A Distinctive Learning Environment: Huxley College of the Environment and Interdisciplinary Engagement at Western

Responses to questions posed by Western Washington University administration.

Huxley College Green Paper Committee
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WESTERN WASHINGTON UNIVERSITY

HUXLEY COLLEGE OF THE ENVIRONMENT

Executive Summary December 2011

Western Washington University is positioned to become a prominent and distinctive "**University of the Environment**." Western's Huxley College has helped bring Western to this point by providing interdisciplinary frameworks for teaching and scholarship. Moving into the future, Huxley can serve as a model and a hub for collaboration, and as an incubator for interdisciplinary thinking about the environment.

In September 2011, Western's administration asked Huxley College a series of questions on critical environmental issues of the future and the role of interdisciplinary engagement at Huxley College and beyond. This document is in response to those questions.

Critical Environmental Issues

Today's environmental challenges are increasingly understood as complex, global in scale, and long-term in scope. Expanding human population is now the primary driver of most environmental challenges. Already, over 1 billion people suffer from malnourishment and lack safe drinking water, and global energy consumption is increasing at more than twice the rate of the population. Simultaneously, society faces the overarching threat of climate change. The natural environment is now human-dominated and our most critical social challenges are environmental challenges. These challenges demand sophisticated social and ecological science.

Industry, government, and social organizations increasingly recognize that **solutions to environmental problems emerge from interdisciplinary research and collaborative frameworks**. The National Academy of Sciences has recently recommended interdisciplinary research combining economics, sociology, biology, and ecology as a core scientific effort. Many other institutions focusing on the complex interconnected challenges of the 21st century have also come to similar conclusion.

For decades, Huxley College has been developing pedagogic and institutional approaches to complex interdisciplinary environmental issues. In recent years, Huxley College faculty have been at the forefront of building on sustainability and resilience platforms, on campus and off. These two frameworks motivate much environmental problem solving today, especially problems critical to our region - rapid population growth, anthropogenic climate change, dissipation of wastes, natural habitat loss, energy production, and natural hazard exposure. Moreover, sustainability and resilience frameworks are ideal foci for catalyzing broad university engagement around social and environmental challenges, for each will benefit from a broad range of disciplinary perspectives and interdisciplinary application.

What Interdisciplinary Looks Like at Huxley College

Huxley College immerses students in interdisciplinary learning, collaborative problem-solving, and engaged research. Rather than the menu of dispersed environmental courses found at many other institutions, **Huxley recognizes that students need discipline to be interdisciplinary**. Therefore, Huxley College offers majors emphasizing disciplinary perspectives applied to environmental problems. Faculty weave interdisciplinary and collaborative problem-solving skills into courses with disciplinary depth.

Huxley College's success in interdisciplinary research and teaching stems from its ability to be nimble and responsive to changing environmental priorities in society. Western has supported Huxley College's curricular innovation by granting **exceptional curricular autonomy**. Huxley College reviews curriculum with an interdisciplinary curriculum committee, followed by a university review. This gives Huxley College the freedom to innovate in teaching while **relying upon many other strong disciplinary partners throughout the university**.

Huxley's status as a college is vital to its interdisciplinary approach. Though Huxley College faculty are rewarded for conventional achievement, the Huxley College **tenure and promotion process also rewards interdisciplinary approaches**. Huxley College's process also encourages faculty to explore how their diverse trainings and interests might be brought together in collaborative instruction and research. This structure also supports **centralized advising**. College advisers recommend a wide breath of interdisciplinary offerings, receive feedback from successful alumni, and encourage students to build strong interdisciplinary learning experiences and effective career plans. By increasing student demand for interdisciplinary courses, this advising structure encourages further curricular innovation.

Strengthening Interdisciplinary Work across Western

To strengthen interdisciplinary work at Western, the administration can provide strong leadership and promote interdisciplinary work through two key institutional changes. **First, procedural and cultural barriers to interdisciplinary work need to be removed**. Strong administrative leadership is needed to encourage academic units to recognize and reward curricular collaboration, co-teaching, co-authorship, and interdisciplinary research. Academic units need clear and explicit instructions on evaluating interdisciplinary work when rewarding faculty. **Second, positive incentives are needed to encourage interdisciplinary work**. These may include enhancing the FIG structure to support co-teaching, awards that highlight interdisciplinary innovation, and support of interdisciplinary proposals such as the Sustainability Initiative. Support for the hiring and retention of joint-appointments could also provide incentive, as could explicit structures for cross-unit affiliations. Where appropriate, members of Huxley College and others could serve as voices of experience during the shaping of these policies.

Western's Vision and Huxley College's Future

The future of human civilization will depend on solving the critical environmental challenges of our day with justice and sustainably. Huxley College wants Western to be a place where all students are exposed to the emerging environmental challenges. Further, Huxley College wants to be the academic home for the students who are interested in becoming part of the next generation of environmental problem-solvers. At Huxley College, they will find opportunities to apply interdisciplinary analytical skills to critical environmental challenges through community partnerships. Concepts like sustainability and resilience will achieve depth and nuance, and ultimately real world application. Interdisciplinary learning will be the norm. A strong Huxley College will continue to incubate innovative environmental problem-solvers who will foster critical local, regional, and global change.

Simply put, If Huxley College did not exist, Western Washington University would need to create it.

A Distinctive Learning Environment: Huxley College of the Environment and Interdisciplinary Engagement at Western

A UNIVERSITY OF THE ENVIRONMENT

Western Washington University is well positioned to become both regionally and nationally prominent as a "University of the Environment." Much of this strength and potential can be traced to Western's Huxley College of the Environment. For the last 41 years, Huxley College has helped bring Western to this point by providing innovative interdisciplinary frameworks for teaching and scholarship, along with active environmental leadership. Moving into the near future, Huxley College can now help Western by acting as a hub for collaboration, and as a catalyst and incubator for interdisciplinary thinking on the environment.

A third of Western's incoming freshmen are involved in an environmental club in high school.

Environmental issues are driving educational changes nationwide. Many institutions are scrambling to develop programs and initiatives because of the growing interest in environmental issues and sustainability. Western is already a leader in this arena because Huxley College provides a strong foundation for innovative teaching and interdisciplinary research on environmental issues. The college is also known for producing students skilled in understanding the human-environment issues of today and the future, while many new students come to Western seeking environmental problem-solving and strong environmentally-focused majors. As a result, the University has gained a reputation as a "University of the Environment." To develop this leadership position, Western must continue to be a place where students learn the interdisciplinary frameworks and problem-solving skills necessary to address all the new and emerging sets of complex environmental challenges. Huxley College is well positioned to be at the center of these critical efforts.

In September 2011, Western's administration asked Huxley College a series of questions. The questions and our responses follow.

CRITICAL ENVIRONMENTAL CHALLENGES OF THE FUTURE

Question #1. What will the critical environmental issues be over the next couple of decades? Which of those will be especially critical? To Washington, the region, and/or the world? To which of these is WWU (Huxley and others) already responding, or could prepare to respond? Are there gaps in environmental education or research that WWU is uniquely position to fill, because of the background of faculty, this region, facilities at Western or through our partnerships, links to potential funders, etc.?

When Huxley College began in 1969, American society faced the growing specter of visible pollution, dead and dying species, and unprotected and deteriorating natural habitats. Huxley College was at the forefront of quantifying these '*first-generation*' environmental challenges. Then a '*second-generation*' of environmental challenges arose, and Huxley College responded by developing techniques for quantifying and assessing problems like the invisible pollution from non-point sources, and policy frameworks for assessing the dangers this pollution had created.

