WSU PUYALLUP RESEARCH AND EXTENSION CENTER



DRAFT VISION **2030**

HEALTHY ECOSYSTEMS IN AN URBANIZING ENVIRONMENT

TRANSDISCIPLINARY SOLUTIONS TO PROTECT WATER, LAND, AND PEOPLE

WATER | LAND | PEOPLE

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SPACE FOR LAND ACKNOWLEDGMENT

As members of the community at the WSU Puyallup Research and Extension Center, we acknowledge that we study, explore and discover on the traditional homelands of the Puyallup Tribe of Indians. It is our vision to continually reflect, evaluate, and improve our stewardship of the land, to cultivate and learn from more relationships with Native communities. We hold the following space open for a land acknowledgment that will be created in the coming years through meaningful and authentic engagement with Native communities to be filled out jointly with them over time and through cooperative action. We seek a land acknowledgment after we have intentionally begun to work on collaborative projects.

Rev. June 1, 2021

The Federal Hatch Act of 1887 supported the Land-Grant College Act of 1862 to create agriculture and experimental stations in each state of the United States. The stations were to be deployed to support all facets of agriculture production allowing research programs to be broad and change with the local community needs.

In 1891, the Washington State Legislature approved the Puyallup Agriculture Experiment State to be part of the new State College of Washington in Pullman, later to be known as Washington State University. Ground was broken to build WSU PREC in 1894. Since then, WSU Puyallup Research and Extension Center has been delivering Land Grant mission critical research and education to address local needs and problems. As a Land Grant, WSU PREC is available to all and is also responsible for implementing Civil Rights Act of 1964, meaning programs need to reach out to underserved communities.

WSU Puyallup Research and Extension Center (WSU PREC) is in the megapolitan (Nelson and Lang, 2018) area comprising Seattle-Tacoma and accompanying urban and peri-urban areas, WSU PREC is at the epicenter of innovation and entrepreneurship, where technology and industry are changing the lives of people around the world. This megapolitan region also coincides with a region that is ethnically the most diverse in the state, as well as a region where environmental health disparities are high. WSU PREC is uniquely poised to support these diverse communities, many that are on the forefront of high impacts from environmental pollution. It is our vision is to learn from these vulnerable communities, to foster resilience in the face of a changing climate and offer inclusive and equitable Extension programming. This location, coupled with the land and infrastructure at the Center, creates unique and transformative opportunities for Research, Extension, and Teaching unique to Washington State University. This document provides a framework for WSU PREC experts to advance transdisciplinary solutions for the Puget Sound region and beyond.

DEFINITIONS FOR SOME TERMS USED IN THIS DOCUMENT

Agriculture *(noun)* The science, art, or practice of cultivating soil, producing crops, and raising livestock and the preparation and marketing of the resulting product.

Horticulture *(noun)* The science and art of growing fruits, vegetables, flowers, or ornamental plants.

Landscape *(noun)* View of inland scenery, landforms of the region; *(verb)* To modify or ornament by altering plant cover

Watershed *(noun)* A region or area bounded peripherally by a divide and draining ultimately to a particular water course or body of water.

Ecosystem *(noun)* An ecosystem is a dynamic complex of plant, animal, and microorganism communities and the nonliving environment interacting as a functional unit. Humans are an integral part of ecosystems. Ecosystems vary enormously in size; a temporary pond in a tree hollow and an ocean basin can both be ecosystems.

The Puyallup Research and Extension Center

HISTORY AND CURRENT PROGRAMS

When WSU PREC opened in 1894 to support farmers in Western Washington, much of the acreage around the station was farmland where crops such as bulbs, berries, hops, corn, and peas were grown. In addition, there were numerous dairies and poultry farms in the region. Over time, farmland has been replaced with rural, and then urban development. The remaining acreage is used to grow high value crops such as vegetables, Christmas trees, cut flowers, and berries. Demands on the WSU PREC faculty, staff, and resources have shifted from traditional agricultural systems to challenges relating to healthy ecosystems in an urbanizing area. Many current WSU PREC programs (Table 1) are related to promoting healthy ecosystems with respect to water, land, and people. In recent years, the WSU PREC has grown considerably - serving to a changing demand for information, program priorities, and integrating changes in climate and the socio-political fabric of the region.

