

Ecosystem Services Version 3.0: Moving to Social and Cultural Values, Governance, and Communities

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Ecosystem services are the goods, benefits and services that human communities derive from nature and depend on for their welfare (Millennium Ecosystem Assessment 2003). Ecosystem services theory and methods have come a long way in the past decades. The exponential growth in interest has shifted the role of these perspectives and tools. Early applications of the concept were an effort to critique decision making that failed to appreciate the role of natural systems; this then grew into interest in market based solutions for environmental problems (Gómez-Baggethun et al. 2010). These represent versions 1.0 and 2.0 of ecosystem services. Now ecosystem services methods and models allow for new units of measure outside of economic ones – a shift to version 3.0 based on governance and public involvement.

The fellows of the Portland State University Ecosystem Services for Urbanizing Regions (ESUR) IGERT have focused their research on the social and cultural dimensions of ecosystem services. We argue that ecosystem services are most effective as a contribution to community governance and decision making, breaking from traditional expert driven models of ecosystem services research. This is based on a model that posits transdisciplinary research (Max-Neef 2005) can most appropriately define the problems and research programs to address “wicked problems” (Rittel and Webber 1973). The research presented here comes from five IGERT fellows. Each approaches different substantive ecosystem services domains in the Pacific Northwest. But we share common theoretical starting points. This poster is presented as a synthesis of this work. The common theoretical structure is briefly introduced to ground the multiple perspectives. Then each of the research projects and efforts are introduced.

Developing a Social and Cultural Ecosystem Services Framework

Daniel et al. (2012) provide a compelling agenda of social and cultural ecosystem services research. This agenda notes that cultural and social values in ecosystem services are often lost, or added only at the end of a research effort. They argue that assessments using communities can be more rich and complete than solely expert driven ones. Working with communities allows for assessments to be guided by them, and to achieve a richer understanding. This approach must be paired with a flexible, but grounded ecosystem services analytical framework. To this we add the structure, function, process and service model (Haines-Young and Potschin 2010; Potschin and Haines-Young 2011). This model understand the biophysical world to be composed of structures that provide ecological functions, these functions are in turn part of larger processes that create benefits to humans in services. This model allows for conversations about biophysical settings in part and in whole, and with multiple purposes and meanings. For example, tree canopy is a structure, which provides interception of rainfall as a function, that translates into a slowed the rate of stormwater. This same canopy also provides refugia for songbirds, another function. And thermoregulation for water bodies shaded, another function. This example differs from other ecosystem services approaches that typify the land cover and assign a value for services. This model is flexible to discuss what communities see in their natural systems, and to understand the feedbacks in a more pluralistic knowledge system (Miller et al. 2008).

Ocean Communities via Ecosystem Services

The ocean and coastal waters of the world are critically important to the health and welfare of much of the world's population. These areas are also a complex interface of terrestrial, estuarine, coastal, and human systems that are increasingly facing human development pressures from use and urbanization (Millennium Ecosystem Assessment 2005). Key to many of these is a call for integrated resource management, with intensive stakeholder involvement and science guided decision making (Allison, Lubchenco, and Carr 1998; Lubchenco 2010). To respond to this, we have developed participatory Geographical Information System (PGIS) tools to measure community values on the ocean. In fieldwork along the Oregon Coast, visual resources became a key indicator of community dependence on the ocean.

While the visual resource values were the explicit measure, participants in generating visual resource maps noted the other ecosystem services they considered as part of the process. Using GIS, community focus groups and outreach, we developed a quantification system for visual resources (Lanier, Hillmann, and Manson 2012). The measurements were based on collaborative development of scoring for seven biophysical attributes that then combined into a composite view value. This provided the viewshed measures for over 140 view points in Oregon – and directly assisted the state planning agency as it worked to location acceptable locations for ocean renewable energy development. This process demonstrated the ability to co-produce new scientific knowledge on visible areas, visual values, and community concerns by using ecosystem services.

