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## **Restoring Ecocultural Landscapes in the Pacific Northwest**

Ecosystem services—the benefits ecosystems provide to humans—include food, medicine, and fuel, improvement of water quality, flood control, and pollination of crops. When considering how human health is impacted by ecosystem degradation, we usually think of direct, negative impacts from chemical pollution, but ecosystem degradation from logging, mining, fire suppression, and the alteration of rivers and wetlands also negatively impacts human well-being.

Restoration is often cheaper than an engineered solution to provide those same ecosystem services—for example, restoring coral reefs was 10 times cheaper than installing seawalls for storm protection (Holl 2020, 3-4). "Moreover, some ecosystem services are simply irreplaceable at any cost," such as the preservation of biodiversity, recreational enjoyment, and cultural uses of ecosystems by indigenous peoples (Holl 2020, 4).

Ecological restoration of damaged ecosystems is an important facet of conservation, though the causes of ongoing degradation need to be addressed to curb the trajectory of destruction. It is also clear that ecosystem restoration itself must address human needs in order to be successful. Restoration must provide for human livelihood, and local involvement is critical for ecosystem restoration and maintenance (Holl 2020, 6, 19-20).

## **Pacific Northwest Prairie Restoration**

Pacific Northwest prairies "...are among the most endangered ecosystems in North America" (Stanley et al. 2011, 233). Only 1-5% of these prairie and oak savanna ecosystems remain, most lost to development, agriculture, and invasive species; the small prairies that still exist are highly degraded and unconnected. "This landscape-scale conversion from continuous native prairie and oak woodland to highly fragmented low-quality patches has led to an increasing number of threatened and endangered species associated with this disappearing habitat" (Hamman et al. 2011, 317). Restoring these prairie ecosystems can aid in the recovery of endangered species, but the scale of the challenge is staggering.

A primary goal of restoration is to recreate the historical state of an ecosystem, prior to human disturbance. It is difficult to restore a prairie to a historical state when there are few remaining examples of a reference ecosystem left to study or emulate. Other prairie restoration challenges include the loss of biodiversity due to invasive species, lack of habitat connectivity, lack of available potential restoration sites and the cost to acquire them, and the fact that prairie restoration does not provide a clear benefit to landowners (Sinclair et al. 2006, 35, 40, 54).

Additionally, the historical state of an ecosystem must reflect the fact that Native Americans shaped their landscapes for thousands of years before European settlement. Much of North America, including Pacific Northwest prairies, was a managed cultural landscape when Europeans arrived, not untouched wilderness. Prairie ecosystems evolved with fire, and in fact, "[f]ire appears to be the essential ecological ingredient for the formation and maintenance of grasslands" (Stewart 2002, 69). In the Pacific Northwest prairies, these were purposeful, lowintensity fires set by Native Americans for the benefit of their societies. Frequent burns maintained the prairie ecosystems, increased the quality and quantity of berries, tubers, and bulbs for food, improved oak health and made gathering acorns easier, improved biodiversity, and decreased brush and debris to minimize chances of catastrophic fire (Anderson 2002, 56).

Regular, low-intensity burning was part of the historic disturbance regime and should be included in prairie restoration goals. There are challenges to integrating prescribed fire into prairie restoration, which can be addressed by adopting adaptive maintenance practices and working collaboratively across disciplines, and across agencies (Hamman et al. 2011, 326).

"...[M]anagers have learned that implementing prescribed burns on a scale that is necessary for restoration requires clearly defined and prioritized ecological objectives, an extremely knowledgeable, collaborative burn team, sufficient programmatic and political backing to encourage supportive regulatory guidelines, and accurate information on fire effects to help develop burn plans that meet the ecological objectives" (Hamman et al. 2011, 318).

Introducing fire into a degraded ecosystem with fuel loads or characteristics outside of historic conditions requires careful planning and management. Trees or shrubs may need to be selectively removed so that fire effects are rejuvenating instead of damaging or even dangerous. Herbicide in conjunction with burning is useful in early restoration to control invasive species. Burning is also insufficient to restore native plants because the native seed bank is exhausted, so it is also necessary to re-seed the burned prairie (Sinclair et al. 2006. 43, 51).

