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COMMENTARY

Lessons in policy implementation from experiences with the Northwest Forest Plan, USA

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Abstract Approximately 20 years ago, the preeminent goal for management of the federal forests of the Pacific Northwest shifted suddenly and permanently from sustained timber harvest to conservation of biodiversity and ecological processes, following a series of court cases over protection of species in decline that were associated with old forests. While old growth harvest has largely ceased, some key species are still in decline and forest management has been restricted more than intended. Creation of openings, even those based on disturbance processes, has been especially difficult. Some lessons from this experience include the difficulty of adaptive management, the importance of ecological foundations for management, and the need for stakeholder collaboration. In addition, it is essential to provide society with a vision of ecologically-based forestry, including field demonstrations, and to communicate this approach and its scientific foundation in the popular media.

Keywords Federal forests · Ecological forestry · Collaboration · Public acceptance

Forestry is and always has been as much a social as a technical science and, in that sense, politicized. However, the fundamental nature of citizen knowledge and participation has changed greatly during the last 40 years in the USA. A much broader array of stakeholders are more intimately engaged and professional resource managers must seek social license for management activities. This is particularly true on federal forest lands, such as the national forests managed by the United States Forest Service (USFS).

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Societal interests in the USA have been clarified and expanded by legislation, such as the National Environmental Policy Act of 1969 (NEPA) and the National Forest Management Act of 1976 (NFMA), and subsequent litigation. Among other provisions, NEPA required analyses of the environmental impacts of proposed activities and public review of such proposals. NFMA required periodic preparation of plans for each national forest using NEPA-based processes, including public review and comment on draft plans.

The development of the Northwest Forest Plan (NWFP) for federal forest lands in the northwestern United States represented a pivotal outcome of the forest policy processes in place in the late 20th century. Its impacts were a consequence of both the plan's scale (nearly 10 million hectares) and its incorporation of the most current ecosystem, landscape, and conservation science. This plan has now been in place for 20 years. Our purpose in writing this commentary is to share some useful lessons for forest conservation from our experience with the NWFP.

Development of the Northwest Forest Plan

In 1990 the national forest planning process in the Pacific Northwest culminated in a legal meltdown. A court injunction prohibited further timber harvests of mature and old forests (the source of most federal harvest) within the range of the northern spotted owl (*Strix occidentalis caurina*) (NSO) based on the federal management agencies failure to produce a scientifically credible plan for sustaining the owl. During the following three years neither the executive nor the legislative branches of the federal government were successful in responding to this injunction. During his campaign for the presidency in 1992, William Clinton promised to resolve the timber-owl issues; in 1993 President Clinton initiated a process that led to development and court approval of the NWFP in 1994 (Thomas et al. 2006).

The NWFP dramatically altered the emphasis of the federal forest land management from timber production to conservation of biota and ecological processes, including old-growth forest ecosystems and habitat for endangered fish stocks. In the plan 7.7 million hectares (78 %) of the federal forest lands were reserved from sustained timber production, representing an end to previous plans for conversion of most federal forests from natural to managed stands. The majority of remaining mature and old forests were included in the reserves; those that were not included have become *de facto* reserves, initially as a result of public resistance to further harvesting and subsequently because of their value as critical habitat for NSO and the marbled murrelet (*Brachyramphus marmoratus*), another species listed under the endangered species act.

The NWFP did not achieve all of its stated objectives, however. The decline of the NSO continued despite the large area of reserved habitat; this is believed to be primarily caused by competition from the closely-related barred owl (*Strix varia*), which recently invaded the region (USDI Fish and Wildlife Service 2011). Although very successful at stopping logging activities, the NWFP failed to stimulate the active management needed to restore more resilient conditions in the dry (frequent-fire) forests found along the eastern boundaries of the NSO range. As a third example, annual timber harvests never reached the one billion board feet anticipated under the NWFP. Timber harvesting activities in the productive moist forests west of the Cascade Range have been confined to thinning in young stands, often to accelerate the development of more structurally complex forest conditions (Franklin and Johnson 2012).

Major debates are again underway in the USA regarding appropriate management of federal forest lands in the Pacific Northwest, the reasons include largely perceived failures of the NWFP, additional scientific knowledge, and altered societal objectives.