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Table 1. Current PREC research, outreach, and education programs in core areas.

Water	Land	People
Aquatic toxicology	Agricultural economics	Supplemental Nutrition Assistance Program
Green stormwater infrastructure research and extension	Hybrid poplar and clonal alder	4-H youth development
Business & municipal stormwater permit assistance	Organic farming systems and nutrient management	Consumer behavior, agri-food supply chain organization, dynamic consumer structures
Watershed hydrology	Small fruit breeding & genetics	Professional Education & Conference Management (Sewing & Stitchery Expo)
Vadose zone dynamics	Ornamental plant pathology	Community Science
	Plant and insect diagnostic laboratory	Master Gardeners
	Urban horticulture	
	Urban integrated pest management and pesticide safety education	
	Avian Health and Food Safety Lab and Diagnostics	
	Farming in the Floodplain Project	

Vision and Mission

The WSU PREC vision, mission, core programs, and scope reflect stakeholder needs and opportunities provided by the strength of current programs and the surrounding urbanizing environment.

Mission. The Puyallup Research and Extension Center exemplifies WSU's land grant mission by providing research, technology, instruction, and outreach to all communities, and to improve ecosystem health via land and water management for human mental, physical, and economic health in the urbanizing Puget Sound region and beyond.

Vision. University-based, Puget Sound focused, equitably improving the quality of life in the region and beyond.

Core Programs. PPrograms at the Puyallup Research and Extension Center focus on watershed science, horticulture, production agriculture, and natural resource management, and empowerment in the urban-rural interface.

Scope. Our programs utilize a transdisciplinary approach to support the health and well-being of urban and rural communities by focusing on sustainable management of water and land resources through partnership with cities, counties, state and federal agencies, industries, and non-profit organizations.

Rationale for a New Vision

Across the nation, more people now live in cities than in rural areas. In western Washington, urbanization has changed the natural and agricultural landscape affecting human communities at many levels. With considerable urban growth and industrialization of the landscape in recent decades, the attendant environmental challenges associated with this development threatens every aspect of Puget Sound ecosystem. There is also growing evidence that these environmental threats disproportionately impact indigenous, communities of color, and lower income groups. Furthermore, the population in the Puget Sound region is expected to increase to 5.8 million people by 2050, a 45% increase from the current population[1]. The regions is already experiencing the impacts of a changing climate, changes that are expected to exacerbate extant environmental threats to underserved communities. The Center currently stands at the intersection of rural and urban communities, bridging pristine and developed ecosystems. This confluence of land uses, development pressures, and diverse communities provides a broad platform for cross-cutting and innovative research, typifying urbanizing landscapes across the United States.

Recent events of serious racial and environmental injustices brought to light in an age of information, are making long-overdue conversations that challenge deep systemic inequities more normative. Of relevance is an opportunity for WSU PREC to meet the needs of underserved communities in south Puget Sound cities like Tacoma, Fife, Olympia, Auburn, and Kent—all cities that have truly diverse populations. The center's proximity to these urban areas provides great opportunity to reimagine WSU's reach and ability to advance, extend and equitably apply knowledge in the region's diverse communities.

Research and extension efforts related to human, plant, and animal health—while broadly linked through the fluxes of water, air, and soil—have not been explicitly linked, and scientific progress typically occurs independently. Solutions to problems in one area can have unintended consequences on other parts of the ecosystem. Societal challenges such as climate change, biodiversity loss, movement and accumulation of pollutants, and transfer of plant and animal diseases cross ecosystem components. Isolated, disciplinary research efforts fail to address this complexity—a transdisciplinary approach, however, offers many opportunities for critical transformative and actionable research.

Transdisciplinary research integrates researchers, community members, and policy makers with a shared vision and language, enabling these sectors to work together to address complex problems[2]. Research and Extension Centers foster transdisciplinary approaches because they are located in the community, with a body of faculty and staff that often cross departments and expertise. WSU PREC will foster transdisciplinary research, outreach, and educational programs to tackle widespread land use problems facing cities and the rural landscapes surrounding them.