Today, society is increasingly aware that new '*third-generation*' environmental challenges are global in scale and long-term in scope.[1] The challenges are unmistakably interconnected and complex. The 2005 UN Millennium Report noted that the provision of food, fresh water, energy, and materials to a growing global population has come at considerable cost to the complex systems of plants, animals, and biological processes that make the planet habitable. As human demands increase in coming decades, these systems will face even greater pressure, increasing the likelihood of further weakening the natural infrastructure on which all societies, and life itself, depend.

A crucial driver of today's major environmental challenges is our rapidly growing human population. Demographers estimate that sometime this year, a baby will be born who will be the seven billionth person alive on this planet. A mere forty years ago, there were approximately half as many of us. Forty years from now, our population is expected to reach ten billion, adding the equivalent of almost three new Indias to the number of people alive today. Already, over one billion of us suffer from chronic malnourishment and a lack of safe drinking water. Already, energy consumption is increasing twice as fast as population growth. Simultaneously, we live on a planet faced with the overarching threat of anthropogenic climate change. The natural environment is now a human-dominated one and our most critical social challenges are environmental challenges.

Protecting and improving our future well-being requires wiser and less destructive use of natural assets. This, in turn, involves major changes in the way we make and implement decisions. Differential access to clean water, land, food, and livelihoods -- stemming from looming environmental resource limits and a ballooning population -- create complex socio-ecological challenges that seem unmanageable within the boundaries of conventional policy, practices, and institutions. These challenges simultaneously demand more sophisticated social and ecological science, and increasing transparency and participation in the development, implementation, and enforcement of environmental laws and regulations.

[1] Lamont Hempel (2006). Climate Policy on the Installment Plan. In Vig, Norman J. and Michael E. Kraft (eds.) *Environmental Policy: New Directions for the Twenty-First Century.*

Frameworks for Environmental Problem Solving

Two key frameworks – **sustainability** and **resilience** – motivate much environmental problem solving today. These frameworks guide discussion of the problems, and as metaphors, they suggest strategic approaches and solutions. At Western, these frameworks are ideal foci for catalyzing broad university engagement, for each will benefit from a broad range of disciplinary perspective and interdisciplinary application.

In recent years Huxley College faculty have been at the forefront of debating, implementing, and building on sustainability and resilience platforms on campus and off.

- **Sustainability.** Today, humans are undermining the very environments on which they depend. Anthropogenic environmental changes -- such as climate change, biodiversity decline, and pollution– threaten the viability of both natural environments and human communities.[2,3] Our use of natural resources is simply unsustainable.

  Huxley College has been at the forefront of introducing sustainability approaches to Western. A sustainability framework must necessarily be interdisciplinary and consider the intertwined environmental, social, and economic factors to current problems and, (as originally defined by the Bruntland Commission), seeking to ensure society meets the needs of the present generation while not compromising the ability of future generations to meet their needs.

  At Huxley College, Environmental Science faculty are combining social science, risk assessment, and quantitative ecology to predict whether environmental management programs will be sustainable. Huxley College is partnering with Engineering Technology on a Sustainable Design minor and with the College of Business on an Environmental Economics major. Over the last two years, Environmental Studies faculty have

Environmental Leadership at Every Scale

Huxley is an effective and respected leader on environmental issues ranging from the local to the global. Here are a few examples:

Local. Urban Planning students partnered with the City of Bellingham for neighborhood design. Students assessed local business for green practices; other provide environmental education for local school children.

Regional. Students participated in evaluating the clean-up of the Scott Paper Mill in Anacortes. Others assessed business damage and recovery after the 2007 Centralia floods. Through its off-campus Peninsula program, Huxley College students collect essential baseline data on the Elwha River prior to an during dam deconstruction.

National. The EPA just recognized a Huxley College student for his work to create an interactive map for the Navajo Nation's water resources and the danger of seeping toxic waste.

Global. Each year students work with Huxley College faculty in Siberia to collect data on the thawing permafrost, in Costa Rica to monitor rainforest species, and in Greece to assist villages in sustainable development planning.

[2] Millennium Ecosystem Assessment Report. (2005). Washington, D.C.: Island Press.
[3] P.R. Ehrlich and D. Kennedy, "Millennium Assessment of Human Behavior," Science 309, no. 5734, 22 July 2005, pp. 562-563.

taught courses in sustainability literacy, which began a campus-wide sustainability curriculum. They have since been very active in the campus-wide Sustainability Initiative.

Looking forward to our need for sustainable energy sources, Huxley College is partnering with the College of Business and Economics and the College of Science and Technology to develop a Clean Energy Program (see box, page 12). This program will prepare students to be interdisciplinary problem solvers in the rapidly expanding green energy economy. Faculty throughout campus are collaborating to develop this exciting and integrated program of learning, research, and regional involvement.

In 2010, the Department of Environmental Studies and faculty throughout campus started the Urban Transitions Studio, a collaborative partnership between the university, local government and organizations, to promote urban sustainability in local community development. The department's professional major in Planning and Sustainable Development continues to emphasize the growing specialization in smart growth principles.

Throughout campus, other departments are also implementing sustainability frameworks in teaching and research. For example, Woodring College of Education offers a teaching endorsement in Environment and Sustainability - the first of its kind in the nation - providing teachers with tools to bring sustainability concepts into PK-12 education. Faculty in the College of Business and Economics teach courses in green accounting, triple-bottom line economics, and marketing strategies for sustainability. Faculty in Fairhaven College offer several courses on sustainability and human ecology. Many faculty, within Huxley College and throughout campus, critique differential access to clean water, land, food, and livelihoods, highlighting the important place social justice has within environmental problem solving. In all, thirty courses in the 2011-12 Western Catalog focus on sustainability directly in title or course description. Further, a 2008 survey of faculty associated with the Sustainability Initiative found faculty incorporating sustainability principles in courses, particularly biology, geology, and material science courses, where sustainability was not a primary focus.

Yet, even as the concept of sustainability is permeating the intellectual and policy landscapes, the idea itself requires more careful consideration. At Huxley, the metaphor of sustainability is debated, critiqued, and sometimes even rejected. Western is well served by Huxley students and faculty engaging the very concept of sustainability and its shortcomings. Huxley faculty and students make sustainability a better metaphor and platform by examining its intellectual and political inconsistencies, comparing what is politically achievable to what is ecologically necessary for sustaining the ecosystem services on which society depends. For example, in human ecology courses, students analyze competing goals inherent in sustainability definitions – goals that cannot be achieved simultaneously. In policy courses, students discuss the implications of intergenerational and cross-national equity. Across Huxley, faculty, staff, and students critique calls for sustainability that support a maintenance of current conditions, undercutting efforts to transform society or restore natural systems. Students study how corporations have used the term to obscure harmful practices or promote consumerism. Across an array of courses, faculty and students attempt to

operationalize sustainability, however imperfectly, in the process of solving critical environmental problems. (For a timeline of sustainability activities at Huxley College, Western, and the local community, see Appendix 2.)