Government-to-Government Consultation for Ecosystem Services

The ecosystem services framework holds the promise of recognizing the full spectrum of benefits humans derive from the environment, although cultural services have often received less attention. The failure to fully integrate cultural services into ecosystem services assessments results from the difficulty of conceiving and expressing their values in quantitative units - the basis for much application of the ecosystem services framework. More inclusive approaches to ecosystem services assessments may learn much from examining the existing regulatory framework that provides for the consideration of Native American cultural interests in certain decision-making processes. The National Environmental Policy Act (NEPA) and the National Historic Preservation Act (NHPA) are two key federal laws that require federal agencies to conduct government-to-government consultation with federally recognized Tribes in many undertakings that impact ecosystem services.

In the northern Oregon Cascade Range and Willamette Valley the consultation process has been used effectively to incorporate Native American traditional ecological knowledge, values (e.g. traditional human-ecological relationships, culturally significant places) and interests (e.g. managing for first foods, preservation of cultural landscapes) into a number of conservation and mitigation projects. Examples include the reintroduction of anthropogenic fire into camas prairie habitat in the Willamette National Forest (USFS 2013), establishing huckleberry enhancement projects on the Mount Hood National Forest (Rice 2011), and the use of Native American ecological knowledge in the restoration and ongoing management of Willamette Valley wetlands owned by federal and state agencies (Jones 2010). Each of these cases demonstrate that a process approach can be effective in identifying cultural ecosystem services, ascertaining their value to particular communities, providing relevant information to decision-makers, and integrating these values into conservation and mitigation projects.

Perceptions of Ecosystem Services at the Local Level: Green Infrastructure

Use of the ecosystem services framework to facilitate holistic land-use planning at the local level holds promise due to its explicit inclusion of both social and ecological factors alongside traditional economic values. However, the framework can also (inadvertently or intentionally) act to “de-historicize and de-ecologize debates on urbanized ecologies” (Ernstson & Sorlin 2012), allowing certain conceptions of the relationships between service types (i.e. between goods and services), and between humans and nature, to dominate. Differing perceptions of these connections and interdependencies could lead to drastically different management and maintenance regimes on the landscape, particularly in the case of infrastructure development (Edwards 2003).

Current work in Portland, Oregon seeks to describe the variety of regional conceptions of system linkages within stormwater management strategies at the local level through narrative interviews and survey techniques as a part of a larger analysis of contested discourses (Jacobs 2006, Hajer & Versteeg 2006) regarding the role of nature in cities. Of particular interest is the growing use and popularity of recently sanctioned green infrastructure facilities as an urban stormwater management tool (EPA 2004, EPA 2007). The many “spill-over” benefits (or ecosystem services) that green infrastructure facilities provide (Benedict &