Much of our knowledge of ecosystem restoration evolved independently of local, indigenous knowledge and practices that existed for thousands of years, due to persistent reliance on "hard science," rejection of interdisciplinary research, and cultural bias against Native Americans. "Instead, scientists have developed the principles and theories of fire ecology, fire behavior and effects models, and concepts of conservation, wildlife management, and ecosystem management largely independent of native examples" (Lewis and Anderson, 2002, 4). Increased interdisciplinary work and newer scientific techniques such as fire scar and pollen studies, archaeobotanical research, and pyro-dendrochronology studies demonstrate the physical effects and benefits of using fire in creating and maintaining ecosystems, and how indigenous land management practices were essential to the well-being of their cultures (Anderson, 2002, 48).

While heightened species diversity, abundance, and densities have been associated with disturbance, clear connections between indigenous disturbance regimes and the practical aspects of land use—in making a living—are only now beginning to be unraveled by scientists. New in-depth ethnoecological studies conducted by anthropologists and ethnobiologists in the last two decades that involved direct fieldwork with native people have disclosed to a much greater extent how integral fire is to the overall success of indigenous economies. This is where much of the detailed ecological knowledge, though fragmented, rests *within* the living native cultures (Anderson, 2002, 46).

## **Traditional Ecological Knowledge**

Traditional Ecological Knowledge (TEK) connects ecological and cultural well-being, maintaining that environmental degradation impairs both ecological and cultural systems. "TEK may be defined as 'a cumulative body of knowledge, practice, and belief, evolving by adaptive processes and handed down through generations by cultural transmission, about the relationship of living beings (including humans), with one another and with the environment..." (Senos et al. 2006, 394). It is grounded in observations and adaptive interactions with a specific place over a long period of time; it also has a spiritual component. *Kincentricity* is the belief that humans are part of an extended family that includes all the natural elements of an ecosystem, and that we are as much a part of nature as any other part of the environment. It also means humans have familial responsibilities within nature, and fulfilling those responsibilities is also natural. "The indigenous land ethic holds that we can have a positive restoration effect in the very act of using natural resources. Kincentric ecology entails direct interaction with nature to promote enhanced ecosystem and cultural functioning" (Senos et al. 2006, 397).

Though it seems restoration practitioners would want to consult with local experts who hold years of cumulative knowledge about the land being restored, most practitioners simply have little understanding of TEK (Senos et al. 2006, 395). TEK is a holistic worldview, and the spiritual aspects of it can be uncomfortable or perceived as unscientific to western scientists and non-indigenous people. TEK is not easily accessed, residing in the minds and cultural practices of indigenous people and transmitted through oral tradition (Senos et al. 2006, 395).

In the case study "Rekindling the Fire of Camas Production," (Senos et al. 2006, 416-17) the Songhees Nation, a Straits Salish community of Vancouver Island, was highly impacted by diabetes. While only elders remembered eating traditional foods like camas bulbs, the Songhees were determined to re-introduce native foods to improve their health and culture. Camas "…was featured in families' seasonal harvesting rounds, trade and reciprocity relations between communities and families, feasting, language, and stories. There was much traditional knowledge about its ecology and management" (Senos et al. 2006, 416). Generations ago the Songhees people cleared and tended camas prairies and harvested vast amounts of camas, but the prairies had become degraded due to grazing, fire suppression, invasive species and conifer encroachment. In a ceremonial celebration led by Songhees land manager Cheryl Bryce, camas was harvested and cooked on Songhees land, followed by burning and camas re-seeding.

These events are just the beginning of a series of focal restoration projects grounded in Coast Salish knowledge, practice, and beliefs that will include reintroducing regular burning regimes, promoting community participation and active experiential learning, reintegrating humans with the landscape, and once again tending and using the restored places and their resources in ways that sustain both people and their habitats (Senos et al. 2006, 417).

While incorporating TEK is not appropriate in every restoration project, it shares commonalities with best practices in restoration. Restoration efforts are more successful when they provide for human livelihoods and occur with the input and support of local communities. Practitioners are encouraged to reach out to the local community and indigenous people in the earliest phases, not just to acquire knowledge or inform them of agency plans, but to collaborate throughout the process, from setting goals to restoring, maintaining, and monitoring the site.

Ecocultural restoration is the interconnected process of restoring human culture and ecosystems together; its goals state not just how people will renew the land, but how the land will renew the people. The unfamiliar spiritual component of TEK teaches us that we are kin with all living things, and that philosophy may be the key to growing strong and resilient communities in the act of caring for the environment and all our relations that share it with us.

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