

## NATURAL ENVIRONMENT AND HEALTH

### Natural Environment Determines Health

The World Health Organization (WHO) defines environment, as it relates to health, as “all the physical, chemical, and biological factors external to a person, and all the related behaviors.” Environmental health consists of preventing or controlling diseases, injuries, and disabilities related to the interactions between people and their natural environment.

The health of the natural environment impacts human health, both adversely and positively. While a polluted environment causes diseases that harm our health, research evidence suggests contact with nature provides many health benefits, ranging from stress reduction, attention retention and social connectedness to improved recovery from illness and crime prevention.

By protecting and preserving the natural environment, we can enjoy clean air, water, land and healthy foods while at the same time strengthening environmental capital in local communities. By providing fair access to clean and healthy natural environments, such as air, water, open spaces and shorelines, we honor both environmental justice and health equity. By respecting the nature, we can yield co-benefits, including low-impact development, green site design and buildings, a biophilic built environment, and climate change adaptation. These co-benefits, in turn, improve our health, quality of life, a sense of place, and community resiliency.

### The Logic Model

Input/ Impact Area	Strategies/ Policies	Intermediate Outcomes	Ultimate Outcomes
Air	<ul style="list-style-type: none"><li>• Prioritize Puget Sound Clean Air Agency best management practices.</li><li>• Consider health impacts on vulnerable populations and encourage appropriate mitigation during SEPA and/or NEPA process.</li><li>• Adopt a tree preservation ordinance.</li><li>• Require multi-modal transportation options in new and redevelopment areas.</li></ul>	<ul style="list-style-type: none"><li>• Improved air quality by reducing such pollutants as PM, CO, NOx, O3, VOCs, carcinogens, and greenhouse gases (GHGs).</li><li>• Improved tranquility for urban dwellers.</li><li>• Increased neighborhood satisfaction.</li></ul>	<ul style="list-style-type: none"><li>• Reduced respiratory and cardiovascular diseases.</li><li>• Improved physical and mental health.</li><li>• Improved health of people, wildlife, and the natural environment.</li><li>• Improved environmental justice.</li></ul>

Input/ Impact Area	Strategies/ Policies	Intermediate Outcomes	Ultimate Outcomes
Drinking Water	<ul style="list-style-type: none"> <li>• Update critical areas code language to include best available science and consistency with Ecology’s water supply<sup>i</sup> and critical areas (e.g. aquifer recharge areas).</li> <li>• Encourage connection to municipal water when within reasonable distance of municipal service.</li> </ul>	<ul style="list-style-type: none"> <li>• Reduced development around critical aquifer recharge areas.</li> <li>• Improved conditions of existing wells and municipal water system.</li> <li>• Improved stream flows and overall water quality.</li> <li>• Reduced future contamination of private wells</li> <li>• Reduced groundwater contamination.</li> </ul>	<ul style="list-style-type: none"> <li>• Reduced waterborne diseases.</li> <li>• Improved overall health and safety.</li> <li>• Improved health of people, wildlife, and the natural environment.</li> </ul>
Stormwater and Low Impact Development <sup>ii</sup> (LID)	<ul style="list-style-type: none"> <li>• Encourage environmentally-resilient development.</li> <li>• Incentivize and encourage LID practices by streamlining permitting, developing implementation guidance for business owners, etc.</li> <li>• Ensure stormwater regulations align with <u>Ecology’s Stormwater Manuals</u><sup>iii</sup>.</li> <li>• Maintain and enforce stormwater regulations.</li> <li>• Adopt LID goals and policies in the Comprehensive Plan.</li> <li>• Encourage or require LID practices in subdivision code and/or zoning code.</li> <li>• Require LID in engineering design standards.</li> </ul>	<ul style="list-style-type: none"> <li>• Reduced loss of property and investment in infrastructure.</li> <li>• Improved water quality.</li> <li>• Reduced groundwater and wildlife contamination.</li> <li>• Improved surface water flows.</li> <li>• Reduced damage from heavy rain and flood events.</li> <li>• Increased acreages of green spaces.</li> <li>• Increased retention of onsite natural features.</li> <li>• Reduced water consumption for residential, commercial, and industrial uses.</li> </ul>	<ul style="list-style-type: none"> <li>• Reduced waterborne diseases.</li> <li>• Improved overall health and safety of people.</li> <li>• Improved environmental and wildlife health.</li> <li>• Improved trust and commitment to public investment.</li> <li>• Increased social and environmental capitals.</li> </ul>