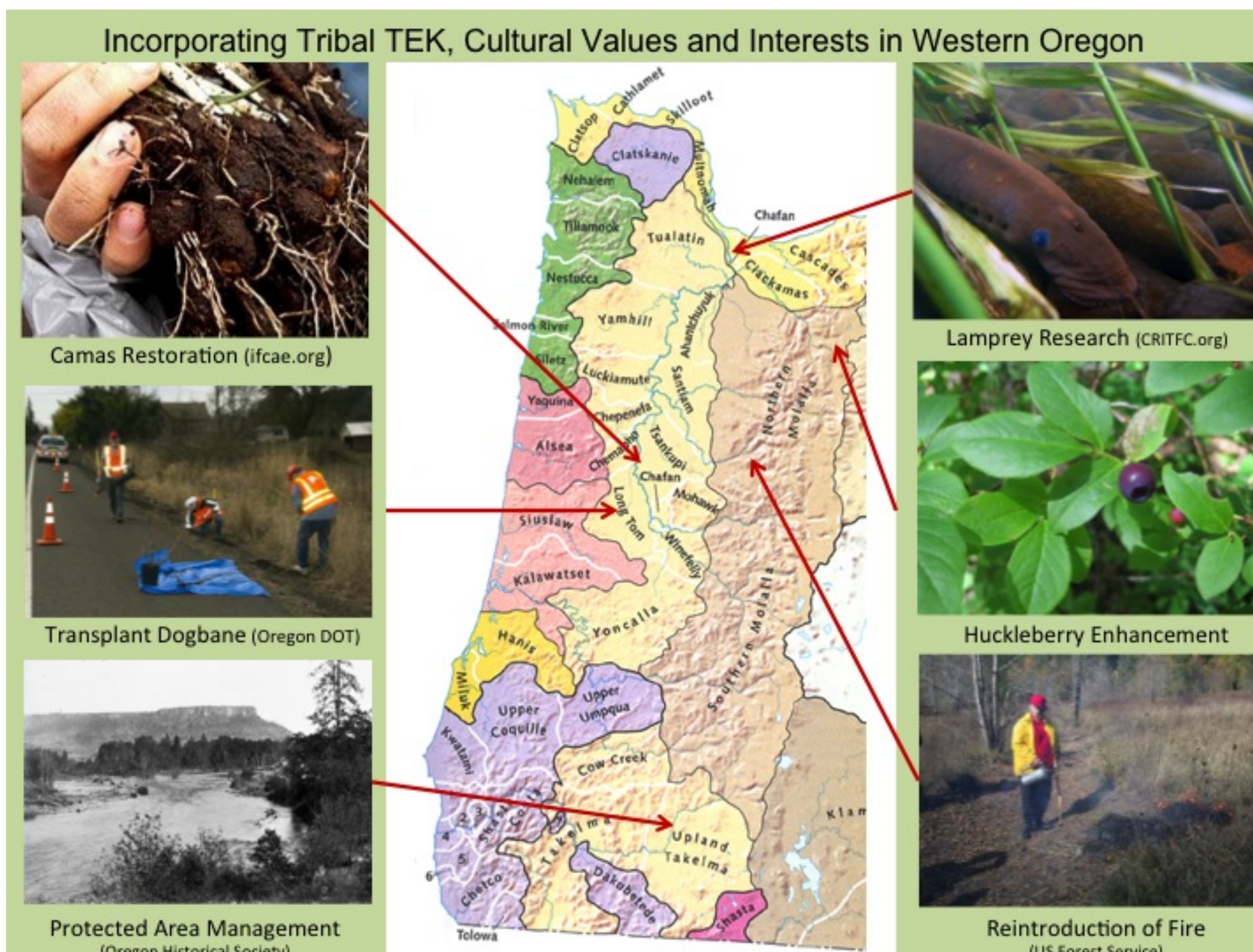
