Protect and Enhance Healthy Ecosystems Resource Guide

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BIG Ideas

Issue Statement

Over the past two years, planners in our region have been meeting to discuss the complex and enormous challenges facing the Pacific Northwest and chart a course to the year 2050. Through a series of seminars, workshops, and task force meetings, we have developed Ten Big Ideas for Washington's Future, endorsed by the APA Washington chapter board. One of these ideas is to increase protection for healthy natural systems and enhance coordination of efforts to protect these areas and systems.

We are at a critical turning point in how we define the future of our state and our nation. We are facing unprecedented and complex challenges that must be addressed with clear and decisive action. These challenges include:

- The economic recession, with a "new normal" slow growth for years to come and limited public resources;
- Accelerating degradation of our natural resources resulting from population growth and unsustainable rates of consumption; and
- Global climate change that will further stress natural systems and cause severe effects on our communities.

Currently, it is difficult for our local plans to recognize the value and preserve the function of natural systems and also protect property rights. In many cases, environmental goals and regulations are in uncoordinated 'silos', such as the historic problems in coordinating the Shoreline Management Act (SMA) and Growth Management Act (GMA), or in assuring that watershed planning is also reflected in critical areas regulations. Our current laws do not address the changes in natural systems likely to result from climate change, such as shrinking habitats, warming stream and ocean temperatures, rising sea levels and increased flooding.

We need an approach that assures natural systems are evaluated and coordinated on a landscape level by moving beyond the critical areas and resource lands approach currently in GMA to recognize ecosystems and the value of the services they provide, such as flood hazard mitigation, water storage, carbon storage, mitigating the impacts of severe storms, and water quality protection. In most cases, natural systems perform these functions at less cost than engineered systems.

Several state agencies have completed studies and mapped resources that will help with this effort. In addition, local and regional governments have been exploring different approaches to defining the benefits of healthy natural systems – such as the ecosystem services approach. This paper summarizes recent studies and resources available to help your jurisdiction identify critical environmental resources and systems and develop policies and ordinances to protect them. In addition, state agencies (particularly

WDFW, Ecology and Commerce) have designated regional staff who can help local governments understand the relevant maps and studies and consider the best way to incorporate the information in plans and ordinances.

Resources for Local Governments Updating Comprehensive Plans and Critical Areas Ordinances

The attached list of resources related to identifying and protecting natural resources were assembled from a variety of sources. It includes both "Critical Areas" identified in the Growth Management Act (GMA) – aquatic resources, wetlands, critical aquifer recharge areas, geological hazard areas, fish and wildlife habitat areas – but also related topics including landscape analysis, ecosystem services and stormwater management. Planners will understand that there is a lot of overlap among these topic areas and resources in one list may help with other topics. For example, riparian areas are likely to include wetlands, frequently flooded areas, aquifer recharge areas, as well as streams and critical habitat.

Landscape analysis resources are included because scientists and planners increasingly recognize that analysis at the jurisdictional level (city, county, even state) does not adequately reflect the importance of connectivity of habitats across larger regions. What may appear to be a small area of poorer quality habitat in one jurisdiction, may in fact be an important corridor between habitats that is critical to their functioning. It is important to understand the larger picture in order to determine the importance of local resources.

Ecosystem services analysis information is included because it is a way to consider the costs and benefits of man-made or engineered systems like stormwater management in comparison to natural systems like streams and floodplains. Generally, natural systems are cheaper to maintain and provide more than one service. For example, streams channel stormwater, allow for aquifer recharge, provide habitat for fish and wildlife and offer recreational opportunities for residents. If they are wooded, they can also help cool the air and reduce carbon dioxide in the area.

The best general guidance to identifying and protecting critical areas is available from the **Growth Management Services, Local Government and Infrastructure Division, Commerce Department.** Their GMS Guidebook: Critical Areas Assistance Handbook and

Appendices (2003) can help planners develop locally appropriate programs to designate and protect critical areas. They also have a guidebook with citations of recommended “best available science” for designating and protecting critical areas.

The Municipal Research and Services Center (MRSC.org) can provide examples of plans and ordinances from other local governments that address critical areas identification and protection, sustainability, and landscape analysis.