Input/ Impact Area	Strategies/ Policies	Intermediate Outcomes	Ultimate Outcomes
Environmentally Sensitive Lands and Natural, Fisheries, Estuarine & Wildlife Habitats	<ul style="list-style-type: none"> <li>• Protect environmentally sensitive and natural resource lands, including but not limited to critical areas, wetlands, natural and wildlife habitats, shorelines, and waterbodies, etc.</li> <li>• Collaborate with tribes and other agencies to co-manage (conserve, protect, restore and enhance, etc.) natural, fish and wildlife habitats.</li> <li>• Improve marine and terrestrial conditions most threatening to declining populations and species.</li> <li>• Elevate visibility of regional indicator species.</li> <li>• Identify habitat areas that will require sensitivity in land-use planning and development.</li> <li>• Update critical areas code to include best available science and consistency with Ecology requirements (e.g. wetlands, streams, aquifer recharge areas).</li> <li>• Limit or prohibit development within shoreline habitat areas.</li> <li>• Consider tools, such as Transfer of Development Rights and conservation easements, to protect environmentally sensitive and natural resources lands.</li> <li>• Assess shoreline management strategies and regulations to improve environmental and human health.</li> <li>• Ensure local Shoreline Management Program balances and aligns with twin goals of environmental/habitat protection and public access established in the Shoreline Management Act.</li> <li>• Consider health impacts and encourage appropriate mitigation during SEPA and/or NEPA process.</li> <li>• Raise awareness of applicable state and federal law related to sensitive lands among the public.</li> <li>• Align comprehensive plans and development regulations with Action Agenda for Puget Sound<sup>iv</sup>, which charts the course to recovery of our nation's largest estuary.</li> </ul>	<ul style="list-style-type: none"> <li>• Increased acreages of critical and other environmental sensitive areas preserved.</li> <li>• Increased biodiversity of natural resources.</li> <li>• Improved protection of endangered species.</li> <li>• Improved marine food web.</li> <li>• Restored social-ecological systems by simultaneously supporting economic and cultural practices.</li> <li>• Reduced urban heat island effect.</li> <li>• Improved viewshed preservation.</li> <li>• Reduced development of site containing significant development hazards.</li> <li>• Increased distribution of natural areas across an area/jurisdiction.</li> <li>• Increased public access to natural areas.</li> <li>• Reduced climate change impacts.</li> <li>• Improved shoreline ecosystem supporting upland and waterward ecosystems.</li> </ul>	<ul style="list-style-type: none"> <li>• Improved balance among the three pillars of sustainable development—people, prosperity and planet.</li> <li>• Improved mental well-being.</li> <li>• Improved health for people, wildlife and the natural environment.</li> <li>• Increased environmental capital.</li> </ul>