We have learned many lessons from our experiences with the NWFP and in the following commentary we discuss four issues of particular relevance in developing 21st century policies for the management of public forest lands.

Difficulty of implementing adaptive management approaches

The NWFP was designed to have a strong adaptive management component. This is not surprising since it was developed by a team of scientists that was extremely aware of both the limits of existing science and the continuing and rapidly evolving scientific basis for management. Hence, many aspects of the NWFP were viewed as "interim", monitoring was strongly emphasized, and 600,000 ha were allocated to 10 Adaptive Management Areas where experimentation with alternative social, scientific, and technical approaches to achieving the goals of the NWFP was encouraged.

The reality was that most stakeholders and decision makers—environmentalists, industry representatives, agency personal, lawyers, judges, etc.—were interested in *certainty*, not in the uncertainty that is implicit in an adaptive management philosophy! As a consequence, little of the adaptive potential of the NWFP was realized. Investments in innovation and experimentation in the Adaptive Management Areas were very limited. The expansive interim riparian buffers were rarely adjusted after analyses of river drainages, as had been intended. Opportunities for restoring historical conditions in dry forests, which had been significantly altered by elimination of wildfire, were rarely exercised. Change in the NWFP did occur but largely as a result of continued litigation by environmental groups of regeneration harvests outside of the reserves. After a decade, timber harvesting was limited to thinning in young stands.

Monitoring has been an important activity under the NWFP and did lead to the only major change in the NWFP that was part of a public process. This was the development and adoption of a recovery plan and designation of expanded critical habitat for the NSO by the USDI Fish and Wildlife Service (2011, 2012) because of the continued decline in NSO populations.

The importance of developing successful adaptive forest policies and practices is the key lesson from this experience. The need is to develop systematic processes for assessing and appropriately incorporating the changes in science, circumstances, and public opinion without having to undergo a social or legal "meltdown" before significant change can happen. Plans need to explicitly incorporate processes that will encourage iterative change. The stakeholder collaboratives mentioned below may prove to be an important vehicle for some of this. However, we also feel that periodic reviews of agency activities by respected "third-parties" are potentially important mechanisms to assess progress and recommend appropriate changes. Such review teams should include both scientists and respected citizens.

Importance of strong ecological foundations for management proposals

Almost all of the active management successes in the PNW have been based on approaches that have strong ecological justifications for the activity. We offer two examples where this circumstance has resulted in social acceptance.

The NWFP provides for ecologically-based thinning of young stands within the late successional and riparian reserves to accelerate the development of more structurally complex forests. Most of these young stands are plantations that were established following clearcutting. The proposed thinning operations must be justified on the basis that they will accelerate structural development. Hence, the prescriptions emphasize development of stand complexity rather than stand uniformity, including development of spatial heterogeneity. Complexity and heterogeneity are the goals of these variable density or clump-based treatments and not uniform stands of crop trees. Thinning programs of this type have proven to be widely acceptable to stakeholders, although many have not been as ecologically-oriented as had been anticipated.

Most dry forests within the area of the NWFP were historically subject to relatively frequent fire, including the ponderosa pine (*Pinus ponderosa*) and mixed-conifer forests found on the dry eastern slopes of the Cascade Range. Most of these forests have been greatly modified by past management activities, particularly elimination of fire. The majority of these forests are now much denser than they were historically with heavy fuel loadings and a dominance of shade-tolerant species with limited fire- and drought tolerance. Residual old-growth ponderosa pines are potentially at high risk of death due to fire, drought, and bark beetles. Stakeholder support for active restoration of such forests has increased rapidly during the last decade. A major factor in the social acceptance of such treatments has been the strong basis in ecological science for such activities (e.g., see Franklin and Johnson 2013).

Importance of stakeholder collaborations in implementing management

Locally-based stakeholder groups ("collaboratives") are proving essential to achieving the social consensus needed to support active forest management. The concept of such stakeholder groups has a long history in the Pacific Northwest—collaboratives existed in the Applegate River valley (OR) and Hayfork (CA) areas prior to development of the NWFP. However, such groups have become numerous, particularly in the Intermountain West, and they are often very effective at achieving broad agreement on active management programs to restore and sustain forests on federal lands.