We are losing opportunities by not including the assets brought by the most diverse populations. As an institution of research and extension, this means both learning from and understanding the needs of communities who are currently not at being served by WSU as a starting point for innovation and problem-solving. This effort would be followed by developing systems and products that meet those needs and ensuring suitable feedback loops are in place to facilitate two-way learning. Benchmarks for accountability will scaffold this work.

Economic impact of industries that WSU PREC faculty and staff are involved in amount to over 35 billion dollars annually (Table 2). Realigning current faculty expertise and investing in additional faculty positions will enable WSU to leverage more of these funds.

Table 2. Value of Puget Sound industries supported by the Puyallup Research and Extension Center.

	Annual Economic Impact
Sportfishing – Western WA	$1.1 billion
Commercial fishing – Western WA	$1.4 billion
Shellfish – Western WA	$0.1 billion
Stormwater management infrastructure – Puget Sound	$1 billion *(estimated)*
Agriculture – Western WA	$1.4 billion
Forestry – Statewide	$26 billion
Nursery and ornamentals – Western WA	$2.7 billion
Red alder forestry – Western WA	$1.8 billion
Total	**$35.5 billion**

IDENTIFIED STAKEHOLDER NEEDS

Educational opportunities

With population centers around WSU PREC expanding, faculty and staff face a growing call to provide more education and training to an increasing number of stakeholders, particularly communities that are typically underserved by University Extension. Many critical needs have been identified by faculty, staff, and stakeholders. Foremost among these are providing instruction for undergraduate and graduate students as well as accredited continuing education for industry. Stakeholders value the connection to a four-year land grant institution and opportunities to interface with WSU's Pullman-based faculty and degree options. Continued infrastructure investment to realize this potential could provide a solid service-based platform that could help financially support the WSU PREC. Another pathway for these types of training are self-paced online modules that teach basic concepts related to environmental stewardship, community health, agronomic practices, urban horticulture, etc. Currently two types of online trainings related to Low Impact Development design, installation, and maintenance are being offered, however, the opportunities to offer other similar courses clearly exist.

Graduate students
By providing mentorship and support for the professional development of their graduate students, WSU PREC faculty benefit greatly from attracting motivated and knowledgeable students. World-class research can only be achieved through fostering the potential of graduate students, who are integral to the conceptualization, design, success and promotion of research carried out at WSU PREC. Current needs include ongoing support for classes attended remotely, focused training opportunities in science communication, career development and networking strategies specific to each field, and WSU PREC community development. WSU PREC is fortunate to have a diverse and passionate group of graduate students supporting research at the center. Student voices and accomplishments should be actively elevated by faculty and WSU PREC leadership. An emphasis should be placed on enhancing recreational opportunities for students, particularly for those living on campus.

Stormwater management
Urban stormwater runoff directly threatens the health of the Puget Sound, including commercial, tribal, and recreational fisheries. Businesses and municipalities are required to comply with the Clean Water Act via stormwater management permits (NPDES) issued by the State of Washington. In 2009, the Association of Washington Businesses approached the legislature on behalf of large and small business owners who needed help with stormwater permit compliance. As a result, the Washington Stormwater Center (WSC) was created and co-located at WSU PREC and University of Washington - Tacoma. The mandate, RCW 90.48. 545, ensures that businesses and municipalities throughout Washington are provided with non-regulatory permit assistance. In addition, research conducted by the WSC informs permit implementation and state policy surrounding the toxicity of stormwater and solutions to the stormwater problem.

Sustaining production agriculture
Farmlands are intertwined in Puget Sound watersheds. Local farms continue to produce high value products, and many integrate agri-tourism and direct marketing to differentiate their products. However, profitability is challenging. For Washington farms with income between $2,500 and $250,000, farming represents under 25% of household income for most (74%) farms[3]. In Western Washington, stakeholders generally agree that there is a need for local agriculture but have different visions of how best to balance development pressures with maintenance of the natural resource base[4]. To remain viable, farmers need information relating to crop production, the management of pests and diseases, as well as potential new high value crops or production methods that are regionally adapted to our changing climatic conditions.

Nursery and landscape industry
Nursery and landscape industries in Washington State continue to request more localized research and education to improve sustainability and protect the surrounding environment. The WA State Nursery & Landscape Association, which represents nursery and floriculture production, tree production, garden centers, and landscape services—industries worth 3.7 billion dollars in annual sales in 2017, identified the following research and extension needs among its clientele: 1) protect and conserve Soils, 2) conserve water, 3) protect water and air quality, 4) protect and create wildlife habitat, 5) conserve energy, 6) sustain healthy plants, 7) use sustainable methods and materials, and 8) protect and enhance human health and well-being[5].