- **Resilience.** For the first time in history, more than half the global population lives in urban centers. These swelling urban centers struggle with environmental challenges on a new scale and with new dimensions. For example, unmanaged development in coastal zones, along seismic faults, and in flood plains, expose great numbers of urban residents to hazards they may not fully recognize. Meanwhile, environmental degradation has weakened the protective buffering of wetlands, coastal marshes, and other natural environments in many areas. Large-scale environmental disasters, such as the Gulf Oil Spill, Hurricane Katrina, and the Japan Tsunami, are on the rise. Resilience considers how communities can develop the necessary adaptive capacity in the face of a dynamic and changing environment. It complements and expands on a sustainability framework, applying a foundational ecological concept as a metaphor for socio-environmental interactions.

  Over the last five years, Huxley College has incubated and grown a new Resilience Institute, incorporating resilience frameworks in teaching and externally funded research. A resilience framework has also focused many of Huxley College's strengths in natural processes and environmental policy and planning. Building upon Huxley College's tradition of pragmatic environmental problem solving, faculty, students, and staff have been examining how communities can better adapt to local environments, whether those environments include wildland fires, earthquakes, floods, or other hazards.

  In fall 2011, the Department of Environmental Studies began offering a minor in Disaster Risk Reduction, providing students throughout campus with access to classes on natural hazards and human vulnerability to them. The minor includes courses where interdisciplinary engagement and collaborative service learning are required.

  Huxley College is not alone in considering how to better manage the impacts of natural hazards. For example, many courses in the Geology Department introduce students to the geophysical and meteorological processes that give rise to natural hazards affecting society, and explore strategies for societal adaptation. The Psychology Department teaches courses in psychosocial adaptation to environments. A few other courses elsewhere on campus also bring disciplinary perspectives to bear on climate change and adaptation to it.

Human civilization depends upon our ability to manage emerging environmental challenges. Huxley College is helping to develop practical ways to solve environmental problems associated with a growing human population, while also drawing attention to the need for reducing population growth to sustainable levels. Its work is at every scale from global, to regional, to local. The college's interdisciplinary approach is, and has been, to study environmental challenges with a pragmatic eye and an approach that fuses policy and science. The leadership and focus Huxley College has so long placed on the environment continues even as the complexity grows and the framing of problems changes.

Critical Regional Environmental Issues

Washington State's economy is largely built upon the natural resources of the Puget Sound. A recent economic analysis found that the natural ecosystems within the Puget Sound provide an annual regional economic benefit of between $7.4 billion and $61.7 billion. The Puget Sound recreational fishery alone is valued at $57 million a year. Drawn to the region's natural beauty, tourists spend $9.5 billion per year in the Puget Sound area.

Puget Sound residents value the region's natural resources. According to a 1998 University of Washington survey, households in Western Washington were willing to pay $8 billion over 20 years to increase the Sound's migratory salmon population by 50 percent. Yet, recent and predicted population growth is threatening the health of the ecosystems upon which residents depend. The 2007 "State of the Sound," produced by the Puget Sound Partnership indicated, for example, that:

- Over 80% of tidal wetlands have been lost since the advent of European settlement,
- Intense urban development has occurred in almost all floodplains,
- Over 150,000 acres of farmland have been lost to development since 1982,
- Approximately 1,474 fresh and marine water sites have been listed as impaired, mostly from toxic contamination, low dissolved oxygen, or fecal coliform, and
- Currently, the federal government lists 10 Puget Sound species as federally threatened or endangered.

Critical environmental issues in Washington State and the Puget Sound region, in particular, mirror global concerns:

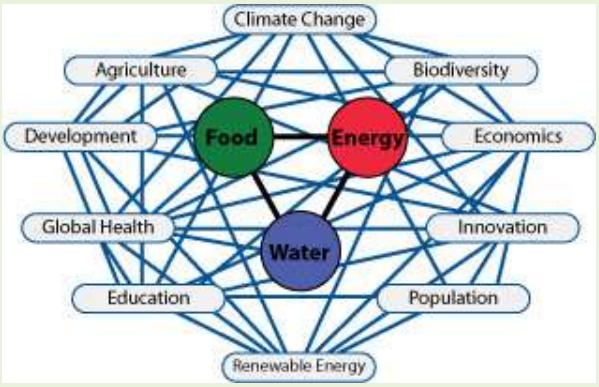
- **Rapid population growth.** Currently, 4.3 million people live within the Puget Sound Basin and the population is expected to grow to 5.3 million by 2025; this rapidly growing population is increasingly dependent upon limited resources.
- **Anthropogenic climate change.** The local economy is dependent upon a decreasing winter snowpack for irrigation, energy production, domestic water supply, and salmon habitat. Increasing rates of sea-level rise will have impact on habitat and human infrastructure.
- **Dissipation of wastes.** The wastes generated by a growing population can have profound impact on many systems, reflected, in particular, by declining water quality in the Sound.
- **Natural habitat loss.** Human development and ecological deterioration have been driving the loss of the natural habitats upon which our economy depends.
- **Energy production.** The region is a microcosm of the complex global energy challenges. On the Olympic Peninsula, the state is dismantling hydropower dams to restore river ecosystems; along the Sound, refineries export oil products via pipelines and ships. In Whatcom County, local agencies are reviewing plans for overseas shipping of coal. Across the state, wind farms have become established energy production technology; experimental tide-driven turbines technology being tested in the region may offer a new approach to energy production.
- **Natural hazard exposure.** Washington State population growth is exposing increasing numbers of residents to significant natural hazards. The state is ranked as having the second highest susceptibility to economic loss caused by earthquakes. Geological evidence indicates a 10-14 percent chance of a large tsunami occurring in the next fifty years. Since 1990, 11 flood events and 13 severe storm events have been designated federal disasters in Washington State since 1990. The state prioritizes natural hazard assessment and adaption through a range of strategies, including its Resilient Washington initiatives, climate change impacts assessments, and growth management policies.

HUXLEY COLLEGE'S INTERDISCIPLINARY APPROACH

Question #2. A strength of Huxley has been its interdisciplinary research and teaching capacity, a capacity likely to be even more important in the future. How is that capacity nurtured and supported by internal and external forces? How is it undermined? How does having a separate college of the environment help or hurt teaching, research and service in this interdisciplinary field? What recommendations would you make for strengthening Western's capacity for interdisciplinary work in all fields?

Industry, government, and social organizations increasingly recognize that effective solutions to current environmental problems emerge from interdisciplinary research and collaborative frameworks. In a 2011 report to President Obama, the National Academy of Sciences recommended interdisciplinary research combining economics, sociology, biology, and ecology. They noted societal well-being and sustainability "require breadth of understanding and multi-factorial approaches." In 1990, the National Council for Science and the Environment was established to make science relevant to environmental policy and encourage collaborative problem solving. The National Environmental Policy Act requires federal agencies "to utilize a systematic, interdisciplinary approach." The National Science Foundation also requires researchers to address the broader implications of proposed research on the environment.

> *"Huxley had a different way of looking at the world that was more complex than the straight biology I had been doing. What Huxley offered was a complicated holistic view."*
> Tim Nord, Manager of Land and Aquatic Lands Cleanup, Dept of Ecology. (As quoted in *Green Fire*.)



AAAS diagram of the challenges to modern science

The call for interdisciplinary environmental problem-solving is clear. So much so, that the American Association for the Advancement of Science, in its 2012 Annual Meeting, is focusing on the complex interconnected challenges of the 21st century. These challenges center on providing food, energy, and water to human populations, a challenge that requires interdisciplinary problem solving across an array of foci.

