes a social aspect in his definition: "[sustainable forestry] is an adaptive social process that creates sufficient future forest opportunity to satisfy potentially conflicting interests". Ecological forestry must be part of a sustainable world (Oliver 2003), which implies meeting the needs of people who rely on forests. The social element of ecological forestry re-emphasizes that humans need to extract products from the forest.

7) Science and place-based experience should guide silviculture.
While ecological forestry is participatory, it also relies on science to understand complex forest ecosystems. As mentioned above, forestry cannot follow natural patterns without in-depth study of these patterns and silviculture has greatly improved as knowledge of forested ecosystems has improved. Scientific research in combination with place-based experience continuously adds to our understanding and management of forests. Adaptive management, which grew out of wildlife management, provides a model for scientific decision making in complex systems (Walters 1986). Foresters are forced to make management decisions about ecosystems that are too complex to model exactly, and so they must adapt their management as new science develops (Swanson and Franklin 1992). "[Silviculture] should be based on proven facts and principles plus analytical opinion but examined and altered when new knowledge becomes available or conditions change," (Minckler 1974).

Despite science's best efforts, forest management remains an art, informed by science. "Land management is an art that builds on history and is based in science," (Stoddard quoted in Crofton 2001b). Foresters have to use their experience to apply standard silviculture to the specifics of each stand. For this reason, long experience in particular places helps foster good forestry and a long-term view of forests. For example, Leon Neel's long career in long leaf pine ecosystems permitted insight into these fire maintained ecosystems (Crofton 2001a, Moser et al. 2002). It would be possible to identify leaders in the forestry field from each region of the country who

have deep experience in that particular ecosystem and can provide personal insight into ecological forestry for the region. "The more profound a forester's knowledge of the life of forests in all their aspects, the fewer difficulties he encounters in modern practice of silviculture," (Toumey 1928).

Related issues

This framework for a definition of ecological forestry avoids a discussion of silvicultural practices or "best management practices", out of deference to the notion that good forestry must be site specific and because future restoration may require practices or tools currently out of fashion. "Silvicultural practice is essentially a local consideration, varying in important details from forest to forest," (Hawley 1929 p 1). "A key lesson of 20th-century forestry: Beware of simple formulas applied over broad areas," (Kohm and Franklin 1997 p 3). Regionally focused discussions of ecological forestry are more specific about silvicultural techniques (Spurr and Cline 1942, Twight and Minckler 1972b, a, Twight 1973b, a, Swanson and Franklin 1992). In some cases, silviculture systems such as clearcutting or tools like pesticides seem less natural, though their effects can emulate natural processes, and so have been excluded from some definitions of ecological forestry. This paper make no such attempt to exclude practices or tools because "The history of silviculture in this country is long enough to reveal that there has been too much tendency for methods of cutting to vacillate between extremes that are partly fads and partly reactions to problems of a temporary nature, "(Smith 1972).

The definition of ecological forestry could also be expanded to include a consumption ethic (Linden and Crocker 1997, Murphy and Cohen 2001). Most discussions of the variation of ecological forestry focus solely on the production side of products and services from the forest, however it is also possible to include the consumption of forest products in the definition. Certainly the consumption of wood, water, wildlife and other forest products has a large impact on forest management, however forest managers' responsibilities with regard to consumption are much less clear. Aside from the personal responsibility individual foresters may feel to limit their own consumption, they may have some role in directing or moderating consumption. The certification of wood products allows consumers to include ecological factors in their decisions (UNCED 1993). Local production of wood products may reduce consumption of fuel costs and reduce the exportation of environmental problems to less developed countries (Dekker-Robertson and Libby 1998, Berlik et al. 2002). The consumption side of ecological forestry is not well developed, but may become a more central theme in the future.

Forest Guild principles

The seven elements of ecological forestry identified above are well integrated into the Forest Guild's six principles (Forest Guild 2006):

1. The well-being of human society is dependent on responsible forest management that places the highest priority on the maintenance and enhancement of the entire forest ecosystem.
2. The natural forest provides a model for sustainable resource management; therefore, responsible forest management imitates nature's dynamic processes and minimizes impacts when harvesting trees and other products.
3. The forest has value in its own right, independent of human intentions and needs.

4. Human knowledge of forest ecosystems is limited. Responsible management that sustains the forest requires a humble approach and continuous learning.
5. The practice of forestry must be grounded in field observation and experience as well as in the biological sciences. This practical knowledge should be developed and shared with both traditional and non-traditional educational institutions and programs.
6. A forester's first duty is to the forest and its future. When the management directives of clients or supervisors conflict with the Mission and Principles of the Guild, and cannot be modified through dialogue and education, a forester should disassociate.

The intrinsic value of forests is stated succinctly and directly in the third principle. Humans' reliance on products extracted from the forest is alluded to in the benefits to human society mentioned in the first principle as well as in second principle's reference to "harvesting trees and other products". The importance of modeling silviculture on natural processes is the focus of the second principle. The need to plan for the future is the focus of the sixth principle, while the importance of a long connection to the land is part of principles four and five. The importance of managing forests as part of the larger ecosystem is not explicitly mentioned in the principles, but the first principle suggests this sort of ecosystem thinking. The Forest Guild mission addresses the social and economic context of forestry by calling for forestry that sustains "the welfare of human communities", but the principles do not address foresters' socio-economic responsibilities. The scientific and experiential foundations for silviculture are well described by the fifth principle.

Conclusion

One reason it is so difficult to define "good" forestry is that there is a great deal of variety in good, ecological forestry. As Lutz (1959) put it: "Between the two extremes of passively following nature on one hand, and open revolt against her on the other, is a wide area for applying the basic philosophy of working in harmony with natural tendencies," or as Minckler (1974) stated "Any managed forest must first be a healthy and sustaining ecosystem, but this does allow some latitude in silviculture." It may be that the definition of ecological forestry has more to do with intent and perspective than particular practices in the woods. For example, one of the most vilified practices in forestry, the clearcut, may be implemented by a rapacious cut-and-run logger solely to extract every cent out of the land or by an ecological forester intent on restoring early successional habitat in an area where it is rapidly disappearing.

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