Quantifying

Cultural

and

Social

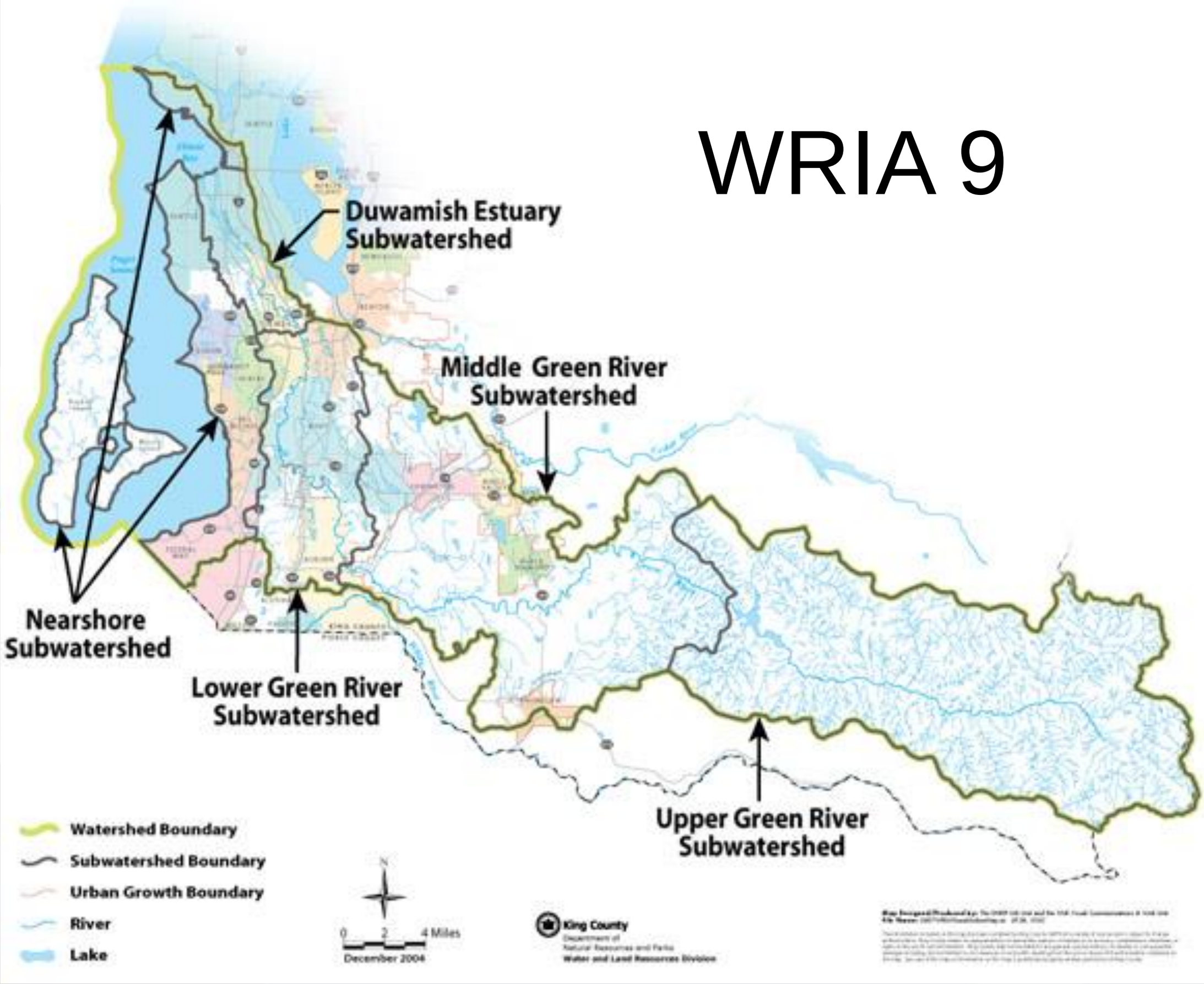
Ecosystem Services

In the urban context

Zachary Christin
Project Lead

EARTH ECONOMICS

WRIA 9


Duwamish Estuary Subwatershed
Middle Green River Subwatershed
Nearshore Subwatershed
Lower Green River Subwatershed
Upper Green River Subwatershed
Watershed Boundary
Subwatershed Boundary
Urban Growth Boundary
River
Lake
N
0 2 4 Miles
December 2004
King County
Department of Natural Resources and Parks
Water and Land Resources Division

What are Cultural Ecosystem Services?

Cultural	Social
Health	Community

Services → Benefits

Urban ←→ Rural

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Provisioning Services

ENERGY AND RAW MATERIALS
Providing fuel, fiber, fertilizer, minerals, and energy

FOOD
Producing crops, fish, game, and fruits

MEDICINAL RESOURCES
Providing traditional medicines, pharmaceuticals, and assay organisms

ORNAMENTAL RESOURCES
Providing resources for clothing, jewelry, handicraft, worship, and decoration

WATER SUPPLY
Provisioning surface and ground water for drinking, irrigation, and industrial use

Information Services

AESTHETIC INFORMATION
Enjoying and appreciating the presence, scenery, sounds, and smells of nature

CULTURAL AND ARTISTIC INSPIRATION
Using nature as motifs in art, film, folklore, books, cultural symbols, architecture, and media

RECREATION AND TOURISM
Experiencing natural ecosystems and enjoying outdoor activities

SCIENCE AND EDUCATION
Using natural systems for education and scientific research

SPIRITUAL AND HISTORICAL
Using nature for religious and spiritual purposes

Regulating Services

AIR QUALITY
Providing clean, breathable air

BIOLOGICAL CONTROL
Providing pest and disease control

CLIMATE STABILITY
Supporting a stable climate through carbon sequestration and other processes

MODERATION OF EXTREME EVENTS
Preventing and mitigating natural hazards such as floods, hurricanes, fires, and droughts

POLLINATION
Pollinating wild and domestic plant species

SOIL FORMATION
Creating soils for agricultural use and ecosystems integrity; maintaining soil fertility