Human health (physical/mental/economic)
The WSU PREC is uniquely positioned to provide research, outreach, and education to support human health in the urban-rural interface. The broadening appreciation for connections between human health, animal health, and the shared environment have been recognized in the “One Health” concept. The concept emerged from increasing worldwide

Image Credit: MabelAmber (courtesy of Pixabay)

incidences of zoonotic diseases and the understanding that broad expertise was needed to work collaboratively to prevent and control pandemic disease[6]. Wellbeing and human health are linked to ecosystem health through connections with soils, plants, animals, biodiversity, and watersheds. Communities around Washington benefit from nutrition education to reduce the incidence of diet-related chronic non-infectious diseases such as diabetes. The causes of these diseases are often multifactorial. There is also a clear mental health benefit to green spaces in urban and peri-urban landscapes. Nurseries, city planners, and other green industries need regionally adapted plants, design expertise, and maintenance instruction. Transdisciplinary approaches that increase communication between medical, environmental, and social scientists can improve program development and efficacy.

Invasive species and exotic diseases
Human, plant and animal diseases travel globally as world trade increases. The Puget Sound region is a significant hub to international trade throughout the West. Many of the new animal, plant and even human diseases and pests enter the state, the country and sometimes the continent through our ports or points of travel entry. With a mild climate, diverse habitat and significant world trade, the Puget Sound stands out nationally as a high risk of establishing a new pest or disease. In a 2018 economic impact study, invasive species cost almost $240 million in crop loss, $120 million impact to livestock production, $125 million loss in timber production and a $20 million loss in recreation revenue annually in Washington State alone (https://www.nwcb.wa.gov/pdfs/EconomicImptsRpt.pdf). Early detection, rapid response programs are key to minimizing the economic, cultural and environmental impact of new species and diseases being introduced into the Pacific Northwest. Significant investment into research of best management practices and protection from new species or disease introduction is further needed for those pests that establish in the state.

OPPORTUNITIES

We present the following opportunities for transdisciplinary research and extension with the goal of achieving a healthy urbanizing ecosystem in the watersheds that surround WSU PREC and beyond.

Collaboration with regionally based corporate partners such as Boeing, Microsoft, and Amazon
WSU PREC's proximity to global corporations in western Washington offer ample opportunities to work with these corporate giants to fund research that seeks to maximize sustainability at the watershed scale. Corporate campuses support hundreds of people and operate large facilities with significant ecological footprints. These provide avenues for design, monitoring, and policy innovations. With Microsoft's dominant hardware platforms, Amazon's expertise in cloud data management, and Boeing's support of innovative materials for stormwater mitigation—there exists a host of opportunities to fundamentally transform how sensors, data collection platforms, and data management protocols perform in urbanizing environments.

Prime location to study a large ecological gradient and a wide pollutant spectrum
WSU PREC is also in close proximity to the two extremes that define the pollutant spectrum in western Washington: the pristine glacially-fed streams that emanate from the Cascades, and the channelized and polluted urban streams and rivers that traverse the lower Puyallup watershed. This region also encompasses a wide diversity of landscapes—mountain forests, valley farmlands, low density suburbs and peri-urban areas, and highly developed urban cityscapes. The landscape immediately around WSU PREC exemplifies the peri-urban landscape and is a living laboratory for studying the forested-rural-agrarian-urban continuum. In addition to toxic chemicals, invasive species also move through urban and peri-urban environments and potentially into forests and agroecosystems. Researchers across scientific disciplines have ample opportunities to pursue broad questions relevant to communities and landscapes across the nation.

Collaboration with regional tribal nations
Regional tribes have centuries of traditional ecological knowledge on managing the land and water resources of the region. Among the treaty rights of Pacific Northwest tribes are rights to fish, hunt, and gather in their traditional places. As such, tribes have a vested interest in sustainable land use in the region. Pacific salmon are in decline throughout much of the Pacific Northwest. In urban areas, development has resulted in loss of physical and chemical habitat integrity. Stormwater runoff from industrial, commercial, and even residential land uses degrade the freshwater habitats where salmon spawn and rear. Several local tribes directly collaborate with researchers at WSU PREC, and the Washington Stormwater Center has partnered with the Pacific Northwest Indian Fisheries Commission to work on salmon health, Orca whale health, and stormwater issues of importance to the tribes and the other stakeholders in Washington State.