Landscape Analysis

Title	Agency/Authors	Date	Where	Summary
Connected Landscape Project: Statewide Analysis	WA Wildlife Habitat Connectivity Working Group	Dec, 2010	http://www.waconnected.org	Analysis and mapping of habitats and values with emphasis on connectivity
Selecting Mitigation Sites Using a Watershed Approach (Western Washington)	WA Dept. of Ecology	2009	https://www.ecology.wa.gov/publications Publication 09-06-032	Guidance on prioritizing wetlands mitigation based on watershed analysis
Selecting Mitigation Sites Using a Watershed Approach (Eastern Washington)	WA Dept. of Ecology	Nov 2010	https://www.ecology.wa.gov/publications Publication 10-06-007	Guidance on prioritizing wetlands mitigation based on watershed analysis
Puget Sound Characterization – Volume 1 The Water Resource Assessments	WA Dept of Ecology	April 2012	https://www.ecology.wa.gov/publications Publication 11-06-016	A set of water and habitat assessments that compare areas within a watershed for restoration and protection value. Useful to local governments for setting priorities and planning.
Watershed Characterization and Analysis of South Lewis County	WA Dept. of Ecology	Aug 2009	https://www.ecology.wa.gov/publications Publication 09-06-025	A set of water and habitat assessments that compare areas within a watershed for restoration and protection value. Useful to local governments for setting priorities and planning.
Watershed Characterization and Analysis of Clark County	WA Dept. of Ecology	July 2009	https://www.ecology.wa.gov/publications Publication 09-06-019	A set of water and habitat assessments that compare areas within a watershed for restoration and protection value. Useful to local governments for setting priorities and planning.
Landscape Planning for Washington's Wildlife: Managing Biodiversity in Developing Areas	WA Dept of Fish & Wildlife	Dec 2009		A Priority Habitat and Species guidance document for prioritizing areas for protection and enhancement.

Watershed plans and management guidance	WA Dept. of Ecology	Various depending on area	https://www.ecy.wa.gov/watershed/index.html	Information on planning in each WRIA and steps to implement each plan.
Title	**Agency/Authors**	**Date**	**Where**	**Summary**
Washington Biodiversity Conservation Strategy	Washington Biodiversity Council	2007		A landscape look at the state of Washington with recommendations for protecting and enhancing biodiversity in various areas.

WDFW has conducted **Local Habitat Assessments** (LHAs) for some counties in Washington. An LHA is typically conducted in partnership with local government planning staff or a local planning group. The LHA provides a GIS map and report that highlights high quality habitat areas at a broad scale (countywide) or at finer scales (watershed or sub-area). LHAs can be used to identify areas of local importance to fish and wildlife resources, and can also be used to inform land use designations, UGA expansions, and other long-range planning work. See the tool and examples at: http://www.wdfw.wa.gov/habitat/lha/.

Ecosystem Services

Ecosystem services are the benefits or values that natural systems provide for themselves and for human society. A wide variety of assessments of ecosystem services have been conducted – the more comprehensive tend to be more expensive. These assessments provide a basis for evaluating ways to address issues such as flood management, water quality, air quality, and recreation. Generally, protecting and enhancing natural systems is less expensive and provides more benefits than engineered systems.

Title	Agency/Authors	Date	Where	Summary
Principles to Guide Assessments of Ecosystem Services Values	Ervin, D., S. Vickerman, S. Ngawhika, F. Beaudoin, S. Hamlin, E. Dietrich, P. Manson, J. Schoenen	2013		Ecosystem services are the benefits that nature provides. Myriad assessments of the value of nature's benefits are being conducted by public and private organizations, and they vary considerably in their coverage of ecological, social, and economic effects, and the rigor with which the values are assessed. This paper provides 10 principles to guide assessments.
Ecosystem Services Decision Support: A Living Database of Existing Tools, Approaches and Techniques for Supporting Decisions Related to Ecosystem Services - Science Brief	EPA Database US EPA	2009, et. seq.	Publication No. EPA/600/R-09/102	A database of tools, approaches, and techniques used in ecosystem services analysis.
Ecosystem Services Fact Sheet	Ecological Society of America	No date	www.esa.org/ecoservices/comm/body.comm.fact.ecos.html	Brief, clearly written summary and definition of ecosystem services and how to evaluate them. Useful for public discussions
Valuing Ecosystem Services: Capturing	US Forest Service	Feb 2007	https:/www.fs.fed.us/ecosystemservices	Summary of market-based approach to protecting ecosystem services.