SOIL RETENTION
Retaining arable land, slope stability, and coastal integrity

WASTE TREATMENT
Improving soil, water, and air quality by decomposing human and animal waste and removing pollutants

WATER REGULATION
Providing natural irrigation, drainage, ground water recharge, river flows, and navigation

Supporting Services

GENETIC RESOURCES
Improving crop and livestock resistance to pathogens and pests

HABITAT AND NURSERY
Maintaining genetic and biological diversity, the basis for most other ecosystem functions; promoting growth of commercially harvested species

Identifying Cultural Services and Benefits

Existing Typologies

SolVES Classification
Aesthetic value
Biological diversity value
Cultural value
Economic value
Future value
Historic value
Intrinsic value
Learning value
Life Sustaining value
Recreation value
Spiritual value
Therapeutic value

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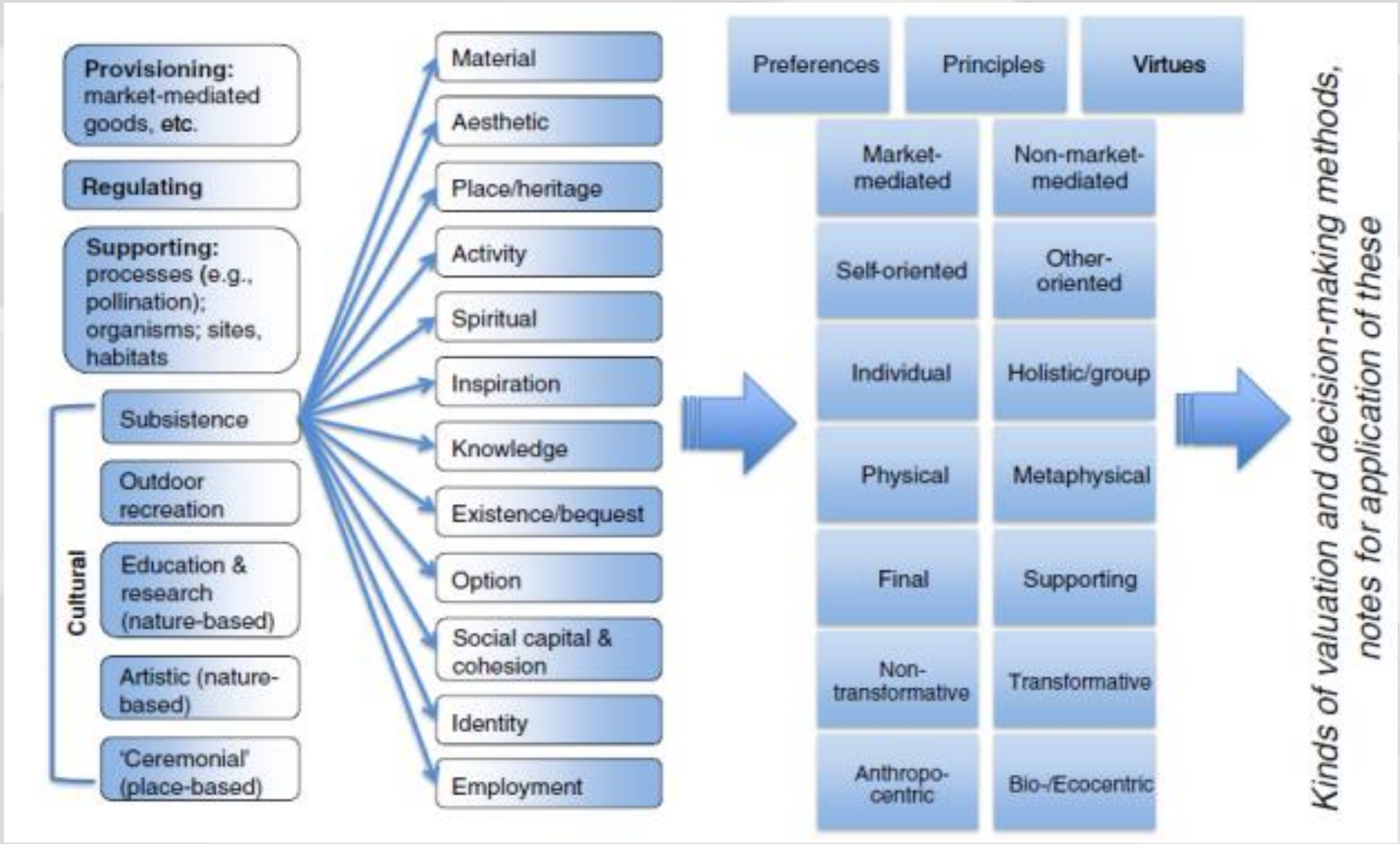
Identifying Cultural Services and Benefits

