Sustainable forest management on federal lands in the US Pacific Northwest – making sense of science, conflict, and collaboration

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Abstract: Sustainable forest management is a contested concept in the US Pacific Northwest, especially on federal forestlands. Over the past three decades, through political conflict and negotiation, the term has evolved from a focus on sustained-yield timber harvest to include species recovery, ecological restoration, and collaborative management. This chapter compares two mechanisms − the Forest Ecosystem Management Assessment Team and place-based collaboration − that have redefined how sustainable forest management on federal land is understood and practiced. Both innovations brought new approaches to forest management in the Pacific Northwest, ranging from interdisciplinary science-based analysis to a strong culture of participatory, inclusive deliberation on federal forestlands at the local level. They have undisputedly changed forest management since the Northwest forest crisis of the early 1990s. Yet, they operated in a context where older dynamics were in play, including the primacy of agency expertise, the role of courts as a venue for conflict resolution, and budget structures that make integrated management difficult and limit the capacity of collaborative groups to act. The legal frameworks of the federal land-management agencies have not changed significantly, creating a complex, hybrid system.

Keywords: Collaboration, planning, ecosystem management, community-based forestry, regional, conservation, Oregon, Washington, Forest Service

10.1 Introduction

The US Pacific Northwest region – covering Washington, Oregon, and northern California – is home to the largest trees and some of the last remaining virgin temperate rainforests worldwide. The region has a productive forest industry sector as well as a vibrant community of environmental activists. During the 1980s and 1990s, the land owned by the national government (so-called federal lands) in the Pacific Northwest was at the centre of one of the most intensive forest policy conflicts in the world. At issue was whether old growth trees would continue to be harvested or protected. This Northwest Forest Crisis ultimately resulted in a dramatic shift in forest policy on federal lands in the mid-1990s not only in the Pacific Northwest but on all federal forestlands across the western United States.

Sustainable forest management has long been a central concept to Pacific Northwest forest policy. However, as in so many other forest regions, the concept has been highly contested and has changed meaning over time (Winkel et al. 2011). Varied and contested ideas have been institutionalised into the processes of forest management over the past century, creating a complex mix of new and old ideas that drive forest management in the region (Moseley 1999, Johnson 2007).

Most of the controversy around sustainable forest management has been related to the vast federal forestlands in the region. For the past three decades, the Pacific Northwest has been a laboratory for new ideas. Forest management concepts such as ecosystem management, adaptive management, and ecological restoration were developed or tested in this region. Later, these concepts significantly influenced

forest management in other parts of the world.

Pressure for innovation was also significant in forest policy-making. The intensity of conflicts in the late 1980s and 1990s triggered the development of new approaches to federal forest management in the region. In this paper, we discuss two influential and innovative approaches to forest policy-making that developed at this time. First, the Forest Ecology Management Assessment Team (FEMAT) was established during the height of the Northwest Forest Crisis to develop a regional plan for managing the wet forests in the western part of the region. FEMAT brought together federal land managers and university and agency research scientists in a new regional-scale approach to land management analysis and planning. Second, at the same time, local, place-based[1] collaboration and community forestry approaches developed in the region. Since the early 1990s, an increasing number of place-based multi-stakeholder collaborative groups have sought to engage diverse stakeholders in processes to solve complex problems of restoring ecosystem function while creating local economic opportunity. These two approaches to forest policy aimed to redefine and implement sustainable forest management on the region's national forests. Although they are in many ways distinct approaches, both were driven by the same stresses and conflicts, and today both are part of a complex governance system for national forest management in the region.

In this paper, after to a brief chronology of the political development of sustainable forest management on national forests lands in the Pacific Northwest, we describe FEMAT and place-based collaboration and compare these two strategies as mechanisms to address conflict in the Pacific Northwest. We conclude with an outlook on major challenges related to the Pacific Northwest's forest policy and the issue of sustainable forest management on the region's federal lands in particular.

[1] We use the term *place-based* rather than *local* because these collaborative groups are organised around a particular geography or place but may include participants (such as regional interest-group activists) who do not live or work nearby and may participate in multiple collaborative groups.

10.2 A short history of forest policy in the US Pacific Northwest

10.2.1 The institutionalisation of the sustainable-yield forestry paradigm

The US Pacific Northwest is an ecologically diverse landscape due to the varied terrain. The west coast includes a temperate rainforest created by coastal mountains and the volcanic Cascade Mountain range (Figure II 10.1). The east side of the Cascades is arid and can only support trees at higher elevations, where there is adequate moisture. Wildfire is a frequent natural disturbance, especially in the dry forests in the eastern two-thirds of the region. Forests are largely coniferous, with broadleaf species only in the understory or in isolated pockets. The particular conifer species depend on moisture availability and include Douglas-fir, true fir species, cedar species, and many species of pine.

Prior to the European settlement in the 19th century, the forest landscapes of the Pacific Northwest were mostly used by Native Americans. Relatively little is known about how extensively and intensively Native Americans impacted forests, although it is clear that forests were sources of material for housing and transportation, food, and clothing. Native Americans in many places used fire to manage the forests (Johnson and Swanson 2007).

In the 19th century, Europeans brought cattle and sheep grazing, gold mining, agriculture, fishing, and, later, timber harvest and processing to the region. At the end of the 19th century, members of the so-called Progressive movement (a political movement that emphasised the importance of government-led scientific expertise and long term planning for the public welfare) were increasingly concerned about the prevalent timber harvest model in the US – clear-cutting followed by abandonment, which occurred in the Great Lakes states in the 19th century (Fries 1951, Dana and Fairfax 1980, Hays 1999). They feared that this practice would also occur in the far western United States once the timberlands further east were exhausted. These progressives, led by Gifford Pinchot, began to advocate for holding vast parts of the remaining forestlands in reserves rather than granting them to homesteaders and railroad companies. In 1897, Congress created the US Forest Service to manage forest reserves for, in the words of Pinchot, "the greatest good for the greatest number over the longest time" (USDA Forest Service 2007). Subsequently, large tracts of the forestlands in the West became forest reserves and, later, national forests. Today, the US Forest Service and Bureau of Land Management (BLM) together control approximately 58% of all (forested and not) lands in the states of

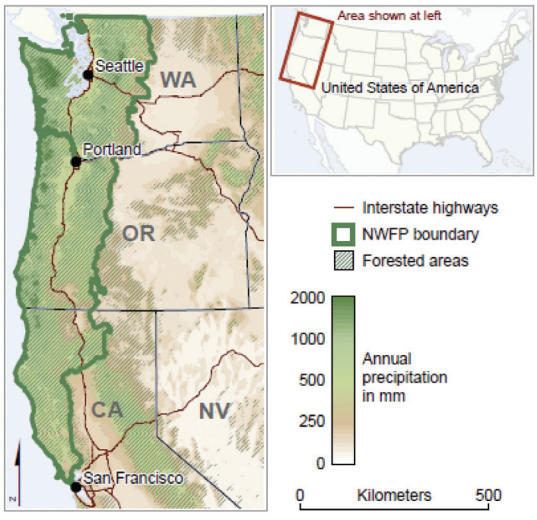

Figure II 10.1 Precipitation and forest cover in the Pacific Northwest.