Urban agriculture

Urbanization in Western Washington has been accompanied by an increase in overall income, resulting in increased demand for higher value agricultural products, including meat[7]. Additionally, farms located near urban economic centers have more opportunity for at least one family member to earn off-farm income relative to more rural locations, which can facilitate innovation and intensification[7]. The 21st century is experiencing a resurgence in urban agriculture[8]. Rooftops, walls, balconies, abandoned lots and even kitchens can take advantage of a city's resources such as captured rainwater and composted food waste. Technological innovations are making indoor production of vegetables and herbs practical and efficient and new innovations in LED lighting are enabling high-throughput "vertical" farming[9,10]. Multiple startups are pursuing economic opportunities with encouragement from engaged cities8. Potential benefits include increased nutrient quality from not having to pick crops early for transport, and these new, innovative approaches may allow traditional agriculture to focus on crops that cannot be grown using high-throughput methods. To support the rapid growth of urban food production, the USDA in 2016 published the Urban Agriculture Tool Kit[11,12] including resources for mobile markets and intensive hydroponic and aquaculture operations.

Urban farms and communities

Farms on the urban fringe have the opportunity to incorporate agritourism and education into their business model. The economic value of some events, such as the annual fall harvest festivals can exceed the value of farmed crops. In addition to providing economic value to the farmer, a simple trip to a U-Cut Christmas tree farm or U-Pick berry farm provides urban dwellers insight into the importance of the natural resource base to the local economy. Likewise, student field trips to peri-urban farms can reinforce scientific concepts such as soil-plant-water relations, ecosystem services, nutrient cycling, and production efficiency. Through community engagement, activities such as educational outreach to local schools, citizen science projects, Master Gardeners and other stewardship groups, people in the community can learn about their role and impacts on the ecosystem. This will lead to a better informed public that will influence policy decisions at the local and state levels.

Image Credit: Any Lane (courtesy of Pexels)

Urban landscape design and management

Landscape plantings and urban forests mitigate the effects of stormwater and agricultural runoff, reduce excessive heat buildup in cities as well as intercepting rainfall, parks and landscapes for recreation. Demonstration gardens provide the public with an opportunity to learn about the ornamental and food plants that will grow in their area. Examples are plants that attract pollinators, and varieties of elms resistant to Dutch Elm Disease. Homeowners and urban landscape managers can be provided with tools and knowledge that will help them to reduce their environmental impact. Examples include reduced pesticide usage, proper plant selection, mitigating stormwater runoff, and early detection and rapid response to invasive species introduction.

Urban food supply

Food supply has changed in recent years and traditional food retail models are battling for survival. Consumers are now more demanding of fresh, local, novel food products. The millennial generation makes profoundly different food choices than previous generations, creating new opportunities for producers at the urban-rural interface[10]. Various forms of direct sale channels including farmers markets are growing and becoming a thriving outlet for peri-urban farmers to sell their food, cut-flowers, and ornamental plants directly to urban dwellers. The number of farmers markets increased more than 3-fold in Washington State from 56 in 1997 to 160 in 2012[13]. Farmers markets support cities and neighborhoods that host them by bringing consumers to adjoining businesses. Producers that sell at farmers markets also compound their local economic impact by spending their income in their communities. Direct sales to restaurants, schools, grocery stores, and other urban outlets are also facilitated by local proximity. Corporations are exploring new models for food delivery that cater to affluent urban dwellers. In the Puget Sound region, with high-profile large corporations such as Starbucks, Amazon, Costco, and others, there is an opportunity to explore innovative market models that strengthen peri-urban agricultural systems and support local farmers at a scale beyond farmers markets.