Existing Typologies



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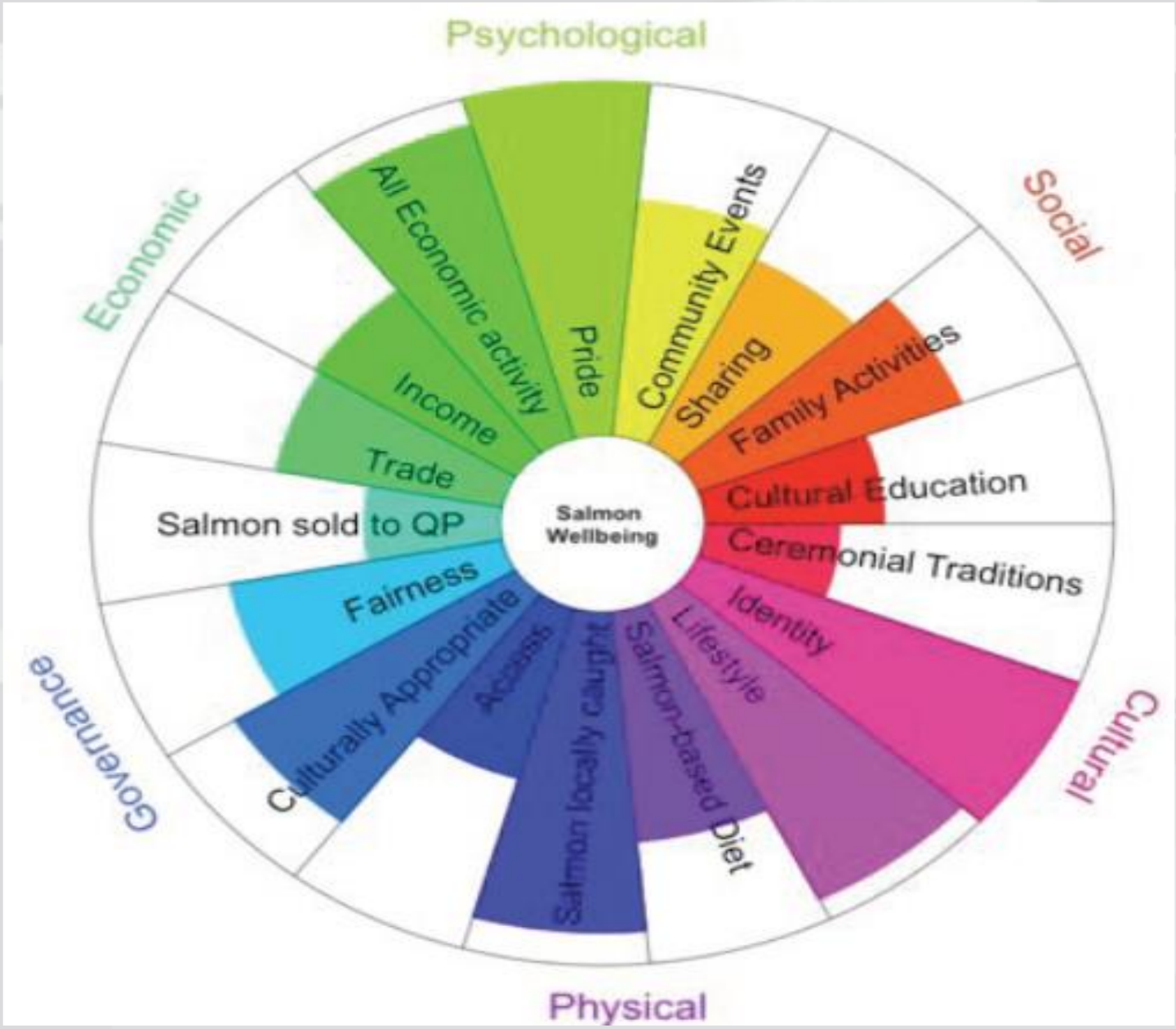
Identifying Cultural Services and Benefits

Existing Typologies



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Identifying Cultural Services and Benefits

Existing Typologies

RESEARCH THEMES

- Livable Cities
- Social Strengths
- Local Economics
- Place Attachment & Meaning
- Crime & Public Safety
- Safe Streets
- Active Living
- Reduced Risk
- Wellness & Physiology
- Healing & Therapy
- Mental Health & Function
- Work & Learning
- Lifecycle & Gender

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“New” Cultural Service Framework

Access to Local Food	**Access to Foraged Goods**	**Access to Clean Water, Food, and Air**	**Active Living and Exercise**	**Aesthetic**
Biological Diversity	**Communication**	**Community Cohesion and Social Capital**	**Crime and Public Safety**	**Cultural Events**
Job Satisfaction	**Education**	**Future**	**Heritage, Identity and Place**	**Historic**
Intrinsic	**Mental Health and Capacity**	**Physical Health and Recovery**	**Recreation**	**Reduced Physical Risk**
Spiritual and Inspirational	**Therapeutic**			

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Measuring Cultural Services

Cultural Service	Data Proxy or Analytic Tool
Spiritual and Inspirational	Survey, SolVES, Coding Narrative
Crime and Public Safety	Spatial Data, CHIA Score
Community Cohesion and Social Capital	Volunteer Data
Mental Health and Capacity	Park Proximity Map (ARIES), CHIA Score, Tree Canopy Cover
Cultural Events	Survey Data, Coding Narrative

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Monetization vs Quantification