What Interdisciplinary Learning Looks Like at Huxley College

Huxley College teaches and researches policy-relevant environmental science, a necessarily interdisciplinary endeavor. In mission, in vision, and in practice, Huxley College immerses students in interdisciplinary learning, collaborative problem solving, and engaged research on critical environmental challenges. The college offers a place and space for a consistent, innovative, and collaborative conversation about environmental challenges and their solutions.

Rather than give students a menu of environmental courses dispersed across the University, Huxley College recognizes that students need some discipline to be interdisciplinary. Huxley College offers majors that emphasize applied environmental problem solving in our Departments of Environmental Science and Environmental Studies. Within these departments, faculty weave interdisciplinary and collaborative problem-solving skills into courses with disciplinary depth. Advising, teaching, and research all emphasize applied learning. Here's how:

- **Each Huxley College student takes cross-departmental courses.**
  The hallmark of a Huxley College education has been the melding of science, the social sciences, and the humanities. Science describes the problems and technical fixes and the social scientific and humanistic studies suggest how problems and solutions may be addressed in economics, politics, and culture. Huxley College's curriculum requires Environmental Science students to take at least two upper-level Environmental Studies courses, and vice versa. Any upper-level cross-department course is also an acceptable elective course. The cross-curriculum requirement mimics the work world. No field ecologist is free from the need to understand policy; planners or geographers need to interpret scientific reports.

- **Every Huxley College student takes a capstone course.**
  In their senior year, every Huxley College student takes a capstone course that requires students from the Environmental Science and Environmental Studies departments to collaborate on the development of an interdisciplinary and applied solution to a real-world environmental problem. In capstone courses, students work in cross-disciplinary teams for the entire quarter. Team projects are based on actual environmental challenges, with partners from off campus.

  "At Huxley, I have found a community of peers and scholarly mentors who inspire and support me to make a positive difference in the world."
  recent alumna

  Capstone projects are diverse, but all focus on interdisciplinary problems. Past examples include environmental impact assessments for proposed development, reducing impacts of geese at SeaTac Airport, the Bellingham waterfront redevelopment, design solutions for local urban villages, and designing emergency housing solutions for Haiti following a devastating earthquake in 2009. The success of this approach to cross-discipline collaboration can be seen in Huxley College's yearly participation and dominance in the Environmental Challenge, an international competition arranged much like the Huxley capstone course. Award winning Huxley teams, made up of toxicology, geography, policy, and planning majors, have worked on scenarios ranging from Hurricane Katrina to the tar sands of Alberta.

- **Every Huxley College student completes 300 hours of internship, student research, or international studies.**
  The Huxley College curriculum encourages students to experience workplace collaboration and problem solving by requiring a 300-hour internship with a non-profit organization, business, or government agency. Since 1999, students have completed over 361,800 internships. Huxley College internships have helped sustain groups like the Nooksack Salmon Enhancement

Association, Yukon Delta National Wildlife Refuge, The Tasmanian Long Point Reserve as well as agencies in Seattle, Bellingham, Ferndale, Blaine, and Anacortes. Interns have observed whales, wolves, and goats; others have made impacts on the Bellingham waterfront and the rehabilitation of the Port of Anacortes. After completing their internships, students write a report reflecting on the experience and documenting their contribution. Other students have provided detailed scientific data gathered from their research with NOAA, the Washington Department of Fish and Wildlife, and the Washington Department of Ecology. Huxley College faculty also led several international studies applied programs, bringing students into international communities to help apply global knowledge to local problems.

- **Huxley College courses and research emphasize student service learning.**

Through service learning, Huxley College engages with local, state, national and international communities. Direct student engagement in environmental problem solving forms a core component of capstone courses, but is also embedded in studio and skills courses. Environmental Education majors have created and run multiple outdoor schools and designed restoration and interpretive education programs throughout the region. Students studying toxicology have applied their research skills to local clean-up sites, in partnership with the Department of Ecology. This year, Planning and Policy students worked with county agencies to develop tsunami preparedness guides on the Olympic Peninsula. For years, Huxley Environmental Science and Environmental Studies faculty have co-taught a course on environmental stewardship. Students have worked with Whatcom County Parks Department preparing newly acquired land for parks management and public access. For six years, Huxley College students taking international studies courses have assisted communities in Kefalonia and Ithaca, Greece as they planned sustainable development. In Costa Rica, students have contributed to field research on species occurrences in the Carara National Park. Locally, student service learning has resulted in public policy reforms supporting sustainable approaches to Bellingham urbanization.

> *"I wanted to let you know how amazing Huxley's program was . . . The "Big Ten" Masters program that I am currently attending is simply a disappointment in comparison."*
> Unsolicited email from Huxley alumna

What starts as service learning in the classroom often catalyzes change outside the classroom. In 2005, Huxley College students and faculty formed the Air and Waste Management Association and began quarterly waste audits across campus. Student's efforts to catalog compost and recyclable material in Western's waste stream have resulted in food composting bins in some buildings and may lead to paper towel composting on campus.

- **Huxley College institutes give students interdisciplinary research experience.**
  Huxley College's four research institutes employ undergraduates and graduates in applied environmental research:

  –**Institute for Watershed Studies**. The Institute, celebrating its 50th anniversary next year, works with students, faculty, staff, and members of the community to help solve critical problems related to declining water quality in our region.

  –**Institute for Spatial Information and Analysis**. Students use GIS, GPS, and Remote Sensing technologies to gather and analyze spatial data and for cartographic projects, including web mapping.

  –**Institute of Environmental Toxicology**. Students assess chemical effects on humans and ecological systems in diverse locations, including Port Valdez, AK; Australia; South America; and the Pacific Northwest.

  –**Resilience Institute**. Students work with communities to evaluate and enhance their resilience in the face of complex and changing environmental hazards. Students survey communities, analyze state policy gaps, create online hazard planning tools, develop resilience workshops and assist in external grant writing.

> *"Huxley currently practices what many visionaries believe to be necessary for the beneficial future of the planet. . . . I see Huxley and its curriculum as the nexus for learning on the Western campus and would like to see it reflected and promoted as such."*
> Kathryn Wayne, Professor at Woodring

Repeatedly, Huxley College courses and major requirements expose students to interdisciplinary environmental problems, and then expects them to develop workable solutions. In each case, faculty and staff supervise student work and teach valuable professional and analytical skills.

Huxley College's ability to produce environmental problem-solvers is a result of a common culture valuing interdisciplinary perspectives. Huxley College cultivates a worldview that highlights the critical connections between humans and their environment, and encourages sustained collegiate engagement of faculty across disciplines. Furthermore, the geography of the region lends itself to the study of complex problems with our blend of wilderness, working landscapes, and dense urban settings. Western's size allows Huxley College to be agile, adjusting curriculum to a changing world. The College's international network of alumni provides networking for our students and continuous feedback on our efficacy.

How Collegiate Structure Supports Huxley College's Interdisciplinary Work

Huxley College faculty and staff comprise a systematically identified group of individuals whose training collectively spans a wide range of disciplines from social and natural sciences to the humanities. They apply rigorous disciplinary expertise to interdisciplinary teaching and scholarship. Many also bring explicit interdisciplinary training to their work at Huxley College. Faculty have been selected to provide

the broadest representation of environmentally related concerns and solutions. Huxley College's success in maintaining an interdisciplinary research and teaching lies in the autonomy it has as a college, allowing it to be nimble and responsive to rapidly changing needs and priorities.