Agri-food supply chain
The rapid evolution of the agri-food supply system is fostered by technological innovations resulting in new production and processing practices for food products, novel food products, and new locations for producing existing products. This also involves the establishment of novel institutional arrangements to organize dynamic supply chains. The change is also fostered by structural and behavioral change from consumers as one result of the growing urbanization phenomenon. The body of literature suggests that research efforts to better understand this dynamic environment are scarce but are growing[14–16]. This implies that there is an abundance of opportunities to grow a research, extension, and teaching program in this nascent branch of agricultural economics.

Plant, animal, and ecosystem biosecurity
WSU PREC is positioned well to respond to new pest and disease problems. The station houses the Avian and Food Safety Lab, a lab dedicated to the betterment of animal and human health providing timely diagnostic support to safeguard the health of livestock, pets, poultry, and fish in the Pacific Northwest and to protect the public from zoonotic diseases. The R&E Center also houses a USDA-APHIS certified quarantine facility used to receive and research plant diseases that threaten native and agricultural ecosystems. The WSU Puyallup Plant Diagnostic Lab provides one-on-one identification of both home and commercial pests. The weed biological control program at WSU PREC provides research, education and support to land managers for implementing natural management of invasive weeds statewide. The clinic deals with over a thousand specimens per year. The center's faculty run pest detection programs such as the Master Gardener first detector program and Forest Health Pest Watch in collaboration with state and federal regulatory agencies.

Nursing
In 2015 WSU PREC was approached by the College of Nursing to develop an opportunity for WSU Vancouver Nursing students who are place-bound in South Puget Sound to access courses from WSU PREC. Rather than driving to Vancouver weekly, these students receive their instruction via distance education at the WSU PREC from hosting sites in WSU Vancouver, Spokane, and Tri-Cities. Historically, WSU PREC hosted 1–2 courses a year as a Nursing faculty member's office is located at WSU PREC. In fall 2015 and spring 2016 that increased to 21 courses per semester with approximately 10 students taking advantage of this opportunity. Today, over 40 students access nursing courses from WSU PREC. With the largest community-based, locally-governed health system in the state of Washington, MultiCare, located in our community, the opportunities for expansion in health care education are vast. Since classroom space has changed from the COVID-19 pandemic, new models to serve regional students is being developed.

Nutrition
The WSU Extension Youth and Families Program Unit operates across the State to foster economic well-being and quality of life. Nutrition education occurs through 4-H, Expanded Food and Nutrition Education Program (EFNEP) and Supplemental Nutrition Assistance Program Education (SNAP-Ed). EFNEP and SNAP-Ed programs provide low-income communities the tools and knowledge they need to develop positive health behaviors associated with obesity prevention. The expansion of nutrition programing at WSU PREC would provide such programs to the broader community. Education outreach promotes environmental and policy actions to increase access and availability of healthy foods and physical activities in communities where families live, learn, work, and play.

Community Health
The WSU Elson Floyd Medical School provides valuable opportunities for collaboration in pursuing healthy ecosystems in an urbanizing environment. The Nutrition and Exercise Physiology program within the medical school is a natural ally for One Health transdisciplinary "soil to society" research. Nutrient density of foods grown with different management practices human wellbeing associated with gardening and green spaces are specific research projects achievable through collaboration between the medical school and WSU PREC.

Food Safety

Produce Food Safety extension at the Washington State University is designed to assist the food producers of all types and sizes in the State of Washington, the Pacific Northwest region, and the Nation. The Avian and Food Safety microbiology lab located at WSU PREC provides critical support for testing against food borne microbials for the food processing industries. Consumer food safety education to avoid illness includes canning procedures, proper cooking temperatures of food, and handling of expired foods. There are numerous opportunities to pursue food safety research questions and consumer behavior through cooperation with the WSU statewide consumer food safety specialist and food science faculty in Pullman.

Fate and Transport of Toxic Chemicals

Current and historical land uses associated with urban environments can lead to contamination of soils and water with toxic chemicals. This is an important consideration for growing (e.g., terrestrial crops) or harvesting (e.g., seafood) food from landscapes in and around urban centers. The emerging concept of 'soil security'[17] bridges water, agriculture, and human health and provides a framework for studying the movement and impact of contaminants through human food webs.