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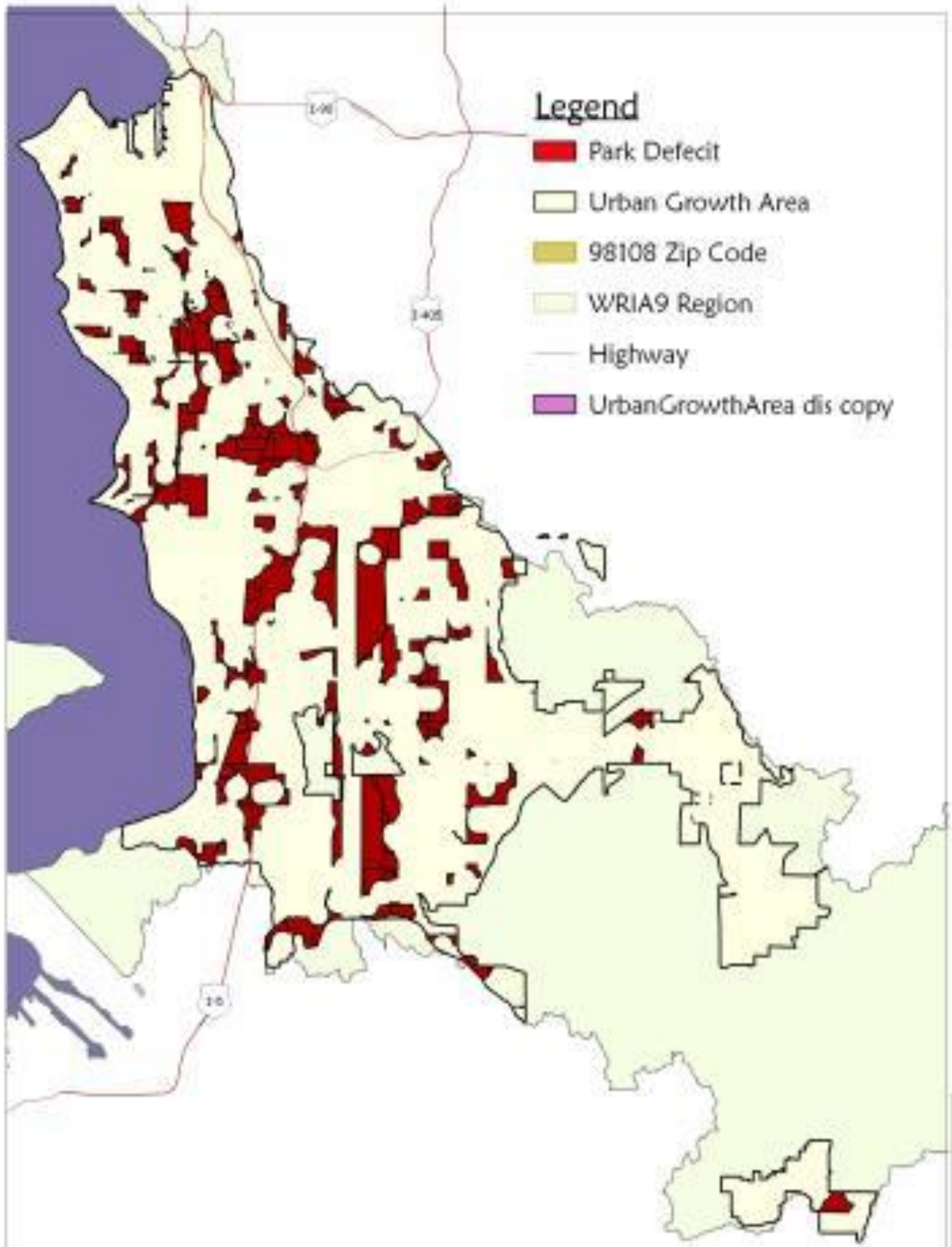

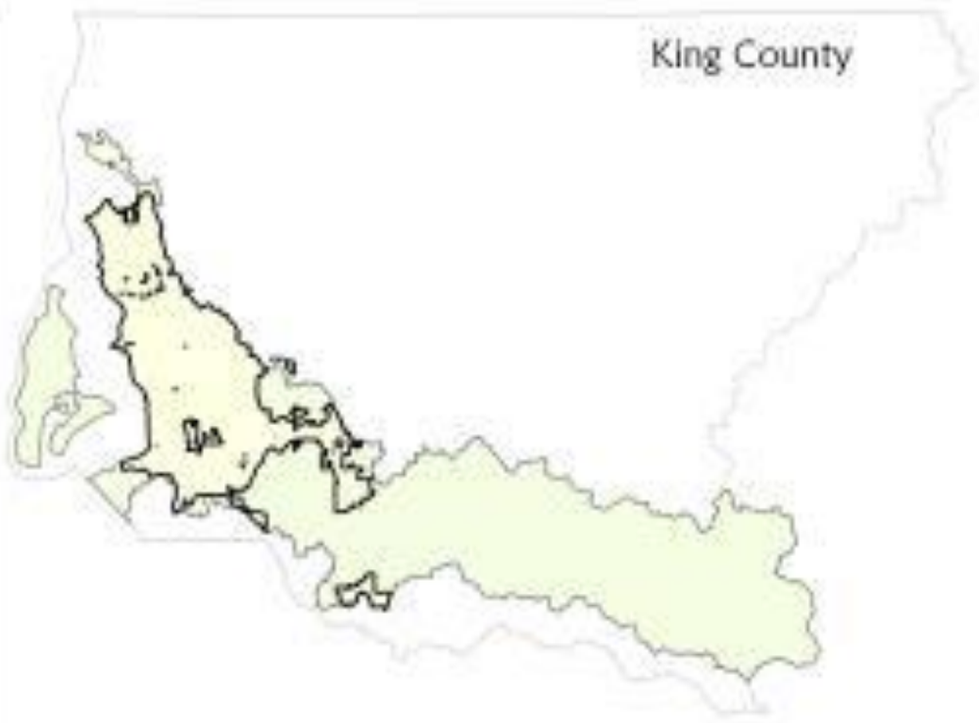

Areas With Park Defecit in the Urban Growth Area of King County Washington

Areas with Park Defecit are defined as those areas within the City Urban Growth Area whose number of households living below poverty level are higher than the King County Average that are greater than one-quarter mile walking distance from current parks.

4 0 4 8 miles

WA State Plane North NAD83 Lambert Conformal Conic

Sources
Map: Rebecca Putman, Volunteer GIS - Earth Economics
Data: United States Census Bureau 2006-2010 ACS 5-year Estimate by Block Group, King County Data Portal, Washington State Department of Natural Resources, Washington State Department of Transportation