the True Value of Nature's Capital				
Title	**Agency/Authors**	**Date**	**Where**	**Summary**
Caring for Our Natural Assets: An Ecosystem Services Perspective	USDA Forest Service Sally Collins & Elizabeth Larry	Oct 2007	https:/www.fs.fed.us/ecosystemservices	Summary of steps the FS has taken and could take to protect forest ecosystems and the services they provide to people and wildlife.
What are ecosystem services	The Willamette Partnership	No date	www.willamettepartnership.org	Summary and examples of valuing ecosystem services to enhance conservation of natural systems.
The Puyallup River Watershed: An Ecological Economic Characterization	Earth Economics	June 2011	www.eartheconomics.org/resources	A characterization of the Puyallup River watershed to be used to evaluate the best way to resolve issues such as flooding, water quality, water supply, habitat restoration
Integrating ecosystem services into land use planning in Hawai'i	The Economics of Ecosystems & Biodiversity	2010	www.teebweb.org/resources/case-studies	A summary of the work of the state of Hawai'i to evaluate ecosystem services and consider them in land use planning
Multiple benefits of urban ecosystems: spatial planning in Miami USA	The Economics of Ecosystems & Biodiversity	2010	www.teebweb.org/resources/case-studies	A summary of the ecosystem evaluation and how it was used in land use planning in Miami Florida
River Restoration to avoid flood damage	The Economics of Ecosystems & Biodiversity	2010	www.teebweb.org/resources/case-studies	A summary of the efforts of Napa County CA to reduce flood damage and protect ecosystem services in Napa CA
Regional Open Space Partnership	Regional Open Space Strategy (ROSS)	2014	http://www.openspacepugetsound.org/	A partnership of local, state and federal agencies, non-profit organizations and private corporations used an ecosystem services approach to identify and evaluate open space benefits and strategies to protect them in the Puget Sound

Critical Areas

Aquatic Habitat/ Streams and Rivers

Title	Agency/Authors	Date	Where	Summary
Stream Types	WA Dept of Natural Resources (DNR)	2011 et seq	http://www.dnr.wa.gov/ResearchScience	Streams are classified based on their use by fish, particularly anadramous fish. Stream types are updated periodically based on scientific research.
Protecting Nearshore Habitat Functions in Puget Sound	Aquatic Habitat Working Group and Envirovision, Herrera	2009		Guidance for near-shore habitat protection and development.
Protecting Aquatic Ecosystems: A Guide for Puget Sound Planners to Understand Watershed Processes	WA Dept of Ecology (Stanley et. al.)	2005	https://www.ecology.wa.gov/publications	Watershed processes
Watershed Processes and Aquatic Resources: A Literature Review	Christopher May for WDFW	2009	https://www.wdfw.wa.gov/hab	Summarizes findings from the scientific literature on landscape and aquatic processes and how development impacts these processes, resulting in changes to habitat and processes themselves.

Wetlands

Information on protecting and managing wetlands is available from Ecology's website at:
https://www.ecology.wa.gov/programs/sea/wetlands.
Ecology is encouraging local governments to incorporate a **watershed-based approach** to wetland regulation and land use planning. Information and links to watershed characterization tools are available at:
https://www.ecologyy.wa.gov/mitigation/landscapeplan.html

Title	Agency/Authors	Date	Where	Summary
Wetlands in Washington State	Ecology	April 2005	https://www.ecology.wa.gov/sea/wetlands	Guidance for classifying, protecting and managing wetlands in Washington.
WA State Wetlands Rating System for Western Washington	Ecology	Aug 2004	https://www.ecology.wa.gov/sea/wetlands	Guidance for classifying wetlands based on their sensitivity to disturbance, significance, rarity, our ability to replace them, and the functions they provide. Wetlands are grouped into four categories that are used to determine regulatory criteria for avoidance, width of buffers, and mitigation ratios. The rating systems have been deemed Best Available Science by Growth Management Hearings Boards.
WA State Wetlands Rating System for Eastern Washington	Ecology	Aug 2004	https://www.ecology.wa.gov/sea/wetlands	Guidance for classifying wetlands based on their sensitivity to disturbance, significance, rarity, our ability to replace them, and the functions they provide. Wetlands are grouped into four categories that are used to determine regulatory criteria for avoidance, width of buffers, and mitigation ratios. The

				rating systems have been deemed Best Available Science by Growth Management Hearings Boards.
Title	**Agency/Authors**	**Date**	**Where**	**Summary**
Wetlands and CAO updates: Guidance for Small Cities (Western Washington)	WA Dept. of Ecology	Oct 2012	https://fortress.wa.gov/ecy/publications publication number 12-06-002	Guidance for mapping wetlands and developing a wetlands protection program and ordinances.
Wetlands and CAO updates: Guidance for Small Cities (Eastern Washington)	WA Dept. of Ecology	Oct 2012	https://fortress.wa.gov/ecy/publications publication number 12-06-001	Guidance for mapping wetlands and developing a wetlands protection program and ordinances.

Stormwater Management and Frequently Flooded Areas

While stormwater is not a critical area, managing stormwater is important to avoid impacts to critical areas. Many jurisdictions must manage stormwater according to general permits issued by the Department of Ecology Water Quality Program under the NPDES Phase 1 and Phase 2 standards. Frequently flooded areas are considered critical areas and Comprehensive Plans should address drainage, flooding, and stormwater run-off according to RCW 36.70A.070 (1).