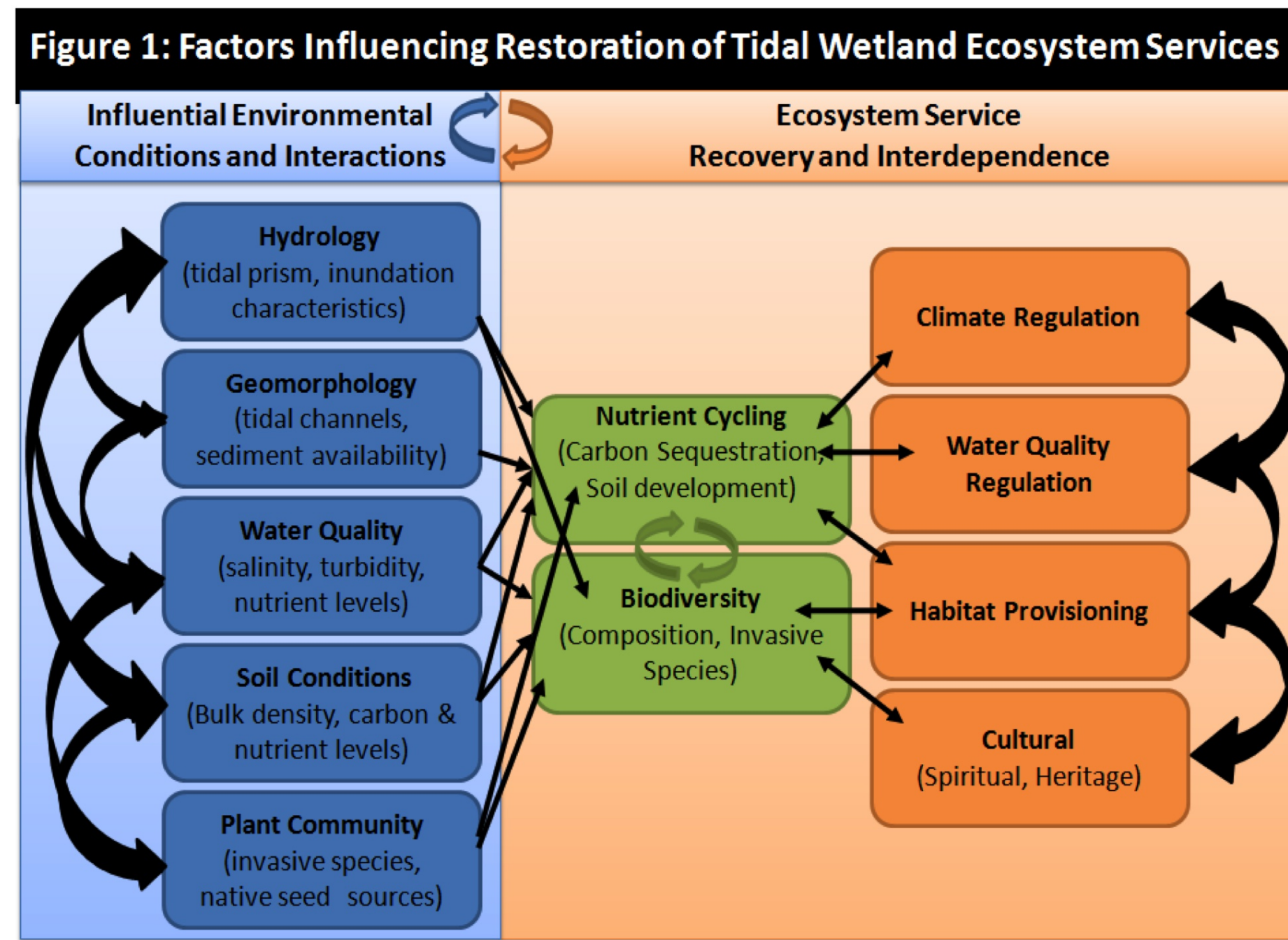