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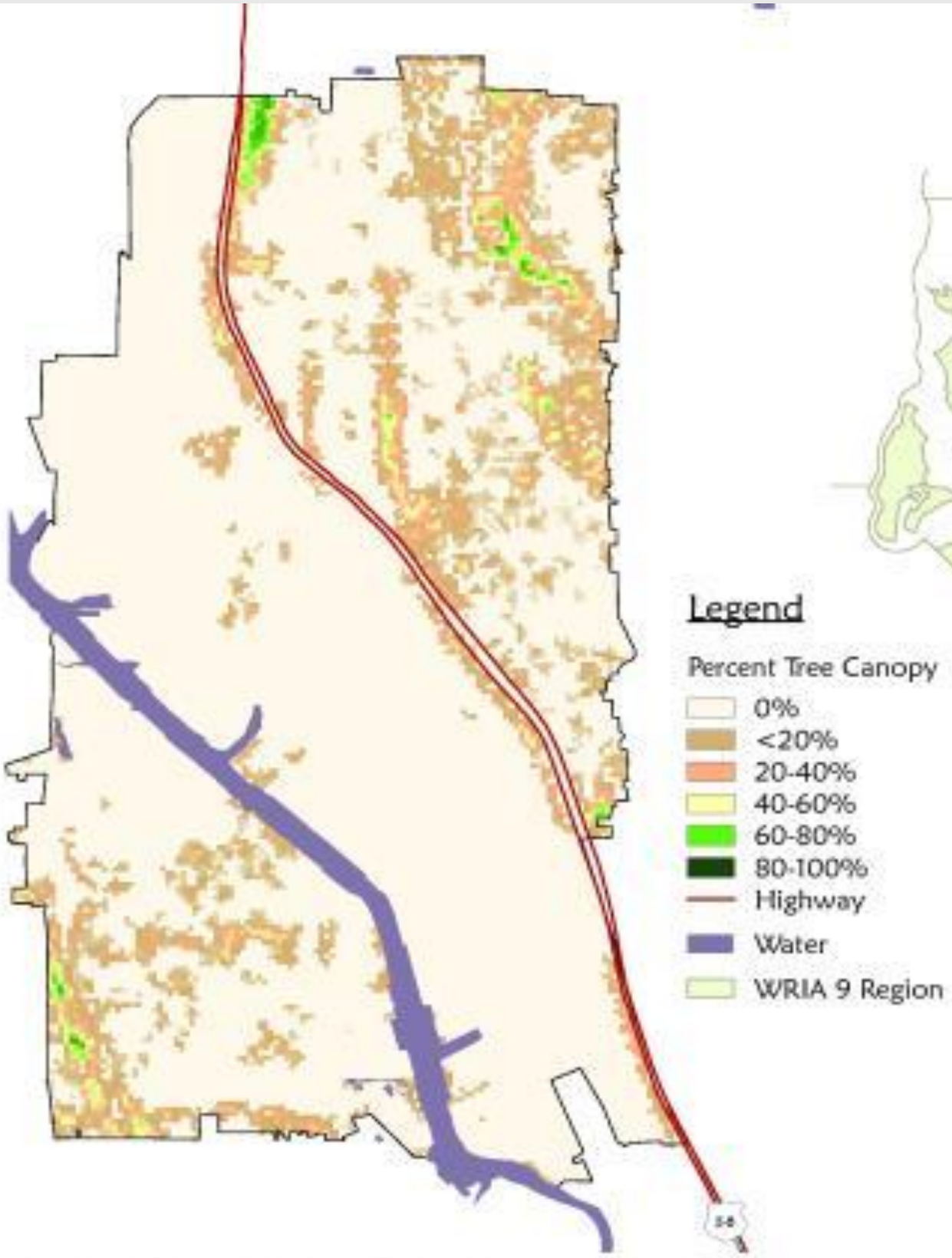

2011 Percent Tree Canopy In the 98108 Zip Code of King County Washington

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ESV Change from 2001 to 2011

Land Cover Type	Acreage change from 2001 to 2011	Ecosystem Value from 2001 to 2011 ($/Year - Low Value)	Ecosystem Value from 2001 to 2011 ($/Year - High Value)
Hay/Pasture	-992	**($456,320)**	**($596,192)**
Deciduous Forest	-365	**($282,875)**	**($761,025)**
Evergreen Forest	429	**$232,518**	**$3,424,707**
Mixed Forest	-1,045	**($566,390)**	**($8,342,235)**
Grasslands/Herbaceous	-1,211	**($512,253)**	**($30,236,248)**
Riparian	298	**$20,860**	**$1,839,554**
Shrub/Scrub	840	**$166,320**	**$166,320**

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Tree Canopy Cover from 2001 to 2011

Density	Acres 2001	% WRIA9	Acres 2011	% WRIA9	Acre Change	% Acre Change
0–20%	145,259	39.67%	107,255	29.29%	-38,004	-10.38%
20–40%	21,601	5.90%	42,132	11.51%	20,531	5.61%
40–60%	16,404	4.48%	37,450	10.23%	21,046	5.75%
60–80%	38,401	10.49%	112,753	30.80%	74,352	20.31%
80–100%	144,471	39.46%	66,546	18.18%	-77,925	-21.28%

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Ecosystem Service Value of MPT Parks After Restoration

High	$13.0 Million
Low	$3.6 Million

Each Year

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Social and Human Capital

Education

- Child Education
- Academic Projects

$1.4 million

Social Capital

- Volunteerism
- Donations

$6.9 million

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Community and Human Health

Community Cohesion

- Tacoma Garden Club
- Flower Societies
- Neighborhood Councils

Mental Health

- ADHD Treatment
- Stress Relief
- Noise Avoidance

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Metro Parks Tacoma Bond: $198 Million