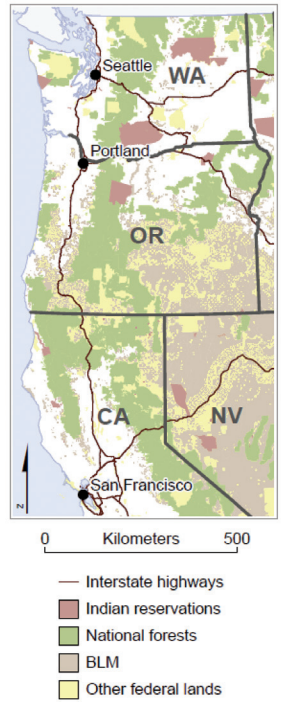

Figure II 10.2 Public lands in the Pacific Northwest.

Oregon and Washington (Figure II 10.2). In addition, Indian Reservations account for approximately 4% of the land and state ownership is approximately 5%. Timber investment management companies (known as TIMOs), industrial timber companies (which own both forestlands and sawmills), and non-industrial, family forestland owners control the remainder of the forestlands.

Pinchot and his peers believed that the best way to manage these forests would be for the federal government to hire professional forest rangers as civil servants who would work for the long-term common good of the nation and be free from the influence of industrial timber companies and other local interests. Pinchot and those who followed worked to create a bureaucratic culture with a strong "can do" attitude that allowed the agency to efficiently implement management objectives such as fire suppression and scientific forestry (Kauffman 1960, Carpenter 2001). Yet, in the Pacific Northwest, a vast and sparsely populated territory where timber supply seemed infinite, there was limited demand for federal timber during the first half of the 20th century. Consequently, the Forest Service was focused primarily on controlling grazing, fire suppression, and building trails and roads during the first 50 years of the century, and its management approach was mostly described as custodial (Dana and Fairfax 1980, Steen 2004).

Yet, after World War II, timber harvest became the central focus of federal forest management in the Pacific Northwest. With private forestlands cut over during the War and in the post-War housing boom, especially in California, there was enormous demand for lumber, with the federal lands still largely unexploited. At the same time, the belief that scientist and professionals could improve upon nature was at its peak (Hirt 1994, Hayes 1999, Moseley 1999). The Forest Service and BLM focused efforts on conversion of natural stands into young, productive plantations. During this period, sustainable forest management was conceptualized as sustained-yield forestry (Burnett and Davis 2002, Johnson 2007). Well-supported by Congress, the Forest Service and BLM developed a strong bureaucratic culture and financial systems to harvest and convert old-growth forests to plantations (Clary 1986, Steen 2004). Timber harvesting produced low-cost building materials to rapidly growing California. The revenue from timber harvests created well-funded forest management agencies, numerous business and jobs opportunities in the region, and substantial payments to local government, which limited the needs for local taxation (LaLande 1979, USDA Forest Service 2007).

10.2.2 The Pacific Northwest Forest Crisis

The Forest Service's strengths of independence and efficiency focused on timber production eventually became weaknesses as the nation's attitudes changed about how national forests should be managed. With the rise of environmentalism in the United States in the 1960s, there was growing controversy over federal forest management, especially the practice of clear-cutting old-growth forests, which had been prohibited at the founding of the Forest Service but

the agency was practicing widely. Protests and court cases followed that sought to change management practices. Facing this political pressure and a court decision that determined clear-cutting to be inconsistent with federal law, Congress passed a number of laws to change how national forests were to be managed. The National Forest Management Act of 1976 replaced the original founding act of the Forest Service. It legalised clear-cutting on national forests but created requirements for forest planning, emphasized multiple use, and required protection of sensitive species of plants and animals. The National Forest Management Act was enacted in a period with significant other legislation, including the Endangered Species Act (requiring the protection and recovery of threatened and endangered species), and the National Environmental Policy Act (requiring the disclosure of the environmental impacts of federal actions) placed significant new environmental protection obligations on the agencies (Biber 2009).

Although these laws did increase a focus on environmental protection and opened the door to new forms of public engagement, they did not fundamentally change the focus of the agency on timber management in the 1970s and 1980s (Hirt 1994, Burnett and Davis 2002). In response to the new legal requirements, the Forest Service extensively engaged in professional planning in order to substantiate multipurpose forest management. The computer-based FORPLAN model tried to integrate different societal demands into bureaucratic decision-making, but it was driven by the calculation of the allowable sustained cut (Hirt 1994, Biber 2009). Moreover, with the forest products industry still the largest sector of the economy in the Pacific Northwest, local economies reliant on large-scale federal timber harvest and local governments dependent on revenue from federal timber harvest, there was enormous pressure to continue high-harvest levels despite new laws and growing environmental protest. Hence, it was not until the second half of the 1980s that the logging on federal forestland peaked in the Pacific Northwest (Moseley 1999).

These new laws did, however, create new leverage for environmentalists to begin to force changes in the agencies (Moseley 1999). During the late 1980s and 1990s, environmental activists used these laws to challenge forest management practices of the Forest Service and BLM. Grassroots environmental groups formed, which would become known as "forest watch" groups. They would read the environmental analyses for timber sales, write comment letters, appeal, and sometimes litigate them. Over time, many of these groups banded together to create the Ancient Forest Campaign, which had a political and legal strategy to end native forest logging on federal lands in the Pacific Northwest (Durbin 1996).

Through a series of lawsuits in the late 1980s and early 1990s in which environmental activists successfully argued that the federal land-management agencies had neither adequately disclosed the environmental impacts of their actions nor developed sufficient plans to protect the threatened northern spotted owl, environmental activities managed to get series of injunctions halting logging on federal lands in western Oregon and Washington (Yaffee 1994).

The land management agencies had written numerous plans during the Reagan and first Bush administrations, but with enormous political pressure and significant bureaucratic inertia, they were unable to develop a plan that would comply with the laws and courts and with the political expectations of their political allies at the same time (Yaffee 1994). With businesses, workers, and rural county governments highly dependent on federal timber harvest, the region found itself torn apart: major controversy developed, including social protests from both sides and heavy involvement of not only regional but also national media and politics.

10.3 New tools for sustainable forest management

10.3.1 FEMAT and the Northwest Forest Plan

After nearly a decade of conflict over federal forest management and federal agencies' efforts to write management plan after management plan that would satisfy the courts, environmentalists, and the timber industry, newly elected President Bill Clinton held a forest summit in early 1993 in Portland, Oregon. This conference brought together agency personnel, research scientists, and stakeholders to discuss how to move forward. Following that meeting, the Clinton administration convened the Forest Ecosystem Management Assessment Team (FEMAT) to create a plan to facilitate not only spotted owl and salmon recovery but also protect a large number of other species thought to be dependent on old-growth habitat.[(2)]

[(2)] In parallel to FEMAT, President Clinton created two other teams, one focused on coordination among state and federal natural resource and economic development agencies and a second whose task was to focus on easing the economic transitions that were going to occur as a result of reduced timber harvest on federal forest lands in the region (Hellström and Vehmasto 2001). Although this section focuses on FEMAT since it was this process where sustainable forest management was reconceptualised, these two other committees were also central to making the transition away from old-growth harvesting politically and economically feasible.