Within Huxley College, the tenure and promotion process rewards interdisciplinary approaches. Faculty are still rewarded for conventional forms of achievement – good student evaluations of teaching, a well-developed research agenda and plan, and scholarly output. However, Huxley College also rewards faculty for exploring new approaches to teaching about the environment and to interdisciplinary problem solving.

Furthermore, Huxley College's tenure and promotion process challenges faculty to explore how their diverse trainings and interests might be brought together in instruction and research. During the review process, all faculty must understand and assess the achievement of their colleagues, part of which is usually beyond their special expertise and interest. The very process requires faculty to examine new disciplinary perspectives and methods in ways that educate and foster interdisciplinary exploration.

Western has supported Huxley College's interdisciplinary curricular innovation, by granting the college exceptional curricular autonomy. Huxley's status as a distinct college has made its unique curriculum possible. Curricular innovation is, by nature, difficult. Interdisciplinary innovation is especially so when curricular review bodies are dominated by faculty with strong disciplinary backgrounds and interests. At Huxley College, faculty are encouraged to co-teach with diverse faculty, both within and outside of the College. The result is exceptional interdisciplinary curricular innovation.

Western has allowed Huxley College to review curriculum through an interdisciplinary College Curriculum Committee, followed by standard University review. This freedom from the constraints of a discipline-dominated university curriculum has given the college greater freedom to experiment in teaching and learning. It has also allowed Huxley College to respond rapidly in a curricular fashion to outside needs generated by new environmental challenges. Huxley College has been successful because it can innovate interdisciplinary inquiry approaches, while relying upon strong disciplinary partners in the university at large.

Western has also supported Huxley College's interdisciplinary research achievements by supporting its critical mass as a college. The small size and democratic structure of the college foster communication and collaboration in an atmosphere of appreciation and respect for the wide range of intellectual pursuits that result. College faculty, staff, and students interact frequently and congenially, fostering a strong sense of community and shared values.

College structure has also supported centralized student advising. Rather than individual faculty advising students based upon their own disciplinary leanings, college advisers encourage students to expand beyond disciplinary boundaries. College advisers recommend a wide breath of interdisciplinary offerings. Advisers receive feedback on courses from successful professional alumni and encourage students to build strong, interdisciplinary learning experiences. By increasing student demand for interdisciplinary courses, the college advising structure further encourages curricular innovation.

Currently, the lack of a unified physical space impedes Huxley College's interdisciplinary work. Environmental Science and Environmental Studies faculty, students, and staff are spread across two buildings, without a functional common space for exchanging ideas, advising, or administration. While weekly all-college seminars, staff meetings, and social engagements do draw faculty across the college together, shared spaces would trigger further informal interdisciplinary conversations and lead to more dynamic interdisciplinary engagement in research and teaching.

Strengthening Interdisciplinary Work throughout Western

To strengthen interdisciplinary work across Western, the President and Provost can provide strong leadership, publicly promoting interdisciplinary work and its fundamental importance to Western's mission. Furthermore, they can support two key institutional changes.

First, procedural and cultural barriers to interdisciplinary work need to be removed. Procedurally, most faculty experience disciplinary based peer review for tenure, merit, and promotion. Co-authorship, co-teaching, and interdisciplinary research may not rank highly in these disciplinary reviews. Cross-department and cross-college curricular innovation may meet with internal skepticism about curricular experimentation and alternative education practices. Culturally, many faculty may be most familiar and comfortable with disciplinary approaches, methods, and perspectives. Without strong leadership, this disciplinary comfort may foster a sense of disciplinary competition. Interdisciplinary collaboration may be perceived as a budgetary threat rather than an opportunity for innovation.

WESTERN'S CLEAN ENERGY PROGRAM

Western's emerging Clean Energy Program serves as a model for how Huxley's interdisciplinary approach can be applied campus-wide. This program is one of the pillars of the new capital campaign and its development is moving forward rapidly with strong participation from three of Western's colleges.

The Clean Energy Program's curricular structure is directly modeled on Huxley College's interdisciplinary approach – an approach where students from different majors begin their work together with shared fundamentals, develop disciplinary depth separately, and conclude together with an applied project. The new program is an innovative effort like Huxley College: interdisciplinary, applied, and responsive to current societal needs.

The curriculum for the Clean Energy Program includes energy majors with a Bachelor of Arts degree and a Bachelor of Science degree. Students may also work towards minors in energy science and technology; or policy, economics and business. The students in the program share a common core set of courses on energy science, policy and technology. The BA students then specialize in energy policy, economics and business. The BS students focus on energy science and technology. These tracks merge again with a capstone class that brings together the science-oriented and policy-oriented students to work on an applied energy issue. Students bring their respective strengths and tools to bear on a real-world problem and develop critical collaborative skills. (For more information, see Appendix 4)

As Western moves forward as a University of the Environment, Huxley's College's approach to interdisciplinary education may serve as one useful model for further campus-wide interdisciplinary innovation.

Academic units may need encouragement to remove these barriers, such as clear and explicit instructions on evaluating interdisciplinary work when rewarding faculty. For example, The University of Southern California has done so by directing departments to include interdisciplinary co-authors and faculty outside the candidate's department in the review of interdisciplinary and collaborative work.[4]

Second, positive incentives are needed to encourage interdisciplinary work. Potential incentives may include enhancing the FIG structure to support co-teaching in upper-level courses, awards that highlight interdisciplinary innovation, and support of interdisciplinary proposals such as the faculty-developed Sustainability Initiative. Support for the hiring and retention of joint-appointments may provide further incentive, as may explicit structures for cross-unit affiliations.

Third, to scale interdisciplinary work throughout campus will require multiple, robust forums for engaging highly- salient social challenges with broad interest. Sustainability may serve as one such hub – a dynamic theme bringing faculty, students, and staff together to collaborate across collegiate units. Additional hubs may center on other key social issues, such as health, energy, or the liberal arts. In each case, interdisciplinary forums will be most effective when they are supported by a physical space, have clear mechanisms for affiliation, and are empowered with institutional authority. These hubs may serve as appropriate entities for establishing internal and external affiliations, providing review mechanisms for interdisciplinary teaching and research, and supporting disciplinary units when evaluating interdisciplinary tenure and promotion packages.

Fourth, to retain Western's role as a university of engaged learners and Huxley College's role as producer of environmental leaders, Western should provide incentives and recognition for work on problem solving in practice.[5,6,7] Practical work should be rewarded because it supports real progress towards solving interdisciplinary problems, refining scholarship and teaching, and increasing opportunities for students to actively engage in service learning.

Huxley College, where appropriate, can serve as a voice of experience during the shaping of policies aimed at enhancing interdisciplinary work at Western.

[4] http://cgi.stanford.edu/~dept-ctl/tomprof/posting.php?ID=1130&search=interdisciplinary
[5] Whitmer A., et al. 2010. The engaged university: Providing a platform for research that transforms society. Front. Ecol. Envt., 8:314-321.
[6] Arlettaz R., et al. 2010. From publication to public actions: When conservation biologists bridge the gap between research and implementation. BioScience, 6:835-842.
[7] Pace M.L., et al. 2010. Communicating with the public: Opportunities and rewards for individual ecologists. Front. Ecol. Envt., 8:292-298.

HUXLEY COLLEGE'S MISSION

Question #3.Given all the above, in light of the university's mission, should Huxley's vision be revised to position it for the next two decades? Should the vision of the University or other units within it be revised in light of the above?