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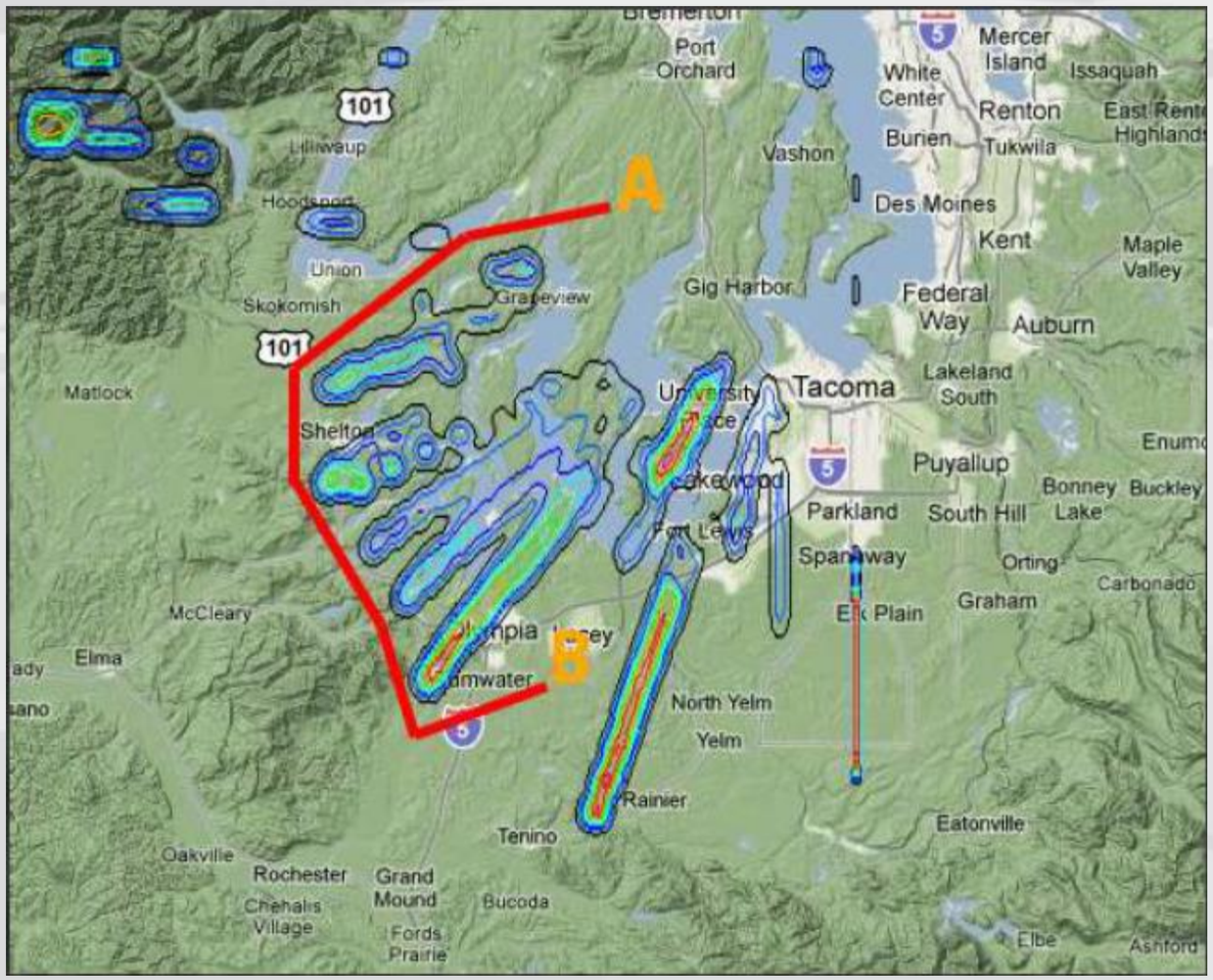
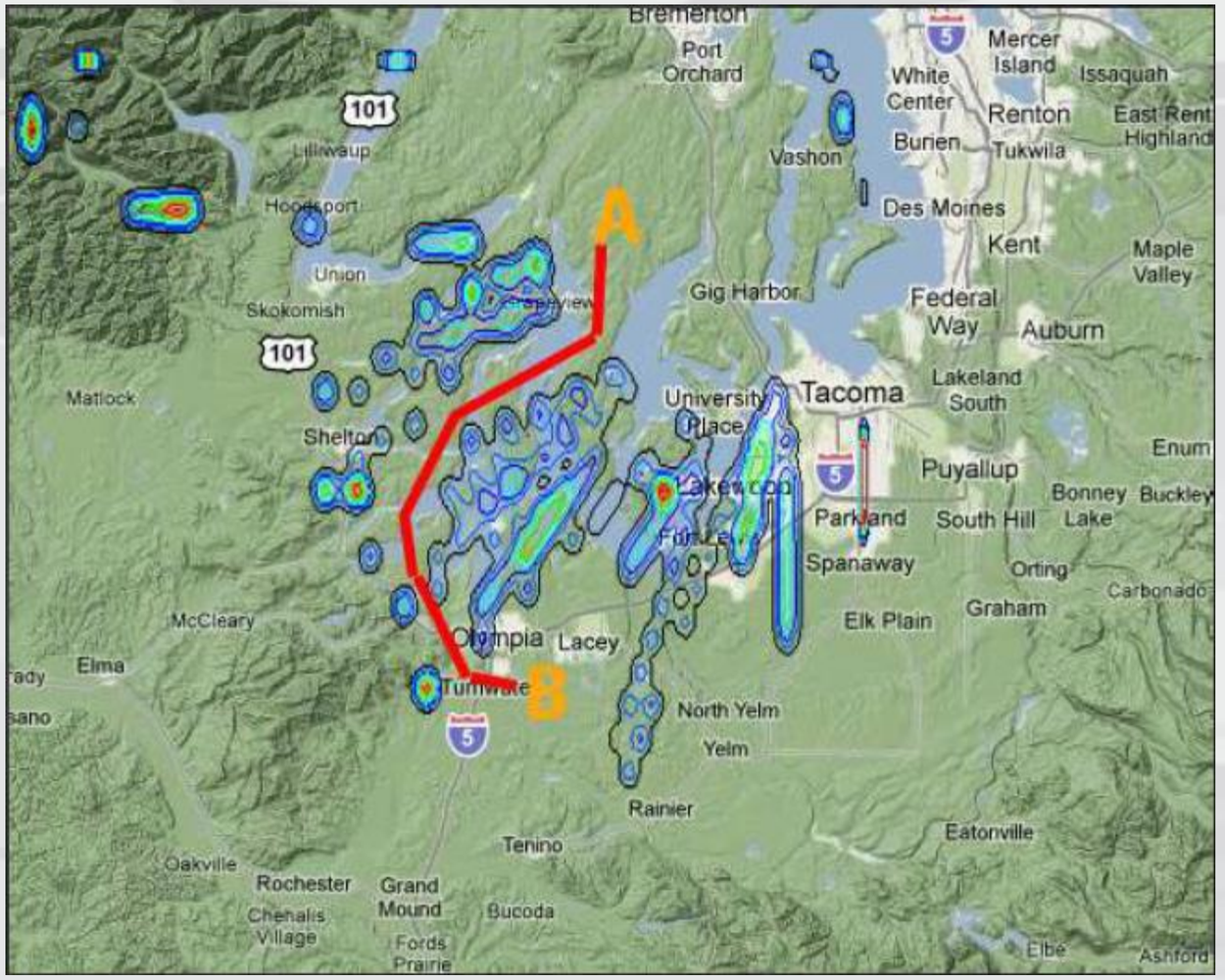
ARIES