Figure 3: Tribal Ecosystem Services Components



Figure 5: Sunnyside Diversion Dam and Canal in Yakima River Basin (Lampman 2013)

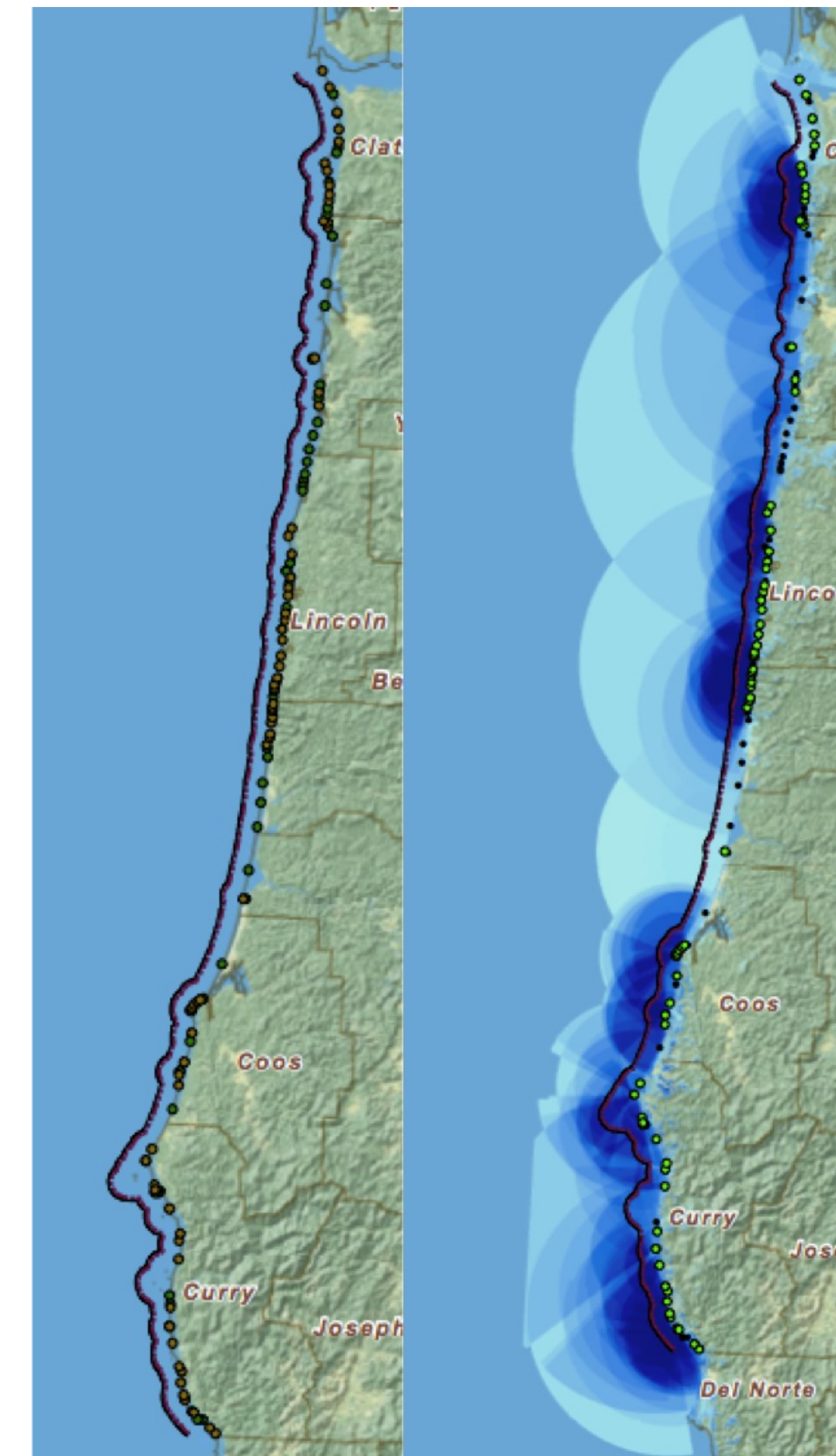


Figure 2: Visual Resource Maps

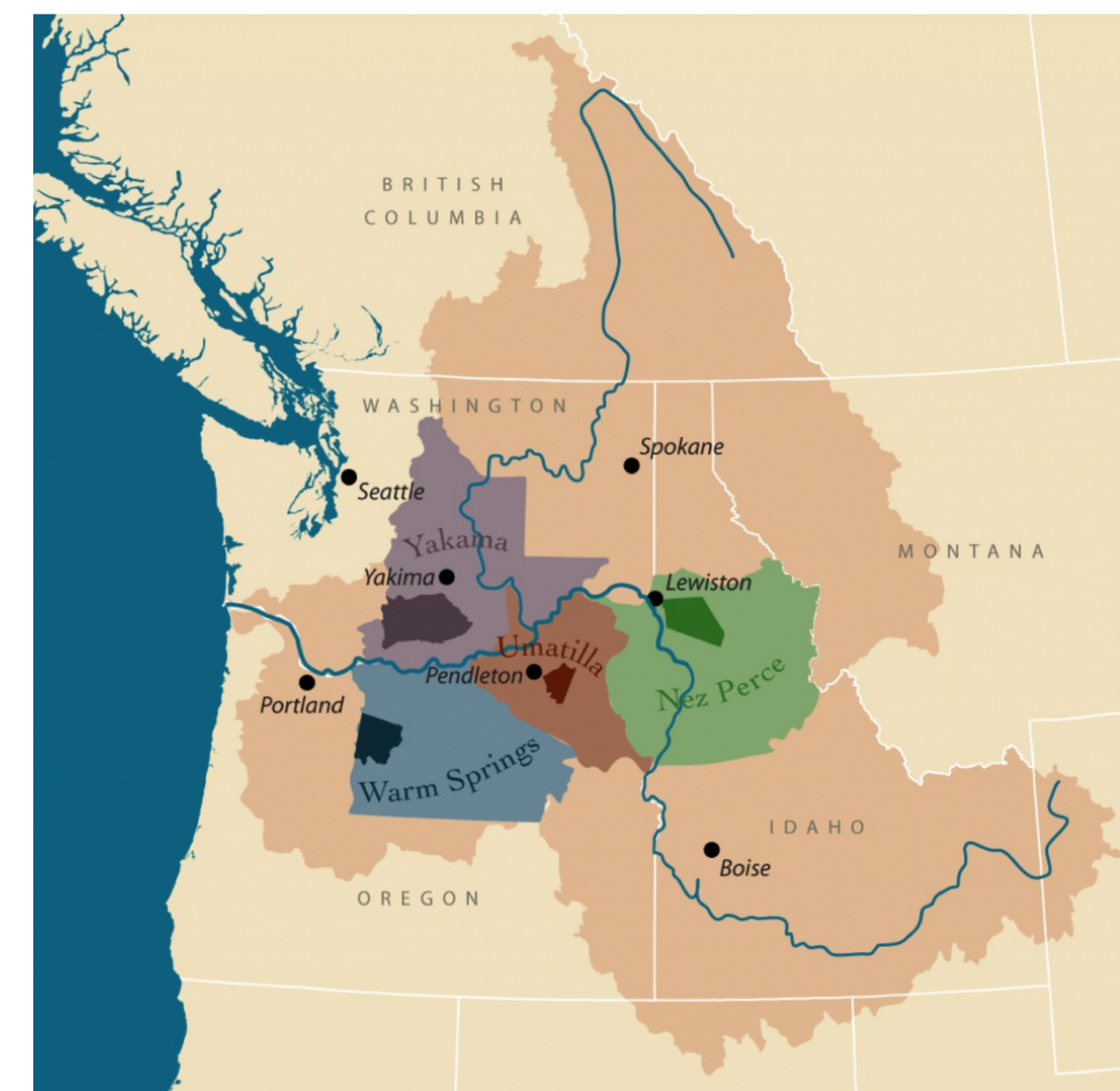


Figure 4: Regional Study Area and Tribal Nations (CRITFC.org)

McMahon 2006, Tzoulas et al. 2007) are often touted.

This research uses a Science, Technology, and Society (STS) approach, stressing the dialectic relationship between society and technology in which technology both shapes, and is shaped by, society (Winner 1986, Aibar & Bijker 1997, Edwards 2003). To explore how different perceptions of the benefits and interdependencies of green infrastructure may affect projects on the ground, a preliminary analysis of stormwater infrastructure plans and metrics (including ecological conservation and restoration plans) begins to uncover an ecosystem service governance discourse through the following research questions: How did the ecosystem services framework interact with the development of green infrastructure in Portland? In particular, does green infrastructure development reflect similar views on the role of nature in the city as the ecosystem services framework?