Huxley College's vision is to be a premier institution for the education of future environmental experts and leaders, both regional and global. Huxley College's mission is to address today's environmental challenges and prepare tomorrow's interdisciplinary problem solvers. We accomplish this mission by integrating outstanding educational programs, faculty-student collaboration, applied research, and professional and community service – using the teaching, advising, and college structure described above.

To further Huxley College's mission and the University's vision of being a leader in active learning and societal problem solving, the college continues to find better ways to engage with Western students in Whatcom County and beyond.

- **Freshman and sophomore engagement.** Huxley College, traditionally an upper-division college, is moving towards direct engagement with freshman and sophomores. In 2012, Environmental Studies students will be able to declare a Huxley College Major and have access to Huxley College advising and community-building events during their first two years at Western. Huxley College has also committed to a new set of lower division courses to serve these new students and to accommodate the growing demand for lower division environmental courses throughout campus. Three of these courses are part of our Environmental Studies core curriculum, and many of our lower division courses are also intended to serve the entire campus community and operate as GURs on topics such as sustainability, environmental literacy, and clean energy. For the Department of Environmental Studies, these changes begin in 2012. The Department of Environmental Science intends to follow.

- **Consolidated majors.** Over the last two years, the Department of Environmental Studies has undergone an unprecedented restructuring, consolidating its major offerings and developing a set of core courses and competencies students need to effectively address emerging environmental problems. Starting in 2012, the department will introduce an entirely new rubric for all department courses and five streamlined majors. The department will also reach students earlier and students will be able to navigate programs more easily.

- **Interdisciplinary graduate degree.** Huxley College is also considering an interdisciplinary graduate degree in Environmental Studies. Such a program would provide an opportunity for graduate students to build on the interdisciplinary strengths of the College. More importantly, this program would incorporate faculty from all across Western. Huxley College hopes to establish an affiliated Environmental Studies Graduate Faculty, available to the graduate students, and able to serve as chairs for student committees.

- **Peninsula and off-campus programs.** Huxley College's collaboration with marine scientists and biologists at Shannon Point Marine Center and its extension program on the Olympic Peninsula have extended interdisciplinary education opportunities throughout northwestern Washington. Mid-career and place-bound students in the Huxley on the Peninsula Program can take a full set of Environmental Science or Environmental Studies courses at campuses in Port Angeles, Bremerton, Poulsbo, and Everett, while actively engaging with local tribal and government agencies through service learning projects, research, and internships. On the peninsula, Huxley College's off-campus faculty also managed a large Research Experience for Undergraduate (REU) program focused on environmental assessment prior to the Elwha River dam deconstruction, the largest such deconstruction project in the nation.

Frameworks like sustainability and resilience, combined with concerns about environmental equity, are driving the search for solutions to critical environmental challenges today. Any new discussions about the appropriateness of revising Western's and other academic units' visions around these frameworks should be carried out in a democratic and cross-campus collegiate atmosphere. The faculty of Huxley College would enjoy taking part in such endeavors.

ACHIEVING CAMPUS-WIDE ENVIRONMENTAL LITERACY

Question #4. Last year the Sustainability White Paper was finished with a series of recommendations. Would these recommendations be helpful in moving Huxley or Western forward?

Huxley College wholeheartedly endorses the Sustainability White Paper recommendations. These recommendations call for broadly expanding sustainability literacy, in-depth teaching, and collaborative learning and research at Western.

Huxley College faculty helped initiate the Sustainability Academy in 2008, currently serve on the Academy's steering group, and assisted in drafting the Sustainability White Paper. The Sustainability Academy is now an important forum where Huxley College engages with other colleges to deepen its understanding and teaching of environmental problems and holistic solutions.

> *"A major reason I came to Western was Huxley."*
> Roger Anderson, Former Chair of Biology

Huxley College represents an obvious academic unit to facilitate cost-effective campus-wide engagement around issues of sustainability, especially if supported under a broader university strategy aimed at developing multiple forums for interdisciplinary engagement. To provide a forum for interdisciplinary engagement on issues of sustainability, Huxley College's Environmental Studies department taught the experimental literacy courses in 2009-2011. Huxley College also proposed a new tenure-track position in sustainability, intended to partially support the White Paper recommendations for a GUR sustainability literacy sequence. The College anticipates the permanent course sequence will impact up to 30% of the freshmen class. Together with other existing GUR courses, including several offered by Huxley College, Western readily could achieve a GUR track in sustainability, as recommended in the Sustainability White Paper. Regardless of whether the White Paper recommendations are furthered under a new independent institute, as proposed, or through an existing institutional unit, Huxley College intends to play a central role.

Huxley College strongly agrees with the White Paper's recommendations to further strengthening university-wide research and initiatives in sustainability studies. Huxley College faculty initiated this priority through campus brown bag discussions and a collaborative sustainability design session in 2009.

Furthermore, Huxley College actively promotes Western's involvement in regional sustainability initiatives. For example, Huxley College is involved in the *Curriculum for the Bioregion* Initiative housed at the Evergreen State College. Huxley College and other Western faculty meet together regularly with Bioregion partner institutions to further integration of sustainability curriculum throughout colleges and universities in the Puget Sound. In August 2011, Huxley College– along with Skagit Valley College's Environmental Conservation Program and The Evergreen State University's Curriculum for the Bioregion Initiative – will be hosting a one-week field course on the Northern Puget Sound/Salish Sea.[8] The course

[8] http://www.evergreen.edu/washcenter/home.asp

will address environmental issues such as water use, farmland preservation, hydropower, and watershed restoration, among other issues.

Other Sustainability Initiative White Paper recommendations call for sufficient resources to coordinate better activities among governments, businesses, non-profits, and institutions. The goal of such coordination would be toward re-imagining and redesigning higher education to meet the context of the 21st century. Huxley College agrees with the importance of this funding recommendation and anticipates the College will play a continued key role in the university's longer-term vision.

"I think it is absolutely critical that we have a group of faculty with expertise in environmental sciences and environmental studies focus on interdisciplinary problem solving."
Victor Nolet, Professor at Woodring

WESTERN'S VISION, HUXLEY'S FUTURE

Human civilization depends on our ability to solve the critical environmental challenges of our day with justice and sustainably. Huxley College wants Western to be a place where all students are exposed to current and emerging environmental challenges through campus-wide sustainability literacy courses. For students interested in becoming part of the next generation of environmental problem solvers, Huxley College wants to be their academic home. At Huxley College, students gain the interdisciplinary analytical skills to address critical environmental challenges in environmental equity, sustainability, and resilience. In the classroom, they find opportunities to apply these frameworks through community partnerships at the local, regional, and global scale.

A strong Huxley College supports Western's goal to be a "University of the Environment." At Huxley, faculty, students, and staff debate strategies for environmental problem solving. Concepts like sustainability and resilience achieve depth and nuance, and ultimately application. Interdisciplinary learning is the norm in classrooms, in applied research, and in the college's internal reward structure. A strong Huxley College will continue incubating innovative environmental problem-solvers that excel within the academic unit and continue to trigger broader campus-wide and community-wide change.

Simply put, if Huxley College did not exist, Western would need to create it.