FEMAT had the task of collecting scientific evidence about ecological, social, and economic conditions and to develop options to meet the legal species protections requirements while providing timber supply and other resources from federal forestlands. In this sense, FEMAT had to redefine sustainable forest management and related policies in the region (Yaffee 1994, Hellström and Vehmasto 2001). FEMAT was a departure from previous approaches to environmental assessments in that it included non-agency scientists from the region's universities. It also included a number of prominent natural resource social scientists charged with determining the social and economic impacts of the new plan on timber-dependent communities in the region.

Over the course of 90 days, FEMAT processed vast amounts of interdisciplinary scientific information and evidence related to forest ecology, potential vulnerable plant and animal species, and management. It also brought together information about employment and other economic impacts of the pending changes as well as likely impacts to life styles and cultures of forest-dependent communities (Hellström and Vehmasto 2001). It synthesised scientific and professional evidence that had been created over the decades of struggle over forest policy and transformed this information into new policy and management recommendations. In this sense, FEMAT created a new, holistic perspective on forest policy that fundamentally departed from the old perspective focused mostly on timber (Shannon 2003).

FEMAT drew on a decisionist model of policy advice. Scientists analysed the issues and developed several management options based on scientific evidence, with policy-makers responsible for deciding on one of the options based on a value judgment. Yet, FEMAT was constrained by significant political dynamics. For example, when the involved scientists presented eight policy options that differed according to their effects on forest ecosystems and on forest-based economies and forest-dependent communities, the Clinton Administration was concerned that the options that would adequately protect species, as required by law, would not produce enough timber to create a politically viable solution. Political pressure led to the development of a ninth option that provided for the legally required and politically demanded protection of species dependent on old growth species while enabling a higher annual cut. The Clinton Administration selected this ninth option, which became the basis for the Northwest Forest Plan. This plan covered the federal land in the range of the northern spotted owl (western Washington, Oregon, and northern California). It created a "meta framework revising all the administrative-unit plans of the agencies within the analysis area" (Shannon 2003, p. 264).

FEMAT and the Northwest Forest Plan institutionalized a major shift in the Pacific Northwest's forest policy on public land (Table II 10.1). They greatly reconceptualised the former model of forest management and policy based on sustained yield. Ecosystem management and conservation, including ecological restoration of harvested forests and plantations, became the central paradigm of sustainable forest management in the Northwest federal forests. The Forest Service and BLM's former concept of community stability via continuous timber support for the local mills was replaced by a broader concept for rural development based on community well-being. The Plan further foresaw extensive ecological monitoring and assessment for all management operations on federal forestlands and introduced the concept of adaptive management. Finally, broader public involvement in forest policy and collaboration with all affected stakeholders was set up as an important paradigm for public forest policy.

Following FEMAT, the Forest Service and BLM initially sought to continue efforts to engage key stakeholders and experts in forest management. With a bioregional focus, the agencies created public advisory groups to provide input regarding the implementation of the Northwest Forest Plan. A central challenge of sustaining these agency-led collaborative groups was the Federal Advisory Committee Act (FACA). The law was originally designed to prevent undue influence of interest groups over government decision-making by formalising processes in which the federal government asks for advice from nongovernmental individuals and entities. FACA meant that agency-led groups, such as these advisory groups, were quite formalised, with limited and controlled membership. As political focus shifted away from wet Northwest forests by the end of the Clinton Administration, these groups, along with much of the inter-agency collaboration, faded away.

In a similar vein, the concept of adaptive management envisaged by FEMAT and the Forest Plan was never really implemented. Adaptive management sought to establish a management philosophy that departed from long-term, expert-based static planning and would replace it with an approach characterised by continuous monitoring of management effects and continuous societal renegotiation of management objectives. There is no consensus on why this concept did not succeed, but one important reason was that planning and management institutions in place still favoured upfront planning (such as national forest and project planning regulations) and processes that inhibited post-activity collective learning and adaption. As Shannon (2003) notes, given the persistency of path-dependent institutional and organisation cultures, the implementation of rather rationalist, technical, or science-based management options and tools was more successful than the implementation of the more postmodern elements of FEMAT and the

Table II 10.1 Shifting goals of forest management in the Pacific Northwest.

	Environmental goals	Socio-economic goals	Governance/ public participation structure
Pre-1890	Develop western natural resources.	Provide families and businesses with access to resources; develop transportation infrastructure.	Use land grants to families and railroad companies to encourage resource exploitation and economic development. Hired federal employees via patronage rather than training/skill.
1890s–1945	Conserve resources for future generations; suppress fire to protect forests; protect particularly beautiful landscapes as national parks.	Protect citizens from monopolistic corporations; provide controlled access to resources.	Involve public through representative democracy (via Congress). Employ technical professionals for government work for the common good.
1945–1970	Improve upon nature through scientific forestry and fire suppression, protection only in national parks and (later) wilderness areas.	Provide logs to sawmills to create economic stability; provide recreation opportunities for urbanising population.	Involve public through representative democracy (via Congress). Employ technical professionals for government work for the common good.
1970s–1990s	Improve upon nature through scientific forestry and fire suppression; protect special places via protected areas; protect species and water; limit negative impacts of management via planning and disclosure.	Provide logs to sawmills to create economic stability; offer opportunities for urbanising population.	Involve public via Congress and direct public comment on proposed plans and activities, lawsuits to oppose.
1990s–present	Protect and restore ecological functions and processes and species protection on all national forestlands.	Provide forest products as by-products of ecological restoration, ecosystem service provision, and recreation.	Encourage public participation via multi-stakeholder collaboration; public comment and appeals, and Congress.

Forest Plan. In that way, it was not only – or even not so much – FEMAT and the Forest Plan but also the subsequent implementation process that led the whole instrument, to a certain degree, to reinforce the hegemony of professional expertise and science-based management in the region. Yet, the science that drove the new policy was dramatically different from the forest economics and silvicultural models that had coined management before the change.

Despite these shortcomings, FEMAT and the resulting Northwest Forest Plan were the decisive tools and catalysts for a tremendous policy change that resulted from a major forest policy crisis. The policy concepts developed and legitimised by FEMAT were able largely to stop the cutting of remaining old-growth forests in the region. The new policy ended the era of timber orientation of the Forest Service and destroyed the iron/wooden triangle that had dominated forest policy for several decades. With the federal forests being designated primarily for species recovery and ecological restoration being the management paradigm, the annual timber cut in the Pacific Northwest's national forests decreased sharply from about 6 billion board feet at the end of the 1980s to well below 1 billion board feet in the second half of the 1990s, where it remained.