Input/ Impact Area	Strategies/ Policies	Intermediate Outcomes	Ultimate Outcomes
	<ul style="list-style-type: none"> <li>• Work with Conservation Futures to secure funds to acquire and preserve wetlands, habitat areas, and shorelines, etc.</li> </ul>	<ul style="list-style-type: none"> <li>• Improved surface water flows, stream flows and overall water quality.</li> <li>• Reduced damage from heavy rain and flood events.</li> <li>• Reduced development around critical aquifer recharge areas.</li> </ul>	
Green/Open Space and Trees	<ul style="list-style-type: none"> <li>• Adopt policies in the Comprehensive Plan (e.g. Land Use Element and Parks, Recreation and Open Space plan) to provide fair access to green/open space within walking distance in all neighborhoods and support health and well-being for all.</li> <li>• Create “Green/Open Space Zone/Greenway” to protect and connect habitat corridors in the Comprehensive Plan Map.</li> <li>• Create “Green/Open Space Zone/Greenway” in the Zoning Code Map.</li> <li>• Encourage and protect urban tree canopy.</li> <li>• Protect and/or acquire green/open space to improve the health and functionality of the diverse natural and wildlife habitats.</li> <li>• Encourage or require the preservation of open space, community gardens, and viewsheds in the zoning and landscaping codes.</li> <li>• Encourage or require open space in the subdivision code.</li> <li>• Consider tree replacement ratios when trees within open space or critical areas tracts are removed.</li> <li>• Work with Conservation Futures to secure funds to acquire and preserve open space areas, greenways, and wildlife corridors.<sup>v</sup></li> </ul>	<ul style="list-style-type: none"> <li>• Increased access to open/green space within walking distance.</li> <li>• Increased acreages of open space and greenways/ green corridors preserved.</li> <li>• Increased tranquility for urban dwellers.</li> <li>• Increased neighborhood satisfaction.</li> <li>• Increased human interaction.</li> <li>• Improved health and biodiversity of natural habitats.</li> <li>• Improved health and functionality of the natural environment.</li> <li>• Improved viewshed preservation.</li> <li>• Increased tree canopy protected.</li> </ul>	<ul style="list-style-type: none"> <li>• Reduced respiratory diseases.</li> <li>• Improved physical health and mental well-being.</li> <li>• Improved neighborhood livability and quality of life.</li> <li>• Increased social and environmental capitals.</li> </ul>

Input/ Impact Area	Strategies/ Policies	Intermediate Outcomes	Ultimate Outcomes
		<ul style="list-style-type: none"> <li>• Increased distribution of open space across an area/jurisdiction.</li> <li>• Increased walkability to open space areas.</li> <li>• Increased public access to green spaces.</li> <li>• Increased physical activity.</li> <li>• Reduced urban heat island effect.</li> <li>• Reduced development of site containing significant development hazards.</li> <li>• Reduced community noise.</li> <li>• Reduced community light exposure.</li> <li>• Increased property value.</li> </ul>	
Green Buildings, Green Site Design, and Biophilic Design	<ul style="list-style-type: none"> <li>• Encourage or require sustainable exterior and interior design practices in the development or redevelopment of commercial, industrial, or residential buildings.</li> <li>• Encourage or require consideration of biophilic principles for exterior and/or interior design standards.</li> <li>• Encourage or require the design of buildings in accordance with the guidelines and practices of the US Green Building Council LEED<sup>vi</sup> or Master Builders Association Built Green<sup>vii</sup>.</li> <li>• Encourage and/or require green site design<sup>viii</sup> in the zoning code.</li> <li>• Adopt green site design standards.</li> <li>• Encourage environmentally resilient development.</li> </ul>	<ul style="list-style-type: none"> <li>• Reduced energy and water consumption for residential, commercial, and industrial uses.</li> <li>• Increased urban canopy and vegetation.</li> <li>• Increased tranquility for urban dwellers.</li> <li>• Reduced impervious surface flows.</li> <li>• Improved water quality.</li> <li>• Reduced community noise.</li> </ul>	<ul style="list-style-type: none"> <li>• Reduced respiratory diseases.</li> <li>• Improved health and well-being.</li> <li>• Increased human interaction.</li> <li>• Improved cognitive development.</li> <li>• Improved neighborhood livability and quality of life.</li> <li>• Increased physical, social and environmental capitals.</li> </ul>

Input/ Impact Area	Strategies/ Policies	Intermediate Outcomes	Ultimate Outcomes
	<ul style="list-style-type: none"> <li>Incentivize and encourage green building practices, such as supporting tax breaks, offering contracting priority to qualified firms, streamlining permitting process, lowering development application fees, etc.</li> </ul>	<ul style="list-style-type: none"> <li>Reduced community light exposure.</li> <li>Improved indoor and outdoor air quality.</li> <li>Reduced climate change impacts.</li> <li>Reduced urban heat island effect.</li> <li>Reduced air pollutants, such as particulate matter (PM), carbon monoxide (CO), nitrogen oxide (NOx), ozone (O3), volatile organic compounds (VOCs), and allergens.</li> <li>Improved walkability and social interaction.</li> </ul>	