Title	Agency/Authors	Date	Where	Summary
Stormwater Management for Western Washington	Ecology	2005, et. seq.	https://www.ecology.wa.gov	The Ecology stormwater management manuals are considered as Best Available Science guidance for all the critical areas affected by altered hydrology and water quality impacts of new development and redevelopment.
Stormwater Management for Eastern Washington	Ecology	2004, et. seq.	https://www.ecology.wa.gov	The Ecology stormwater management manuals are considered as Best Available Science guidance for all the critical areas affected by altered hydrology and water quality impacts of new development and redevelopment.
Flood Hazard Risk Mapping, Assessment & Planning (RiskMAP) and Flood Insurance Rate Maps (FIRM)	Federal Emergency Management Agency (FEMA)	Varies by area	FEMAMapSpecialist@riskmapcds.com or 1-877-FEMA MAP	Flood hazard maps and information on river flow, storm tides, rainfall, topography, hydrologic/hydraulic analysis for assessing risk and appropriate measures to avoid flooding and mitigate flood impacts.

Title	**Agency/Authors**	**Date**	**Where**	**Summary**
Title	**Agency/Authors**	**Date**	**Where**	**Summary**
Biological Opinion on National Flood Insurance Program	National Marine Fisheries Service	2008	https://pcts.nmfs.noaa.gov	In 2008, FEMA received a Biological Opinion that the implementation of the NFIP causes jeopardy to listed species through adverse habitat modifications. The BO includes a list of Reasonable and Prudent Alternatives that are required of local governments in the Puget Sound area that participate in NFIP.
Low Impact Development – Technical Guidance Manual for Puget Sound	Puget Sound Action Team Hinman	2005	www.psp.wa.gov/documents	Guidance on how to maintain hydrologic function in developing areas.

Critical Aquifer Recharge Areas

The Pacific Northwest can feel like an area of endless water supply, but climate change is likely to alter that. Recognizing that water resources are limited, it is important to protect those we rely on. The Department of Ecology and Department of Health as well as the Environmental Protection Agency can provide help.

Title	Agency/Authors	Date	Where	Summary
Critical Aquifer Recharge Areas: Guidance Document	Laurie Morgan Dept of Ecology	Mar 2005	https://fortress.wa.gov/ecy/publications Publication No. 05-10-028	Guidance for designating CARA and developing codes to protect them.
Citizen's Guide to Groundwater Protection	US EPA Office of Ground-water Protection Jan Gallagher	Apr 1999	https://www.epa.gov	Introduction to groundwater sources, how it is stored and moves, water quality and legal frameworks for protecting groundwater.

Fish and Wildlife Habitat Conservation Areas

Title	Agency/Authors	Date	Where	Summary
Priority Habitat & Species Program (PHS)	WDFW	Various Updated regularly	http://www.wdfw.wa.gov/hab/phs	The PHS program includes a list of species and habitats that WDFW considers vulnerable to development activities, management recommendations to help planners protect these species and habitats, and maps and data on known species and habitat locations.
Salmonscape	WDFW	Updated regularly	http://wdfw.wa.gov/mapping/salmonscape	Salmonid habitat conditions and distribution of salmonid stocks in Washington
Land Use Planning for Salmon, Steelhead and Trout	WDFW	Oct 2009	http://wdfw.wa.gov/publications/00033	Guidance on land use regulation and development planning near streams supporting salmon, steelhead & trout

Geological and other Natural Hazards

Title	Agency/Authors	Date	Where	Summary
Volcanoes, Earthquakes, Tsunamis, Coal Mine Subsidence	Tim Walsh WA Dept of Natural Resources (DNR)		www.dnr.wa.gov/ResearchScience	Guidance on avoiding and mitigating risk from these and other geological hazards
Landslides in Washington State	Emergency Management Division (EMD)		www.emd.wa.gov/hazards/landslides	Summary of the causes of landslides with maps of landslide prone areas.
Title	**Agency/Authors**	**Date**	**Where**	**Summary**
Grays Harbor County All Hazards Guide	Grays Harbor County	2009-2010	www.emd.wa.gov/hazards/documents	Guide for residents and businesses to the most likely hazards in Grays Harbor County with advice on how to prepare and respond should one strike.
Optional Comprehensive Plan Element for Natural Hazard Reduction	WA Dept of Commerce	1999	www.commerce.wa.gov/growthmanagement	Model comprehensive plan element for natural hazard reduction.