Social Fabric and Water Resources

The western United States is at great risk for significant effects to natural resources and the social fabric of both rural and urbanizing regions due to changes in landscape level ecological processes. This is especially dire for hydrologic resources as much of the West experiences water scarcity at various times throughout the year, and surface and groundwater rights can be contentious. When considering impacts to hydrology within a watershed, endless conflicting opinions exist on what is causing degradation: urbanization, deforestation, agriculture, grazing, and the list goes on and on. Most current research ignores that these regions have long, complex histories of human interaction with the landscape, and thus, a snapshot of primarily biophysical drivers of change is unlikely to reveal enough nuance for land managers and decision makers to move forward with informed decisions.

Similarly, it remains unclear how best to characterize the primary drivers of change to ecological processes at the landscape scale once we acknowledge that ecological systems are comprised of deep histories, legacies, and socio-ecological interrelationships. The Rogue River Basin in Oregon serves as a microcosm for the complex issues being experienced throughout the West. For example, pressures from urbanizing areas, changing climate, impacts to hydrological resources, and shifting economies and cultures are major issues within the Rogue River Basin and within much of the western US. Interestingly enough, despite the threatened status of the Rogue River Basin and its importance for biodiversity and hydrologic ecosystem services, there has been no research that specifically examines how coupled biophysical and social forces within the Rogue River Basin have affected hydrologic ecosystem services across time and ownership boundaries. This research focuses on a mixed methods approach to telling the stories of the Rogue River basin in hopes that a complexity of perspectives will illuminate the drivers of change on hydrological systems in the region.

Ecosystem Services and Tribal Wetland Management

The ecosystem services concept provides a holistic language to discuss management synergies and tradeoffs involved in restoring and protecting wetland habitats. Tribal natural resource agencies in the Columbia River Basin could use the ecosystem services framework to identify and manage culturally significant wetland ecosystem services currently impacted by landscape modifications and land-use change (including urbanization, agriculture, grazing, and dam construction) throughout the basin. Wetland ecosystems provide a myriad of services such as clean water, flood protection, wildlife habitat, livestock habitat and food, human food, fuel, and fiber. However, depending on the condition, land-use impacts, and management of these wetlands, some services may be more abundant or easier to restore than others.

Currently the management of these systems in the Pacific Northwest is singularly focused on endangered salmon habitat restoration and recovery, with little focus on the myriad of other values and ecosystem services these wetland ecosystems can provide. Tribal eco-cultural values are produced through the intertwined and interdependent ecosystem processes and functions of these wetland ecosystems and through direct tribal understanding and management of these interactions. Eco-cultural values are hard to isolate or separate from these biophysical properties, functions, and services provided by these socio-ecological landscapes. Research is evaluating if current endangered salmon focused (regulation driven) wetland restoration projects in the Lower Columbia River Estuary are providing tribal cultural ecosystem services (outside of salmon production) such as restoring tribal keystone plant species to these wetland habitats. Understanding how these regulatory projects align with tribal natural resource (eco-cultural) management goals will be fundamental to developing sustainable regional management strategies that promote tribal well-being.

Lamprey Conservation Research with Yakama Nation

Lampreys, an ancient fish over 450 million years old, are endemic to the Columbia River Basin System and are a vital cultural resource on par with salmon for treaty tribes of the Columbia River Basin. Lampreys are thought to play important ecological roles, serving as an important prey resource for other animals, such as salmonids, or birds. These ancient fish are now recognized to be in trouble, with populations either locally extirpated or at record low abundances in important tribal harvest areas in the Columbia River Basin system. Tribes are leading lamprey population supplementation efforts and collaborating with agencies and academic institutions to further core research on lamprey populations in rivers feeding the Columbia River System. In the Yakima River Basin, research is needed to identify whether or not the irrigation diversions/canals act as an “environmental trap” for multiple life stages of Pacific lamprey. The fish screens in place at irrigation canals may trap lamprey in diversion/irrigation canals. The impact of different types of fish screens on lamprey is also unknown. In collaboration with state agencies and Yakama fishery biologists and undergraduate students from Heritage University, our team, is joining a large pilot study this Spring and Summer to try to answer and quantify the extent that different life stages of lamprey enter and use a large irrigation canal, the Sunnyside Canal, on the Yakima River.

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