Although the Northwest Forest Plan effectively protected the remaining old-growth forests in the

region, the agency never achieved the timber harvest envisioned in the plan. Even with federal funds to support economic adjustment and the booming economy 1990s, some communities suffered considerable economic decline (Charnley et al. 2008). FEMAT and particularly option 9 – the option the Northwest Forest Plan was based on – turned out to be too optimistic in what it could accomplish in terms of trade-offs between conservation and timber production. This was especially true as the agencies responsible for implementing the plan had lost most of their credibility. Moreover, these agencies were confronted not only with sustained political polarisation and continued environmental litigation but also severe budget cuts, caused in large part by the loss of timber revenue (Shannon 2003). Hence, timber harvest from public lands never achieved the desired output, and even the measures that had been established by the government to compensate timber-dependent counties and communities for the loss of revenues and industrial capacities were not able to avoid the decline of some rural communities where alternative economic activities could never be established (Haynes et al. 2006, Charnley et al. 2008).

Nearly 20 years later, the Northwest Forest Plan, especially its management direction and species protection components, have proven remarkably durable. The Plan has been institutionalised into agency management. Arguably, it has created significant rigidities in forest management in the face of changing scientific understanding of the forests and growing understanding of some of the ecological shortcomings of the plan, as well as the desire, especially from timber companies and county governments and their allies, for increased timber harvest.

It is interesting to note that, given its political importance, FEMAT was unique. Although there was a similar process in the Sierra Nevada in California that successfully created a regional management plan, similar efforts to create large-scale plans based on intense interdisciplinary scientific assessments, for instance in the arid region of the Pacific Northwest east of the Cascades Mountains, failed. During the 2000s, the second Bush administration attempted to revise the Northwest Forest Plan on BLM lands within the Northwest Forest Plan area. Despite significant resources that have been spent on analysis and planning in these processes, they were abandoned when either legal or political considerations came into play. Hence, one may conclude that FEMAT was possible only in the specific climate of major political crisis and stalemate.

10.3.2 Early place-based collaboration

Beginning in parallel to FEMAT were the rise of grassroots, bottom-up efforts to resolve conflicts in federal forest management and identify activities that could at once, improve ecological conditions and provide economic opportunity for local workers and businesses displaced by the decline of federal timber harvest. These were place-based, multi-stakeholder groups that included local community residents, environmental activists, and timber industry representatives. Such processes engaged non-experts more deeply than previous efforts. In addition, they conceptualised the role of science and knowledge differently, to include not only science but also local knowledge as a legitimate basis for forest-related decision-making. These efforts were similar in some ways to the community forestry movements in other parts of the world. Some of the early leaders in the Pacific Northwest were connected to the international community forestry efforts through their own international experience, scholars at the University of California, Berkeley, and program office from the Ford Foundation.[3]

Among the first of these in the Pacific Northwest was the Applegate Partnership, which was founded in 1992 in southwest Oregon. A number of community leaders believed that if they could work together across interest groups along with the Forest Service and BLM, they could develop new forest management projects that would manage all lands – public and private – to improve wildlife habitat while sending logs to the sawmills. The Applegate Partnership formed at the peak of the Northwest Forest Crisis, while the injunctions were still in place. This group met weekly for several years and has continued to meet monthly for 20 years (Applegate Partnership 2013).

Given the severe strife and resulting low trust in the Pacific Northwest at the time, participants spent considerable time working to build civil dialogue and trust. Frequently potluck meals and field tours were centrepieces for building trust and identifying common ground. Participants sought to identify common values and areas of agreement and avoid interest-based negotiation that so dominated regional forest politics. They developed a motto, "practice trust, them is us" (Moseley 2001). When the Clinton administration was looking for models to help solve the Northwest Forest Crisis, the Applegate Partnership became an example of the kind of approach that could both improve the environment and provide wood products.

[3] Key informant interviews conducted by the first author and her colleagues at University of Oregon in 2012 with various collaborative group participants.

Initially, the Applegate Partnership developed projects at the forest-stand level, where the group carefully negotiated timber harvest prescriptions that incorporated goals for habitat improvement and other priorities. Over time, the partnership increased both the scope and scale of their efforts. As the agencies' declining staffing made it difficult to implement innovative environmental analyses to match the group's agreements, they experimented with collaborative environmental analysis. The work in forestry developed a collaborative culture that led the partnership to be among the first in Oregon to engage in collaborative fisheries recovery work. In addition, the group also was among the first in the nation to create a watershed wide "fire plan" consisting of a landscape analysis of forest conditions and fire risk. The fire plan, along with a handful of other plans helped to shape the first Bush Administration's Healthy Forest Restoration Acts' wildfire planning provisions (Applegate Partnership 2011).

Despite the Partnership's innovative efforts, on-the-ground success in forest management proved difficult to achieve at times. This was for a wide variety of reasons, often having to do with institutional limitations such as declining staffing, budgets, and the limited decision space created by the Northwest Forest Plan. In addition, the ongoing regional political conflicts over timber harvest on federal lands, continued lawsuits, and the limited organisational capacity of the Partnership itself hampered its impact. Consequently, successes and accomplishments have ebbed and flowed over its two decades of existence.

10.3.3 Maturing place-based collaboration[4]

Over the next decade following the Applegate Partnership's founding, collaborative groups expanded across the Pacific Northwest, including the arid eastern Oregon and Washington (Figure II 10.3). These more arid regions have faced similar conflicts over forest management and endangered species protection. By the late 1990s, timber harvest had dramatically declined, and many of these communities had fewer economic alternatives due to their isolation than communities in the wetter, more populous western part of the region. In some places, the sense of shared fate led to the creation of collaborative groups that focused not only on forest management planning and analysis but also on protecting the last remaining sawmills in their communities or building new types of small-scale manufacturing capacity to utilise the by-products of thinning and other forest restoration projects.

In the late 1990s, residents of Wallowa County in northeastern Oregon started to come together to see if they could reduce conflict and find a way forward for their county. Wallow County historically relied on grazing and timber harvest on public lands. Its rugged beauty also attracted nature tourists and artists. Although outside of the spotted owl area, Wallowa County saw the near end of timber harvest on its federal lands by the late 1990s due to court injunctions associated with the protection of threatened and endangered salmon, the culturally and economically most important fish in the Pacific Northwest. More physically isolated from transportation corridors and urban areas than the Applegate Valley, and more natural-resource dependent, sawmill jobs were the only manufacturing jobs in the county. By the late 1990s, all but the last sawmill had closed, and long-time residents were moving away. Remaining residents were pessimistic about their future.

After local protests against reduced timber harvest became increasingly divisive, a number of residents came together to try to identify common ground. Over time, the local county government began to sponsor this nascent collaborative group and they developed a basis for on-going collaboration. Local residents quickly realised that their efforts would require a nongovernmental organisation to facilitate the collaborative work and implement the agreements that the group developed. Community leaders, with the assistance of Sustainable Northwest, a regional organisation focused on fostering conservation-based economic development and place-based collaboration, founded Wallowa Resources. This organisation became a major source of organisational capacity to foster agreement around federal forest management and rural economic development and to work toward implementing those agreements. Community residents and their partners developed ideas and strategies that went well beyond what could have been implemented through volunteer efforts of community residents.