Scenario 1: Baseline



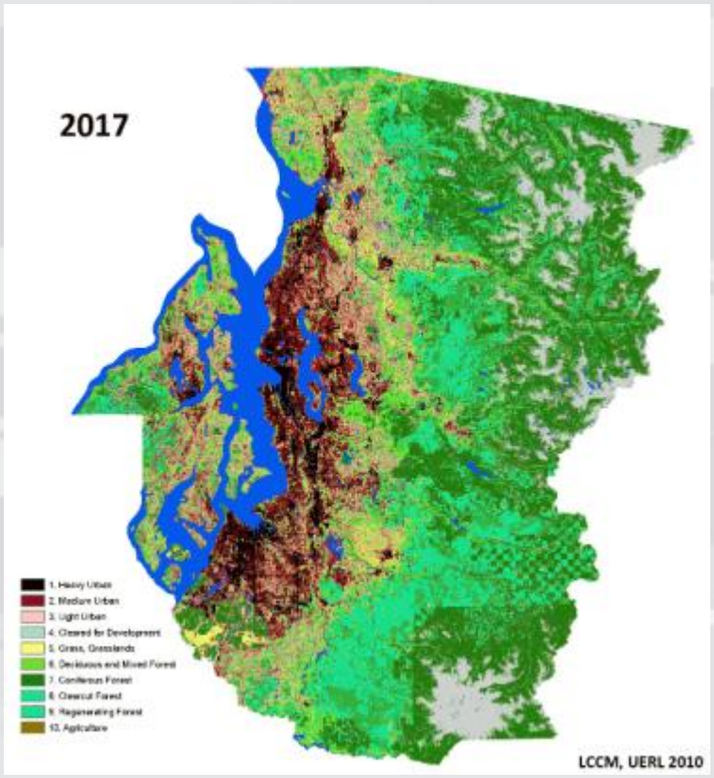
Scenario 2: Reforestation



Snohomish Models

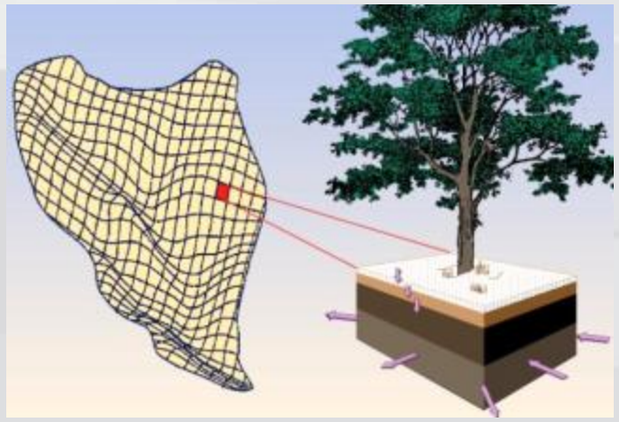
SHIRAZ

LCCM



ECOPath

DHSVM



1000minds®

Preference values

Representing the relative importance of your criteria, based on your decisions.

HOME | start and mode | your criteria | your decisions | preference values

Integer and % values are equivalent with respect to the ranking of alternatives they produce. More »

Show all

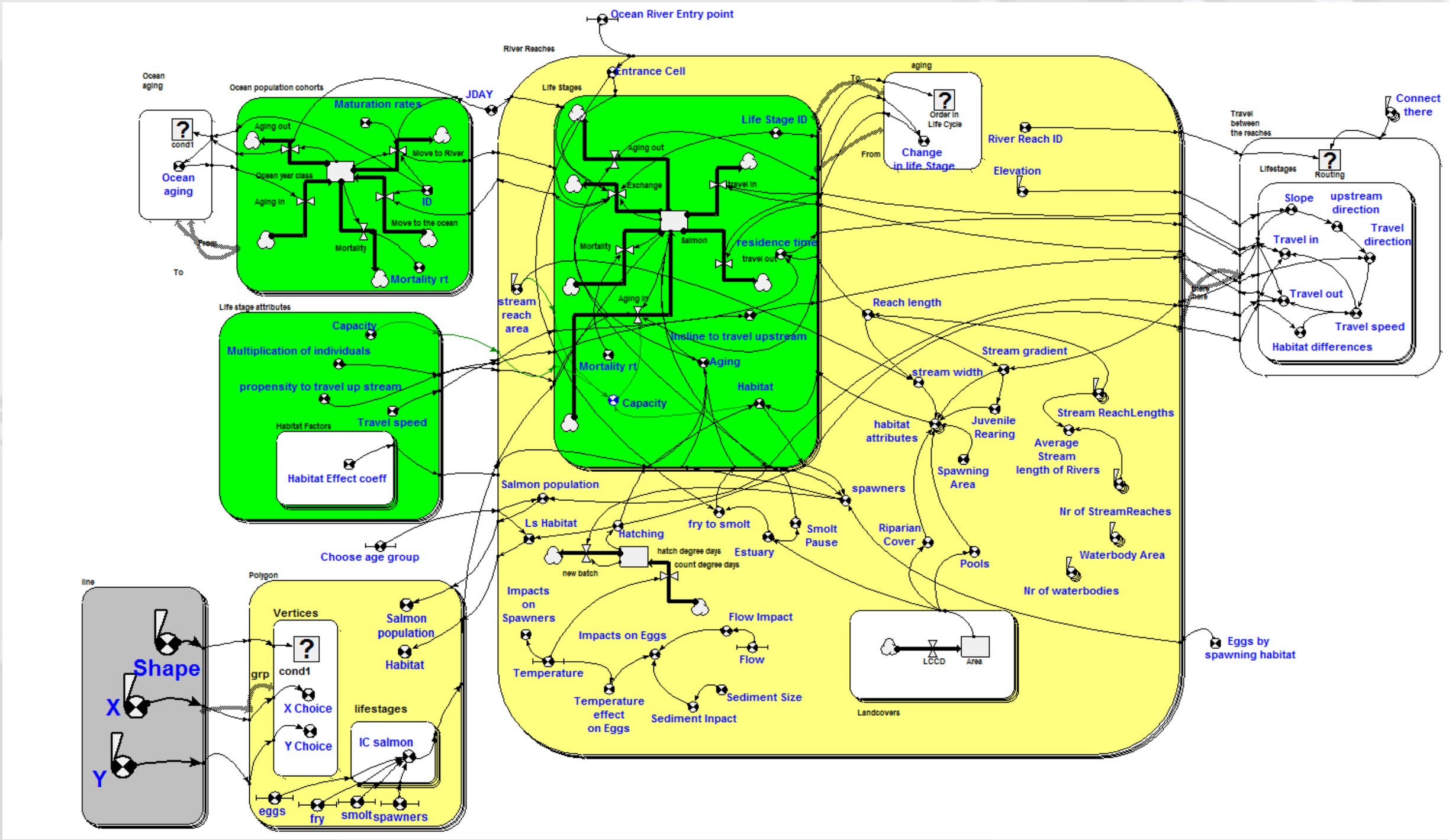
spreadsheet | consistency of decisions? | audit report