The Built Environment

Urban and peri-urban environments are affected by design and planning. Green space for enjoying the natural environment, gardening, and exercising can improve human health and well-being. For example, trees in urban environments do double-duty of improving air quality and reducing summer temperature extremes - both of which can save lives. New research taking place at WSU PREC will additionally address the role that trees can play in controlling stormwater runoff from the built landscape. Beyond these physical benefits, green spaces significantly reduce mental distress in adults and children and can reduce air pollution.

IMPLEMENTING A NEW VISION

With investments in faculty hires and key infrastructure, WSU PREC could further foster innovative approaches to address priority problems while providing education and training for students, industry and the public in Western Washington.

The vision of *Healthy Urbanizing Ecosystems* provides an umbrella concept for existing and proposed programs at WSU PREC. An intentionally transdisciplinary research approach that integrates watershed science, production agriculture systems, urban landscape management and design, and community health leverages the WSU PREC's disciplinary and location strengths. A few are listed below in Table 3.

Table 3. Transdisciplinary programs to promote healthy urbanizing ecosystems at the Puyallup Research and Extension Center.

New Investments for Transdisciplinary Research

The ability for the WSU PREC to effectively address challenges that threaten community and ecological health in urbanizing environments and that also represent an opportunity to better understand economic dynamics and consumer evolution will require new faculty and investments in infrastructure. Expertise in Human Health, Land Use Planning, Horticulture, Supply Chain Design and Management, Social Science, and Urban Entomology are high priorities to achieving this Vision. Several campus buildings are badly in need of replacement, which provides an opportunity to reimagine the educational and demonstration opportunities for Washington State University in the State's metropolitan core. An Environmental Learning Center could serve multiple community needs and integrate research and extension efforts related to transdisciplinary research. A few possibilities for faculty and infrastructure investment are outlined in Table 4.

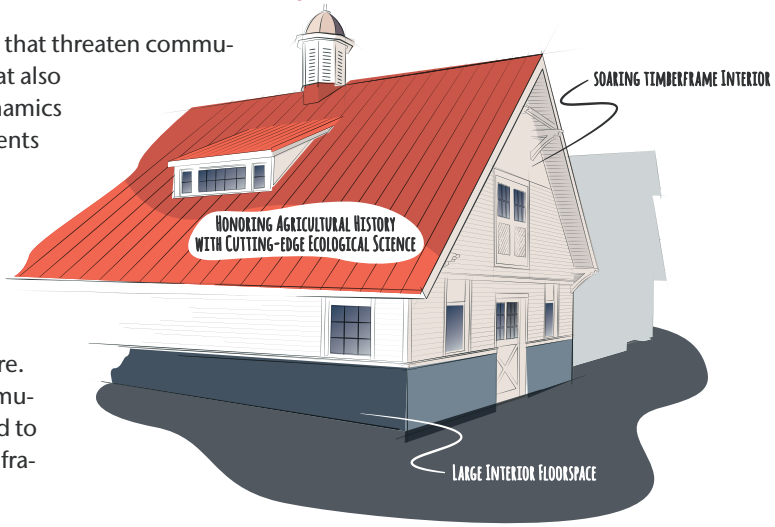

Table 4. Possible and suggested avenues for faculty and infrastructure investment

Item	Description
1. **Possible New Faculty Positions/ Faculty Endowments**	▪ Nutrition/Human or Community Health ▪ Land Use Planning/Policy/Economics ▪ Sustainable urban food production specialist/Horticulturist ▪ Urban Entomology ▪ Urban Forestry ▪ Social Scientist
2. **Graduate Student Support**	▪ Housing Support ▪ Research Assistantships ▪ Graduate Student Recreational Support
3. **New Staff Positions**	Organic Farm Manager
4. **Environmental Learning Center**	Repurposing historic barns to an environmental learning center
5. **Academic Media Center**	Retrofit Administration building for state-of-the art classrooms, digital media and educational broadcast
6. **STEM/Citizen Science Efforts**	Invest in coordinator position and programs to engage citizen scientists and strengthen partnerships with local schools
7. **Campus entrance signage and WSU Appreciation Week**	Improve recognition of the campus, provide opportunities to further develop community relationships
8. **Course Development**	Integrated Stormwater Management certificate program, Integrated Floodplain Management course, Pesticide Education, other watershed course work, Human nutrition, urban agriculture and organic waste management
9. **On-site demonstration projects**	Gardening, landscape, built environment, urban forestry

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