From the beginning, Wallowa Resources and its community partners simultaneously pursued strategies and activities that would at once improve ecological conditions and create economic opportunity via land management. For example, working closely with the Forest Service, they developed a detailed watershed analysis that covered both public and private lands and included not only forest resources but also rangelands, water, and fisheries. This process identified a number of restoration activities to improve ecosystem conditions. In paral-

[4] This section is based on research by the convening lead author and her collaborators, Emily Jane Davis, Autumn Ellison, and Branda Nowell.

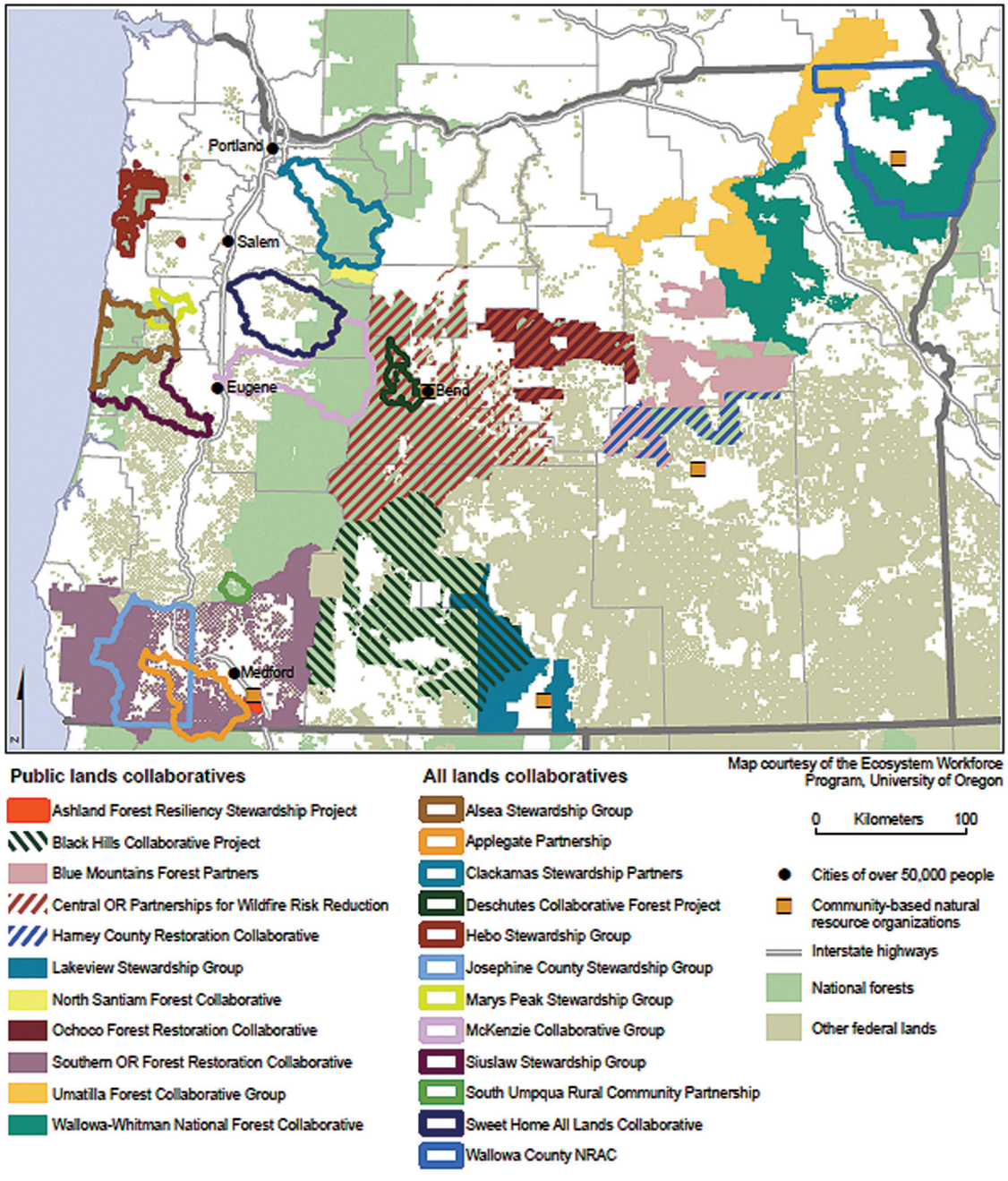

Figure II 10.3 Collaborative groups in Oregon.

lel, they discovered that local businesses were not competing effectively for restoration work on the federal lands, and embarked on an effort to increase the skills and competitiveness of local contractors, in order to increase the local economic benefits from the restoration work.

In parallel, Wallowa Resource began to purchase and modernise the last remaining saw mill. This effort ultimately they could not save the saw mill, but their efforts evolved into a strategy that was less capital intensive and focused more on local wealth creation, not only for local citizens but also as a strategy for generating revenue for local government, which experienced dramatic declines in revenue due to the decrease in federal timber harvest. Because available material was small logs and chips from fire-hazard reduction and forest restoration projects, they focused on a strategy to create multiple value added products using this low-value wood. They created an integrated wood-utilization campus that includes value-added manufacturing and bioenergy production using low-value logs and other woody material. Today, the campus includes a wood-fired boiler, a commercial kiln for drying firewood (producing disease-free firewood that can be transported out of the county), and capacity to create densified fuel

products (e.g. biobricks) and posts and polls. They also worked to convert the local school to wood-fired heating, which created significant savings over heating with oil.

In addition to this focus on restoration and economic development, Wallowa Resources also provides nature-based education to local school children on Fridays, when no public school is offered due to lack of funding (most US schools have five-day school weeks; Wallowa County has only four). Finally, by partnering with several universities, they have developed field classes that integrate learning about natural lands, wildlife, and rural livelihoods.

Wallowa Resources and the collaborative efforts in Wallowa County and across the region have embarked on integrated strategies around forest restoration and stewardship and rural economic development. They have focused on building agreement around federal forest management activities and have used these restoration projects and the wood they produce to create local economic opportunity. In communities with limited local capital and human resources, these organizations often act as conduits between regional and national grant and loan programs. They have also worked regionally and nationally to change federal forest policy to create an environment more favourable to place-based approaches to forest management.

Despite the longevity of place-based collaboration, these efforts continue to face significant barriers. One of the most notable has been the massive disinvestment in federal land management in the region over the past two decades, just as problems have become more complex legally, socially, and ecologically. Moreover, federal land management agencies retain decision-making authority over national forest management, so that, unlike many other contexts where community forestry is practiced, there are no formal co-management arrangements. In addition, these collaborative efforts are dependent on community volunteers and people whose employers can pay for them to participate, which means that participants are often professionals or residents with leisure time, such as retirees. Along with the democratic shortcomings of this arrangement, it can also limit the capacity of these collaborative groups to implement their agreements, especially as the financial resources of the federal land management agencies continue to decline. Finally, in many places, the economic conditions are so poor that the necessary human and financial resources to integrate conservation and development are difficult to attract.