Appendix 1. Productivity of the Collegiate Unit

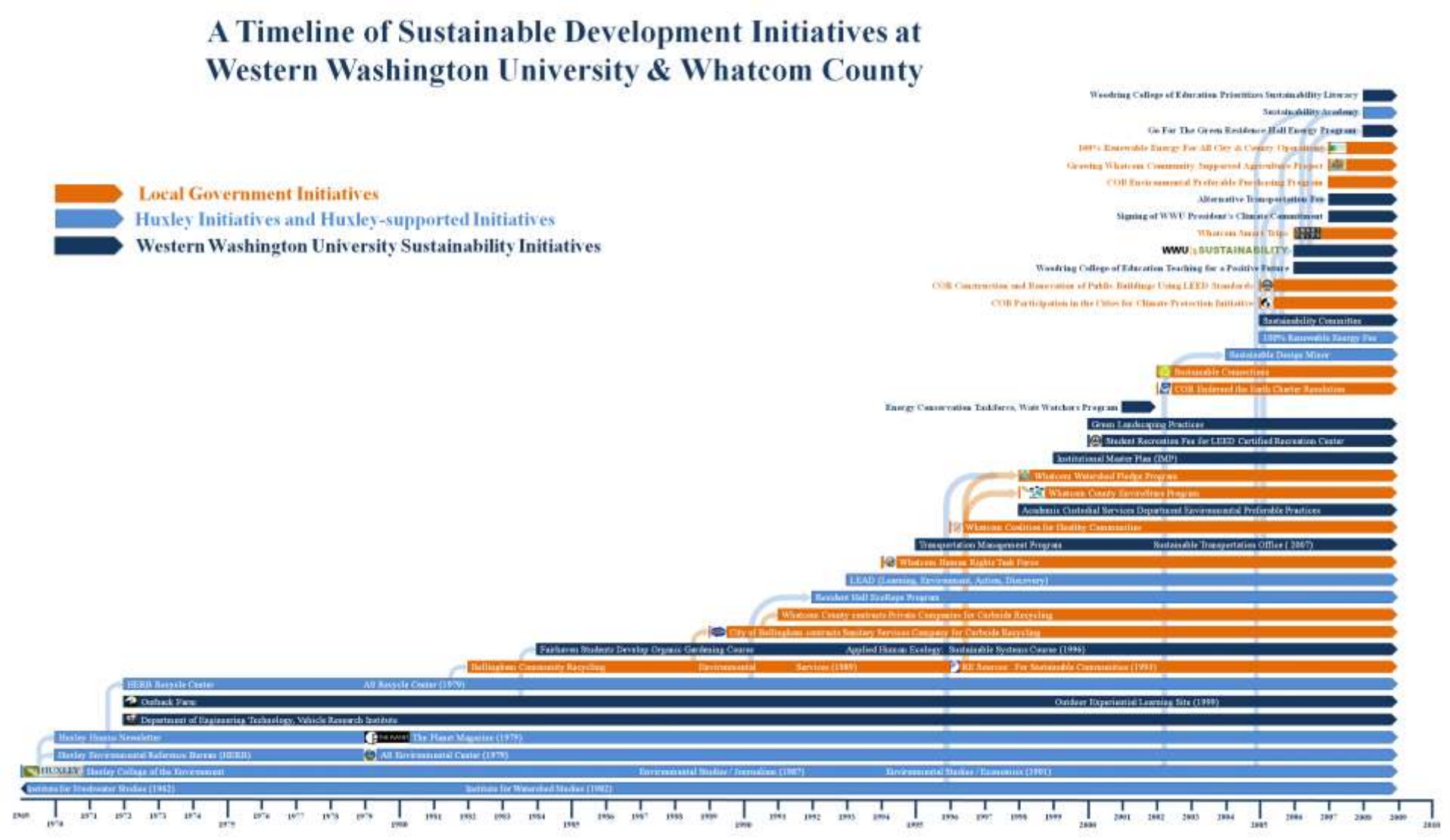
As an established college, Huxley College provides educational and research leadership in an efficient and productive manner. With only 1.9% of the University's operating budget, Huxley draws outstanding students and creates a high quality applied research environment, and achieves high levels of academic output.

- During the 2010-2011 academic year, 7.1 % of all Huxley science majors were Honors students, and 4.1% of all environmental studies majors were in Honors.
- In the Fall of 2011, 14.1% of Huxley' undergrads were non-residents, compared to only 9.5% of Western first-years. Fifty percent of Huxley graduate students are non-residents.
- Over the last year, Huxley's 39.9FTE faculty and staff have produced 32 refereed journal articles, four books, 10 other journal articles, 12 book chapters, two edited volumes, and 72 conference papers.
- Huxley faculty support more graduate students per faculty member than any other college.
- Huxley holds one of the lowest times to degree of any college.

College	Time to Degree[3]	External Grants, 1999-2011[1]	Under grads, SP11[2]	Grads, Fall11	Faculty and Staff, FTE[4]	Under grad per FTE	Grads per FTE	FY 1999-2011 Grants/ current FTE	FY 2011 Operating Budget (state + self-sustaining)	% of University Operating Budget	Grants FY 2009-2011/ Current Operating Budget
CBE	4.4	$4,437,340	1214	114	63.94	18.98	1.78	69,397	9,070,472	4.4%	0.49
Fairhaven	4.6	$132,263	216	0	25.71	8.40	NA	5,144	2,446,562	1.2%	0.05
Humanities and SS	4.4	$6,336,901	3635	265	190.85	19.05	1.39	33,204	20,803,178	10.0%	0.30
S&T	4.9	$47,415,909	1604	133	131.82	12.17	1.01	359,716	15,507,634	7.5%	3.06
Woodring		$19,818,070	1065	175	73.05	14.58	2.40	271,295	7,038,339	3.4%	2.82
Huxley	**4.4**	$9,515,490	401	101	39.90	10.05	**2.53**	238,501	4,039,860	**1.9%**	2.36

1 RSP, Oct 6, 2011. 2. Academic Fact Book and Institutional Reporting. 3. Office of Institutional Research, WWU August 2010. 4. WWU Operating Budget FY 2011, University Planning and Budgeting.

Appendix 2. A Timeline of Sustainable Development Initiatives



URL: http://www.wwu.edu/huxley/docs/SustainAcad_Timeline_Final%20-with%20Huxley.pdf A sustainability timeline includes Institutes of Freshwater and Watershed Studies, the AS Environmental Center, The Planet magazine, the AS Recycling Center, Learning-Environment-Action-Discovery (LEAD), Campus Planning Studios, the Office of Sustainability and Coordinator of Sustainability, and a Sustainability Committee -- all either initiative of or influenced by Huxley College. Compiled for the Sustainability Academy by Huxley's Resilience Institute, 2009.

APPENDIX 3. LETTERS OF SUPPORT

WESTERN
WASHINGTON UNIVERSITY

an equal opportunity university

College of Business and Economics

516 High Street
Bellingham, Washington 98225-9072
(360) 650-3896 • Fax (360) 650-4844

To: Brad Smith, Dean, Huxley College of the Environment

From: Brian Burton, Dean

Date: November 21, 2011

Re: Huxley College in a "University of the Environment"

As I consider the question of Huxley College's role in a university that justly can be called a "University of the Environment," I think of two particular functions it can play that I believe are very important. First is what I will call a "gadfly" role; second is the home for specific expertise related to environmental science and policy. Both relate to what I view a "University of the Environment" as meaning. That is, a "University of the Environment" will have an interest across disciplines, majors, departments, and colleges in aspects of science, policy, economics, society, and the arts that relate to the physical environment. Ideally this interest would naturally permeate what is discussed in courses and what is researched by students and faculty. Of course, this is not likely to occur because faculty and students in departments other than those in Huxley College quite properly have their own areas of expertise and focus. In very few cases will they have explicit training in environmental science and policy; most will have an interest and what might be called casual knowledge.