Such collaboratives typically engage a broad array of locally-based interest groups, community leaders, and interested citizens; management agencies (e.g., US Forest Service) typically participate in some capacity but are generally not the organizers. The successes of such groups have been sufficient to attract the attention of the US Congress, who created the Collaborative Forest Landscape Restoration Program (USDA Forest Service 2014). This program provides sustained financial support for collaborations selected through a competitive process on national forests throughout the USA.

We believe that locally-based collaboratives provide a major mechanism by which citizens can effectively engage in the development and implementation of management programs on the public lands. Such collaborations often stimulate and empower local agency managers to move forward with appropriate activities. Collaboratives have the potential to play many roles in planning and implementing projects and implementing monitoring programs, including interpretation of the results.

Collaborative efforts on federal lands can be especially powerful in forest restoration when combined with new funding approaches that enable retention of receipts that would traditionally go to the federal treasury or to fund county government. Inherently, restoration strategies produce less revenue than production forestry, both because they retain

valuable old trees and because they undertake efforts such as meadow restoration that do not yield commercial products. Thus retaining the revenues from the commercial harvest that occurs can make an enormous difference to the extent of restoration that occurs.

Importance of providing society with a vision of ecologically-based forestry

Our final lesson is the importance of providing society with ecologically credible, active management approaches as alternatives to the choices typically proposed—clearcuts or preservation. Ecological forestry involves management approaches to sustain the full array of forest values by using models from natural forest ecosystems (Franklin et al. 2007). As such, it provides clear alternatives to the intensive production forestry practiced on most corporate forest lands, which is based upon agronomic models constrained by economic criteria (Franklin and Johnson 2013).

Harvesting approaches that incorporate retention of significant elements of the pre-harvest stands and thinning approaches that result in spatially heterogeneous forests are two innovative elements of ecological forestry. The ecological benefits of variable retention harvest, including the creation of openings, is being increasing recognized in the scientific literature as an important element in forest management in moist forests (Gustafsson et al. 2012; Lindenmayer et al. 2012; Mori and Kitagawa 2014). When combined with the nurturing of diverse early seral ecosystems (Swanson et al. 2011), this type of silviculture can make major contributions to the maintenance of biodiversity on forested sites (Franklin and Johnson 2012). However, society must be able to distinguish variable retention harvest from clearcutting for its acceptance and use on public forests (Bliss 2000; Shindler and Mallon 2009). Toward that end, we have begun demonstrations and visualizations to develop a new understanding of the approaches we suggest (Figs. 1, 2).

Society needs to become aware of three important elements by education and demonstration: the importance of active management for forest stewardship, including creation of openings to sustain the full array of forest-related biodiversity and ecosystem functions; the availability of a large body of relevant science to support and guide active management; and the capacity of forestry professionals to plan and implement such activities. The performance of the forestry profession in conceptualizing, demonstrating, and communicating ecologically-based forestry practices in the late 20th century has been limited and professional leadership in innovative, science-based forest stewardship will be critical in the 21st century.

Lessons for other regions and countries

We believe that our experience in the Pacific Northwest regarding public attitudes about active forest management is comparable to recent experiences of foresters in other parts of the developed world—public skepticism about benefits of forestry and acceptance only of activities that maintain forest cover, such as light thinning. Activities, such as creation of openings comparable to those historically provided by fire, wind and other disturbances, are generally resisted. Credible arguments for such activities must find their basis in: (1) the strong scientific evidence for ecological benefits to species and critical ecosystem processes from such approaches; (2) field-based demonstrations, which make visually evident the differences between ecologically-based and clearcutting harvest practices; and (3) effective public communication of the science and practices in popular

Fig. 1 Computer simulation of variable retention harvesting in which patches of forest and scattered individual trees, snags and logs are retained on the harvest unit. (Courtesy of Ms. Laura Hardin, Oregon State University, Corvallis, Oregon USA)

Fig. 2 One objective of variable retention harvesting on forest lands in northwestern North America is to facilitate the development of the highly bio-diverse, early successional or pre-forest ecosystems needed by many native fauna and flora, including songbirds and butterflies. (Willamette National Forest, Oregon USA; photo by Jerry Franklin)

media (print and digital) so that they understand the nature and benefits of ecologically-based forest practices.

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