10.4 Comparing FEMAT and place-based collaboration

Both approaches to national forest management described in this chapter – FEMAT and place-based collaboration – share some similarities (Table II 10.2). Both depart from traditional forest policy-making in the Pacific Northwest in that they place greater emphasis on mutual understanding across new and different distinct scientific disciplines (FEMAT) and local stakeholders groups (place-based collaboration) and on collaboration among government and non-governmental actors. In both cases, the processes have sought to simultaneously improve ecological conditions and provide economic benefits from national forest management. Both processes were initiated in response to major problems of the dominant forest policy-making paradigm. And both approaches developed with a primary focus on national forestlands.

Yet, the tools are also fundamentally different. First, FEMAT and the institutionalisation of the Northwest Forest Plan were sudden and abrupt. The Plan was established 'top down' via a presidential direction to catalyse and legitimise a major forest policy change. It bypassed the established forest policy subsystem, which was unable to organise the change within the traditional institutional setting. Even though the knowledge foundation of FEMAT has been slowly generated over decades, the process itself worked quickly. FEMAT had to do so given its mandate to contribute to the solution of the Forest Crisis at its peak. Under conditions of enormous political and time pressure, FEMAT channelized the complexity of the issue into a small set of concrete policy options, thereby transforming scientific knowledge into (possible) policy road maps.

Although the Plan's species protection focus marked a dramatic change in the way biophysical sustainability was conceived, FEMAT and the resulting Northwest Forest Plan also meant a continuation of the professional, top-down decision-making system that has been so central to forest policy on federal lands in that region. Some of the participatory and adaptive policy tools of the plan could not be implemented as some plan writers had hoped. The Northwest Forest Plan continued and even reinforced other old mechanisms as well. For example, the rise of ecosystem management was focused on achieving multiple goals on the same patch of ground – simultaneously managing for owls, salmon, aesthetics, and timber. The plan also continued and even strengthened the long-standing practice of zoning the national forest to meet particular primary objectives.

FEMAT also increased the influence of science on forest management decision-making or, at least,

Table II 10.2 Comparison of FEMAT and place-based collaboration – patterns of governance.

	FEMAT	Place-based collaboration
Scale	Regional (whole wet forest, Pacific Northwest public forestland)	Local (watershed/community/forest district)
Political aspiration	Solve the Northwest Forest crisis Legitimise/catalyse policy change	Legitimise/reinstall a certain degree of active management, including timber harvest, on public land; integrate local demands into decision-making
Discursive	Supremacy of science; institutionalized in 1970s' federal laws and supported by federal judges, requiring more and recent scientific knowledge	Participation discourse originating from societal movements in the 1960s as well as experiences of innovators in social and community forestry internationally
Type of knowledge that counts	Scientific knowledge, including, to a lesser extent, social science	All types of knowledge, including local knowledge; scientific knowledge still important
Major rationale	Conduct comprehensive interdisciplinary scientific analysis of the current situation; develop options for future development/solving the crisis	Develop a legitimised/sustainable option for forest management at the local level based on local agreement
Forest management paradigm	Ecological (and social) scientific forest management	Community forest management
Mode of decision-making	Scientific evidence crucial, argumentative/interdisciplinary assessment/ decisionist (developing options for policy-makers to decide)	Deliberative/consultative (develop consensus, prepare/legitimise decisions by managers), although science still with a key role to play
Most powerful groups	Federal judges (setting the frame), scientists and national policy-makers	Diverse, depending on the local power structures/leadership and collaboration culture
Innovative potential/ achievements	Policy change: creating new pathways via interdisciplinary assessment/combining different paths of evidence	Depolarisation, creating new pathways via local negotiation/deliberation processes
Important limitations	Restricted to scientific knowledge and evidence, reduced to a focus given by both the president and the court's interpretation of relevant legal institutions, including agency regulations	Localised decision-making, tending to downplay demands that originate from outside the region, yet those activities should be guaranteed by the given institutional framework

dramatically changed the kind of scientific evidence that was seen as valid for decision-making. Hence, the timber-production-focused silvicultural and engineering sciences were replaced by conservation biology and, to a lesser extent, social science analysis. In the plan, the professional ethos of foresters who had been focused on timber primacy was replaced by new types of scientific expertise on conservation. In this way, FEMAT and the Northwest Forest Plan did not only paradigmatically change forest policy on federal lands but also shifted decision power from foresters to ecologists, hydrologists, and others. Although FEMAT itself lasted less than a year, the Northwest Forest Plan that it created has been remarkably du-

rable, even in the face of legal challenges, attempts at law-making, and growing scientific knowledge suggesting that some of the management strategies are not achieving their attended species-protection or timber-production goals.

In contrast, local collaboration emerged over a longer time period and did not have the unique political momentum and impetus that FEMAT had. The process of institutionalising collaboration has been incremental, occurring initially in isolated places without active support from actors and institutions operating beyond local places – only over time leading to realignment of institutions operating at higher scales. It is much harder to capture the diversity of approaches presented in this chapter in analytical categories. What is common to place-based collaboration is a greater departure from an experts-only decision-making mode that has determined forest policy-making on federal lands since the Progressive Era; it places greater emphasis on deliberation among people with a wide set of ways of knowing. At the same time, these approaches aimed to redefine the level of decision-making down to the local level. In other words, they pushed decision-making downward while, at the same time, broadening the notion of what acceptable knowledge was.

Driven by a combination of supporting factors, including local communities that felt excluded by capitalist or expert-based decision-making at higher policy levels, social scientists and activists that shared a desire to improve democratic policy-making, and diverse local interest groups, local collaboration grew in frequency, abundance, and reach. In many places, local collaboration has become a "commonly accepted way of doing things" (Abers and Keck 2103). Yet, collaboration is institutionalised largely through creation of culture and habit rather than via law and policy. Consequently, advocates of collaboration cannot use the courts to ensure that the Forest Service will collaborate or act on the desires or will of collaborative groups. The successes of collaboration often come through the ability of participants to create solutions that are socially appealing, allow the agency to avoid environmental lawsuits, and/or align with agency priorities. Although regional policymakers have long supported place-based collaboration rhetorically, re-aligning Forest Service policies, practice, and funding to support place-based collaboration has come much more incrementally. National forest managers at the local level have responded to these efforts in inconsistent and conflicting ways, due to a mix of institutional pressures and norms about professional expertise and democracy. Collaborative groups are often thwarted by larger, more deeply institutionalised dynamics such as legally mandated planning and budget processes that often do not prioritise collaborative agreements. In addition, the primacy of scientific knowledge continues to be of central importance partly because it is embedded in the legal mandates and culture of the federal forest management agencies and because of its strong support by some interest groups, especially environmentalists.