Input/ Impact Area	Strategies/ Policies	Intermediate Outcomes	Ultimate Outcomes
Climate Change, Rising Sea Water and Natural Disasters	<ul style="list-style-type: none"> <li>• Integrate natural hazards into comprehensive plans<sup>ix</sup>.</li> <li>• Adopt a Hazard Mitigation Plan consistent and coordinated with King County or Pierce County Hazard Mitigation Plans.</li> <li>• Adopt climate change adaptation<sup>x</sup> and sustainability policies in the Comprehensive Plan.</li> <li>• Adopt and implement a climate action plan and strategies that emphasize and address equity implications of risk.</li> <li>• Collaborate with the local health department to develop an emergency preparedness/management plan.</li> <li>• Develop plans to relocate essential services away from 500-year flood plain.</li> <li>• Participate in the <u>National Flood Insurance Program</u><sup>xi</sup> (adopt FEMA requirements).</li> </ul>	<ul style="list-style-type: none"> <li>• Reduced climate change impacts, particularly on vulnerable populations.</li> <li>• Reduced air pollution caused by greenhouse gases (GHGs), etc.</li> <li>• Reduced extreme weather events.</li> <li>• Reduced vector-borne diseases by fleas, ticks, and mosquitoes.</li> <li>• Reduced energy and water consumption for residential, commercial, and industrial uses.</li> <li>• Reduced mortality.</li> </ul>	<ul style="list-style-type: none"> <li>• Reduced health disparities caused by climate change.</li> <li>• Improved environmental justice.</li> <li>• Increased environmental capital.</li> <li>• Increased community resilience and social capital.</li> <li>• Reduced disruption of essential safety, health, and infrastructure services.</li> <li>• Increased neighborhood livability and quality of life.</li> <li>• Increased safety.</li> <li>• Reduced respiratory diseases.</li> <li>• Improved overall health and well-being.</li> </ul>
Crime Prevention Through Environmental Design <sup>xii</sup> (CPTED)	<ul style="list-style-type: none"> <li>• Employ the use of CPTED principles in the zoning code (e.g. zoning development standards, outdoor lighting, trees, landscaping).</li> <li>• Identify places for CPTED prioritization, investment, based on spatial and crime data.</li> </ul>	<ul style="list-style-type: none"> <li>• Reduced crime and fear.</li> <li>• Increased perception of safety.</li> <li>• Increased public access to open space area.</li> <li>• Increased walkability and social interaction.</li> <li>• Increased usage of open space.</li> <li>• Increased sense of place and ownership of open space.</li> </ul>	<ul style="list-style-type: none"> <li>• Improved neighborhood safety.</li> <li>• Reduced crime and injuries.</li> <li>• Increased neighborhood livability and quality of life.</li> <li>• Improved overall health and well-being.</li> </ul>

Input/ Impact Area	Strategies/ Policies	Intermediate Outcomes	Ultimate Outcomes
Sustainable Development Best Practice	<ul style="list-style-type: none"> <li>• Adopt “Smart Growth” principles<sup>xiii</sup> to support triple-bottom line of sustainable development.</li> <li>• Consider project and non-project impacts on people, prosperity and planet.</li> <li>• Consider health impacts on vulnerable populations.</li> <li>• Encourage appropriate mitigation to address impacts during SEPA and/or NEPA process<sup>xiv</sup>.</li> </ul>	<ul style="list-style-type: none"> <li>• Reduced health disparities.</li> </ul>	<ul style="list-style-type: none"> <li>• Improved balance among the three pillars of sustainable development—people, prosperity and planet.</li> <li>• Improved environmental justice.</li> </ul>

## Research Evidence

### Natural Environment in General

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