- [x] Convert integers to % values (maximum possible score = 100)
- [x] Show % values as bar graphs
- [ ] Show scoring boxes (for printing)
- [x] Order criteria by their relative importance

MIMES Ecosystem Service Preferences

< criterion a >		% Bar graph
< level 1, this criterion >	0.0 %	
< level 2, this criterion >	33.3 %	
< criterion b >		
< level 1, this criterion >	0.0 %	
< level 2, this criterion >	33.3 %	
< criterion c >		
< level 1, this criterion >	0.0 %	
< level 2, this criterion >	33.3 %	

Multi-Scale Integrated Models of ES



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Contact Information

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Thank **you.**

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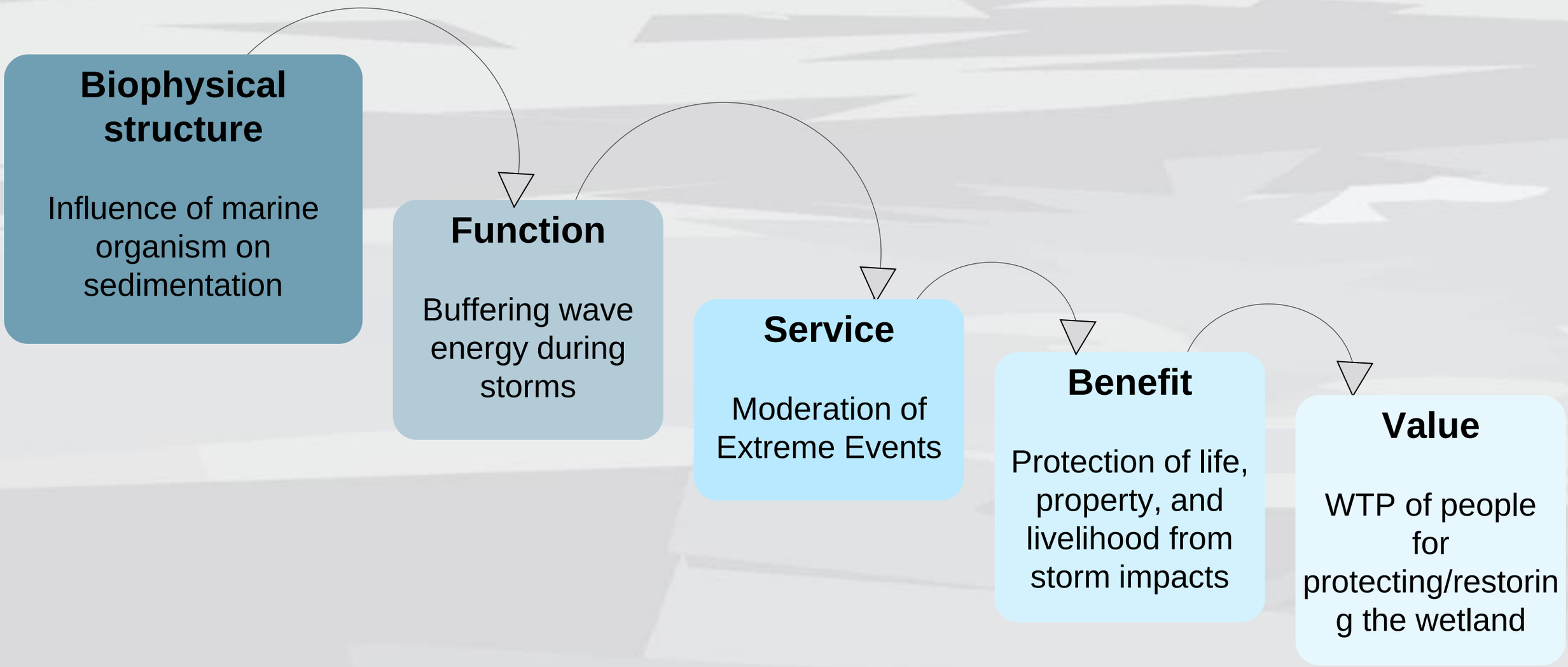
Linking nature and society

Ecosystems & biodiversity

Human well-being



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Adapted from De Groot et al. 2010, based on Haines-Young and Potschin 2010

Restoring Ecosystem Services

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