However, both the Forest Service and Congress found the promise of collaboration among diverse stakeholder groups politically compelling, especially with their focus on conflict reduction and solutions. Over the past 20 years, there has been slowly growing institutionalisation of these collaborative approaches in national forest management, accelerating in the past five years. Examples of recent laws and policies that are focused on increasing community engagement include the Secure Rural Schools and Community Self-Determination Act, which created local resource advisory committees to select restoration projects for funding; national guidance for stewardship contracting, which requires collaboration for certain types of forest restoration projects; Healthy Forests Restoration Act, which reduced planning/analysis requirements for fire-hazard reduction projects that were collaboratively agreed upon; Collaborative Forest Landscape Restoration Act, which was designed to fund collaborative landscape-scale forest restoration; and the new national forest planning rule, which requires upfront collaboration. However, the political organisation of already active collaborative groups has driven these laws and policies rather than the other way around.

To conclude, both FEMAT and place-based collaboration have redefined how sustainable forest management on federal lands is understood and practiced. Yet, they operate in a context where older dynamics are in play, including the primacy of agency expertise, the role of courts as a venue for conflict resolution, and budget structures that make integrated management difficult and limit the capacity of collaborative groups to act. The legal frameworks of the federal land management agencies have not changed significantly, creating a complex, hybrid system. Yet, both innovations brought new approaches to forest management in the Pacific Northwest, ranging from interdisciplinary science-based analysis to a strong culture of participatory inclusive deliberation on federal forestlands at the local level. They have undisputedly changed forest management since the Northwest Forest Crisis. Together with the traditional forest policy-making and management paradigms built in the era of timber primacy, they build the pillars of the Pacific Northwest's public forest governance: ecosystem science, local collaboration, professional expertise, and global timber markets.

10.5 Outlook – challenges for the future

The massive transformation of federal forest policy in the Pacific Northwest came largely without significant new legislation but happened in a legal framework that was established in the 1970s (Moseley 1999, Cashore and Howlett 2007). Although there have been small changes in laws and congressional funding, it was first and foremost a combination of lawsuits, political campaigns, new science (conservation biology, landscape ecology, social science), and collaboration, as well as economic development, that has triggered the dramatic change in the operating definition of sustainable forest management. Sustainable forest management on national forestlands is no longer defined as sustained-yield forestry (as a practice and paradigm) or multiple-use management (as a paradigm). Instead, de facto sustainable forest management on federal lands increasingly involves (1) multi-stakeholder participation; (2) management focused on ecosystem, watershed, and landscape; (3) species protection; (4) wildfire management, community protection, and hazardous fuels reduction; (5) economic opportunity only as a by-product of conservation, restoration, and stewardship of public lands and the natural amenities that this conservation-oriented management creates. The Northwest Forest Plan and local-level collaboration have together helped drive these changes. As a result, the forest-production-oriented term *sustainable forest management* is rarely used anymore in the region, with conservation, ecological restoration, and ecosystem management dominating the forest management rhetoric on federal lands. Yet, regardless of this shift in rhetoric, the content of sustainable management of the region's vast federal forestlands remains contested.

Seen from a broader perspective, the policy change of the 1990s led to a sharp division of forest management across different ownerships. Today, forestland in the Pacific Northwest is divided in public land managed for conservation and recreation values, private industrial forestlands managed for commodity production and equity investment, and non-industrial forestlands managed for a diversity of purposes. With some of its private forestlands among the most productive temperate-zone timber plantations on earth, and some highly efficient and globalised forest product firms being located in the region, Oregon and Washington continue to be among the top forest products/producing states in the United States. Global wood demand, publically traded companies, and the investment decisions of large institutional investors such as retirement funds increasingly drive private land harvest and processing decisions in the region. The relative importance of forest products to the economy and culture of the region has, however, declined significantly. At the same time, growing and changing population, urbanisation and in-migration is moving rural and urban communities socially and culturally further apart because the economic ties between them are increasingly obscure. Urban economies have diversified to include high technology, among other sectors. Natural amenities associated with large protected areas and a "sustainability" culture attracts young, recreationally minded residents to the urban areas in the region. Many isolated rural areas, however, are economically depressed, with few economic options beyond recreation and tourism. Many of these trends are related to a complex set of social and economic developments, not simply effects of the shifts in federal forest management. Yet, the Northwest Forest Plan and its implementation, could not prevent or even accelerated these trends, including the economic decline of isolated communities surrounded by public lands.

Although movement towards comprehensive sustainable forest management and a related forest policy has been substantial over the past two decades, with growing citizen engagement and collaboration, a focus on landscape-scale restoration, and local economic development efforts, there are many open questions about what the future holds for the people and forests in this region. In conclusion, we raise several questions that those engaged with forest management in the region grapple with:

- How can place-based collaboration, which has been based largely on interpersonal relationships and trust at the community scale, co-evolve with the increasing focus on planning and managing at geographic scales well beyond those of the social relationships and economic relationships and patterns that exceed even regional and national boundaries?
- Much of the success in collaboration has been in dry forests where the socio-ecological need to manage wildfire has coincided with the economic desire for logs. In the wet western forests, the link between needs for restoration and timber harvest is more complex and less clear, especially outside of the plantations. Consequently, the path to conflict resolution between those who want to see environmental restoration and those who want continued timber harvest is less clear in the wet forests than in the arid areas. How will collaboration evolve as it grows in these wetter areas?
- With growing agreement about how to manage public lands in complex multidimensional ways, there is a growing need for funds to implement projects. With the decline in timber harvest levels and an unchanged budget system, the Pacific Northwest saw dramatic declines in funding,

which resulted in greatly reduced staffing even as forest management became much more complex. During the 1990s, the number of agency personnel working on national forests was cut in half, largely due the decline of timber revenue. Where will the money come from to implement restoration and stewardship of public lands?

- Should timber harvest beyond what is required for restoration be a part of federal forest management? Social agreement has coalesced around plantation restoration and fire-hazard reduction. But, after 20 years of restoring plantations, some national forests and BLM districts in the wetter parts of the region are coming to the end of their plantation restoration activities. How much, if any, timber harvest should come from public lands once the restoration is done, and how will stakeholders in the region reach agreement?
- How will increasing demand for timber in Asia and other rapidly growing economies exert pressure and create opportunities for the Pacific Northwest forest products industry? What kinds of pressures will it create for access to timber from federal lands? And what role, if any, should public policy and federal forest management play in helping to sustain wood processing capacity?
- How will climate change and other disturbances change forests and, in turn, change social agreement about how forests should be managed? The Forest Service is increasingly incorporating climate considerations into is forest and project planning processes, but there are unanswered ethical, scientific, and policy questions about the climate-change adaption strategy for the future (Spies et al. 2010).
- Isolated forest-dependent communities have growing poverty and limited economic opportunity. Although many have sought to participate in the economic opportunities from ecosystem management by developing business capacity to undertake restoration and manufacturing of value-added wood products, for many communities this has not replaced the losses caused by the transformation of the timber industry (Jungwirth 2000). How can isolated rural communities reverse the trend towards multigenerational poverty?
- Although economic development via forest restoration has been a major focus of the adaption of the Northwest Forest Plan as well as place-based collaborative efforts, some forest restoration jobs, such as manual thinning, are often conducted by Hispanic immigrants who are vulnerable to exploitation (Sarathy 2012). How can the region ensure that restoration jobs are high-quality jobs and avoid conflict between native-born and immigrant workers?

