

Biological Diversity in Forest Ecosystems A Position Statement of the Society of American Foresters

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Position

The Society of American Foresters (SAF) values biological diversity and supports forest management practices that consider biological diversity together with other factors, such as the characteristics of the ecosystem and landowner objectives. SAF believes that active silviculture, using best management practices, can play an important role in restoring and sustaining native species and their habitats, and in maintaining the compositional, functional, and structural diversity of forests at various spatial and temporal scales. Managing for biological diversity (also referred to as “biodiversity”) reflects important choices. Among these are the degree of biodiversity sought, the kind of (genetic, species, and ecosystem) biodiversity, the spatial and temporal scales to be considered, and the roles and objectives of different landowners involved in managing biodiversity.

Issue

Most forest management practices influence biodiversity to varying degrees, with attendant economic, social, and ecological implications. Knowledge of the interaction among biological, social, and economic considerations and the prescribed management methods is necessary to plan and implement actions that will have the desired effects on biodiversity. Historically, human demands on natural systems have resulted in modification, often manifested as a simplification, of many biological systems (Schulte et al. 2007). Forest management practices can increase, maintain, or reduce biodiversity, depending on how they are conducted. Professional foresters can contribute to the management of landscapes for biological diversity by virtue of their knowledge, training, and experience. The main challenge is determining how to manage forestlands for human needs while meeting biodiversity objectives.

Background

Biodiversity refers to the variation of life forms within a given ecosystem, biome, or the entire earth. It includes the variety and abundance of species, their genetic composition, and the communities, ecosystems, and regions in which they occur (Hunter 1990, Gaston and Spicer 1998, Burley 2002). It also refers to ecological structures, functions, and processes in communities, ecosystems, and landscapes and includes variation within a species and among species, and comparative variation or diversity among ecosystems. There is no objective “ideal” for biodiversity, it is not static; genetic and ecological processes continually alter the mix of plant, animal, and other life forms in an ecosystem. Genetic processes such as natural selection are interconnected with ecological processes, including climate change and disturbance from fire, flood, wind events, and insect and disease infestation. Biodiversity is also believed to have dramatically changed due to large-scale catastrophic events such as volcanism or meteor events.

Human activities that affect biodiversity are many and vary greatly worldwide, but may include modification of ecological processes (e.g., fire regimes), conversion of forest to alternate land uses, hunting and fishing, introduction of nonnative species (both in terrestrial and aquatic ecosystems), fuelwood gathering, subsistence agriculture, and forest management practices that change the structural characteristics of forests. Public policies that address the major factors causing changes in biodiversity, such as providing incentives to retain land in forest cover, can help maintain some components of biological diversity (e.g., Greenberg et al. 1995, Best 2002, Provencher et al. 2002,).

An understanding of the ways in which different levels of biodiversity affect ecosystem responses to disturbance and stress will be important for informing forest management strategies aimed at fostering adaptation to future environmental conditions and disturbance regimes (Hooper et al. 2005; Puettmann 2011)

Considerations

Foresters should recognize the context and effects of their operations and their implications for biodiversity (Hunter 1990, Dale et al. 2000). Managed forests exist in many different contexts, including those where other land uses such as agriculture and development may be common. In such situations, foresters need to work with landowners and communities to help identify desired biodiversity objectives and consider how to address such factors as urban expansion, forest uses, and management for fire, disease, and insect outbreaks to meet those objectives. Within landscapes dominated by forest, contextual considerations may include maintaining or restoring a mosaic of forest structural classes, the diversity of native tree species, and the distribution of features (e.g., abiotic features, retention areas, corridors, edges) within and among stands (Dale et al. 2000). In both landscape contexts, consideration of societal interests will be essential to address nonnative species and uses such as hunting and fishing. Foresters also need to consider actions at the stand scale that sustain or restore ecological processes (e.g., prescribed fire) and structures (e.g., large dead wood, both standing as snags and fallen trees) important for maintaining species and functional diversity. Consideration should be given to how structural and functional diversity varies but is still important at all stages of stand development.

Coordination and planning across ownerships can enhance conservation of biodiversity at the regional and local levels. Numerous strategies for conserving biodiversity exist and vary by landowner. For example, public landowners may emphasize late-successional forests or undertake ecological restoration projects, whereas, private landowners may emphasize early-successional habitats or make other contributions, such as protection of riparian zones. Efforts to date indicate that a mix of strategies, involving both public and private forest owners, offers the greatest promise of success. In developing ownership-level goals for biological diversity, foresters should become familiar with the conservation priorities of habitat and recovery plans for endangered, threatened, and sensitive species and initiatives that exist at the regional or national levels (e.g., Recovery Plans for specific endangered and threatened species, North American Bird Conservation Initiative, Partners in Flight, the North American Waterfowl Plan, and Partners in Amphibian and Reptile Conservation). Landowner incentives and forest certification programs are valuable tools to influence private landowners' capacity and desire to manage forests for biodiversity (Hagen et al. 2005).

Research provides significant information to assist forest managers in providing for biological diversity while meeting the economic and social objectives of their forest management strategies. However, there is

a need for continued long-term research and monitoring to enhance our understanding of ecological interactions in forests and between forests and other land uses (Schulte et al. 2006). When feasible during forest inventories, foresters should gather data on forest structural features that are useful when considering biological diversity at relevant spatial scales (Pregitzer et al. 2001, Hunter 2005). Additionally, foresters should seek to integrate standard forest data and biological inventory data (Pregitzer et al. 2001). As knowledge accumulates through research and monitoring, management actions will have to be taken using the best available information. Thus, forest management activities should be considered “adaptive” in terms of their relationship with biological diversity, and foresters should be willing to “learn by doing” (Walters and Hollings 1990).

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