Obviously, responses to these questions will to a large degree depend on larger social, economic, and ecological forces that originate beyond the influence of the region's forest policy stakeholders. Yet, the experience of more than 30 years of conflict and debate over federal forest management in the region has not only led to polarisation (a problem not only for forest policy but also for the overall US society) but has also created a rich pool of concepts, tools, and collaborative processes to deal with social, economic, and ecological challenges. In this sense, the people of the Pacific Northwest created not only competing expectations towards the region's rich forests but also invented tools to overcome the cleavages. With this rich social capital in place, there is no reason for pessimism regarding the future of this beautiful forest landscape.

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References

Abers, R.N. & Keck, M. 2013. Practical authority: Agency and institutional change in Brazilian water politics. New York: Oxford University Press.

Applegate Partnership 2011. Balancing Act: Living with fire in the Applegate. Available at: https://scholarsbank.uoregon.edu/xmlui/handle/1794/2691 [Cited 24 Apr 2013].

Applegate Partnership 2013. Applegate Partnership and Watershed Council. Available at: http://www.applegatepartnershipwc.org/about-us/ [Cited 24 Apr 2013].

Biber, E. 2009. Too many things to do. How to deal with the dysfunctions of multiple-goal agencies? Harvard Environmental Law Review 33(1): 1–64.

Burnett, M. & Davis, C. 2002. Getting out the cut: politics and national forest timber harvests, 1960-1995. Administration and Society 34(2): 202–228.

Carpenter, D.P. 2001. The Forging of bureaucratic autonomy: Reputations, networks, and policy innovation in executive agencies, 1862-1928. Princeton University Press, Princeton, NJ.

Cashore, B. & Howlett. M. 2007. Punctuating which equilibrium? Understanding thermostatic policy dynamics in Pacific Northwest Forestry. American Journal of Political Science 51(3): 532–551.

Charnley, S., McLain, R.J. & Donoghue, E.M. 2008. Forest management policy, amenity migration, and community well-being in the American West: Reflections from the Northwest Forest Plan. Human Ecology 36: 743–761.

Clary, D.A. 1986. Timber and the Forest Service Lawrence, KS: University of Kansas Press,

Dana, S.T. & Fairfaix, S.H. 1980, Forest and Range Policy. 2nd Edition. McGRaw-Hill, San Francisco.

Durbin, K. 1996. Tree huggers: Victory, Defeat and Renewal in the Northwest Ancient Forest Campaign. The Mountaineers, Seattle, WA.

Fries, R.F. 1951. Empire in pine: the story of lumbering in Wisconsin. State Historical Society of Wisconsin, Madison. 285 p.

Haynes, R.W., Bormann, B.T., Lee, D.C. & Martin, J.R. 2006. Northwest Forest Plan: the first 10 years (1994-2003): A synthesis of monitoring and research results. USDA Forest Service Pacific Northwest Research Station (General Technical Report, PNW-GTR-651). Available at: http://www.fs.fed.us/pnw/publications/pnw_gtr651/pnw_gtr651a.pdf [Cited 24 Apr 2013].

Hays, S.P. 1999. Conservation and the gospel of efficiency: The Progressive Conservation movement, 1890-1920. University of Pittsburgh Press. Pittsburg

Hellström, E. & Vehmasto, E. 2001. Environmental forest conflict in the United States: conflict patterns in the Pacific Northwest and Minnesota. EFI Working Paper 22. European Forest Institute, Joensuu, Finland.

Hirt, P.W. 1994. A Conspiracy of optimism: Management of the national forests since World War Two. University of Nebraska Press, Lincoln, NE.

Johnson, K.N. 2007. Will linking science to policy lead to sustainable forestry. Lessons from the federal forests of the United States. In Reynolds, K.M., Thomson, A.J., Köhl, M., Shannon, M., Ray, D. & Rennolls, K. (eds.). Sustainable forestry: From monitoring and modeling to knowledge management and policy science. p. 14–34.

Johnson, K.N. & Swanson, F.J. 2007. Historical context of old-growth forests in the Pacific Northwest – policy, practices, and competing worldviews. In Spies, T.A. & Duncan, S. (eds.). Old Growth in a New World. Island Press, Covello, CA. p. 12–28.

Jungwirth, L. 2000. Who will be the gardeners of Eden? Some questions about the fabulous New West. In Brick, P. Snow, D. & Van de Wetering, S. (eds). Across the great divide: explorations in collaborative conservation in the American West. Island Press, Covelo, CA: p. 58–63.

Kaufman, H. 1960. The Forest Ranger: A Study in Administrative Behavior. Johns Hopkins University Press, Baltimore, MD.

LaLande J.M. 1979. Medford Corporation: A History of an Oregon Logging and Lumber Company Klocker Printing, Medford, OR.

Moseley, C. 1999. New ideas and old institutions: Environment, community and state in the Pacific Northwest. Ph.D. Dissertation, Yale University.

Moseley, C. 2001. The Applegate Partnership: Innovation in crisis. In Brick, P., Snow, D. & Van de Wetering, S. (eds). Across the great divide: explorations in collaborative conservation in the American West. Island Press, Covelo, CA. p. 102–111.

Sarathy, B. 2012 Pineros: Latino Labour and the Changing face of forestry in the Pacific Northwest. University of British Columbia Press, Vancouver.

Shannon, M.A. 2003. The Northwest Forest Plan as a learning process: A call for new institutions bridging science and politics. In Arabas K. & Bowersox J, (eds.). Forest futures: Science, politics and policy for the next century. Rowman and Littlefield, New York. p. 256–279.

Spies, T.A., Giesen, T.W., Swanson, F.J., Franklin, J.F., Lach, D. & Johnson, K.N. 2010. Climate change adaptation strategies for federal forests of the Pacific Northwest USA: ecological policy and socio-economic perspectives. Landscape Ecology 25(8): 1185–1199.

Steen, H.K. 2004. U.S. Forest Service: A history. University of Washington Press, Seattle.

USDA Forest Service 2007. The greatest good: A Forest Service centennial film. USDA Forest Service, Washington, D.C.

Winkel, G., Gleissner, J., Pistorius, T., Sotirov, M. & Storch, S. 2011. The sustainably managed forest heats up. Discursive struggles over forest management and climate change in Germany. Critical Policy Studies 5: 361–390.

Yaffee, S.L. 1994. The wisdom of the spotted owl: Policy lessons for a new century. Island Press, Covelo, CA.