The first role I see for Huxley College thus is to keep a focus on environmental issues strong and constant throughout the University. I call this a "gadfly" role, but it also could be described as a "champion" role. Throughout the University particular people and departments raise the banner promoting emphasis on certain areas of high importance. Whether the champion is a center, a department, a college, or a committed group of individuals, the fact that a champion exists and the passion that champion brings to the subject keep it at the forefront of people's activities. Because the environment, like international studies, or service learning, or a number of other areas, crosses disciplinary boundaries, a champion must be in place to bring issues to the attention of all disciplines.

Admittedly, that champion does not have to be a college. However, I believe Huxley College has another function in a "University of the Environment"—that of housing the specific expertise related to environmental science and policy that must form a foundation for such a university. We could not be a "University of the Environment" without the expertise housed in Huxley College. Other faculty and students interested in the environment need that expertise to be able to study the issues involved. Collaboration with Huxley College faculty is vitally important to CBE students, for example, in our Economic/Environmental Studies major and in our proposed Business Sustainability major. The teaching and study of environmental science and policy could be housed elsewhere in the University. Then, however, they suffer from a bureaucratic separation of two units that, I believe, must work together to most effectively inform campus and public discussion of environmental issues.

APPENDIX 3. LETTERS OF SUPPORT

WESTERN
WASHINGTON UNIVERSITY

An equal opportunity university

Fairhaven College of Interdisciplinary Studies

516 High Street
Bellingham, Washington 98225-9118
(360) 650-3680 • Fax (360) 650-3677

To: Provost Catherine Riordan, WWU, and

Dean Bradley Smith, Huxley College of the Environment

Re: Huxley's Unique Niche in Western Washington University

Date: November 20, 2010

Dear Provost Riordan and Dean Smith,

I write to address a question I hear that you two are addressing: what is the unique niche of Huxley College of the Environment within Western Washington University, given that issues of the environment and sustainability are addressed in some other departments around the University, including Fairhaven College.

Huxley has a long record of working with other colleges at Western in terms of curricular themes, faculty and student research, and shared degree programs. This collaboration is essential to a university committed to interdisciplinary education and research. But it does not imply that having a center of expertise and excellence concerning ecology and the environment is redundant to scattered, even systematic, offerings elsewhere across the university's curriculum. Such a fundamental theme as the nature of ecological and societal sustainability deserves a central place and organized structure within the university. I know of no more efficient way to organize all this effort than relying on the leadership of Huxley College. The university has many learning outcomes that cross colleges – critical thinking, effective writing, international perspectives, social entrepreneurship, and so on – but we do not function without centers of expertise and excellence in these areas important to fulfilling our shared mission.

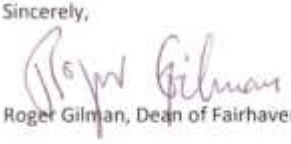
Huxley has been an effective way of organizing cross-college partnerships and resources for cross-college degree programs. It has been an effective way of organizing opportunities to fulfill sustainability learning outcomes for our students.

Many universities are adding schools or colleges of the environment, not dropping them. Huxley is a historic lead institution in this field. It brings distinction to Western. Many students and faculty are recruited to Western because Huxley is part of our university.

APPENDIX 3. LETTERS OF SUPPORT

Specifically from Fairhaven College's point of view, we value the fact that many Huxley faculty members participate in Fairhaven students' Concentration Committees. We share students between the colleges; we've hired each other's alums as faculty; we often share visiting scholars; we share use of the Outback Learning Center for courses, and so on. Huxley has certainly been a valued partner with Fairhaven in promoting the interests of students at Western. I hope that Huxley will be preserved as a college; its track record of success in helping the university fulfill its mission is evident.

Sincerely,



Roger Gilman, Dean of Fairhaven College, Western Washington University

Appendix 4. Clean Energy Program Details

Clean Energy Program

Educating the Leaders for our Clean, Efficient and Renewable Energy Future

Western Washington University is developing an innovative new program designed to meet the needs of a rapidly expanding green energy economy.

The program will integrate research and outreach with a unique interdisciplinary curriculum. The curriculum will include a Bachelor of Arts degree, a Bachelor of Science degree and the option to minor in science and technology; or policy, economics and business. Graduate degrees will also be offered. Research will cover a wide range of investigation related to clean and renewable energy and energy efficiency. Program participants will gain core competencies in energy related science, policy, technology, economics and business and have opportunities to participate in energy research with nationally recognized faculty-mentors.

Graduates of the program will be uniquely prepared to enter the workforce as leaders, equipped with the knowledge, skills and applied expertise demanded by this dynamic and evolving sector of the global economy.

Why Western Washington University?

Western is already involved in clean and renewable energy research and education. Several departments offer courses related to energy and numerous faculty members are engaged in energy related research. For example, the Advanced Materials Science and Engineering Center (AMSEC) is currently conducting research that could significantly improve the effectiveness of solar panels by developing technology for ultra-high efficiency collection and concentration of sunlight. Other research includes projects focused on upgrading biomass to renewable bio-fuels for transportation applications.

Western is geographically located in a region where energy entrepreneurship is prevalent and potential sources of renewable energy abound. Western has a long tradition of innovation and leadership and is well positioned to lead a timely expansion of educational opportunities for the region and, indeed, the nation.

The Clean Energy Program will continue Western's tradition of research innovation, environmental leadership and commitment to undergraduate education. Three colleges within the University have collaborated to produce a unique program that harnesses expertise from throughout the campus. All three colleges are nationally recognized for their outstanding educational programs and demonstrated educational excellence. This multi-college program will support interdisciplinary learning while fostering an approach to problem solving that encourages cross-discipline thinking.

Why create a new program?

Across the nation universities and colleges are expanding programs to respond to the demand for education and training related to clean and renewable energy. There has been a particularly strong surge in academic offerings connected with engineering and research. Some institutions have developed programs focused on policy.

What is missing, according to industry leaders, policy makers, business owners, researchers and academics, is a program that combines the fields of science, technology, economics, business management and public policy. Industry experts tell us there is a growing demand for an energy- related undergraduate program that produces both depth and breadth of knowledge. Scientists, researchers and business people need to

understand policy. Policy makers and entrepreneurs need to understand the science and technology upon which the industry is based. And everyone needs to understand the principles of economics and business management.

The Clean Energy Program at Western will address this critical, unmet need—right here, in Washington State. This new program will position the state to lead the nation in the next wave of economic expansion and innovation.

What will the Clean Energy Program look like?

Energy Experts

Individuals from outside the university, who understand the complexities of building and growing a clean, efficient and renewable energy sector, will have an ongoing role in helping guide the development and expansion of the program. Their participation will insure the continuing relevance of the program within a rapidly changing external environment.

Applied Research

Western is already involved in energy research including projects to increase the efficiency of photovoltaic cells; upgrading of biomass to renewable bio-fuels for transportation applications; and the development of highly fuel-efficient vehicles with low emissions. Students enrolled in the program will have opportunities to be directly involved in faculty-mentored research and applied technology projects. Research conducted in the program will have a direct impact on the regional economy and the ability of the state to lead development of clean, renewable and efficient energy.

Faculty Commitment

Faculty members from each of the three colleges have led the development of the program. Their commitment to education and research; recognition of student and societal demand; and renewable energy expertise has helped shape a program that is uniquely suited to fill an educational gap identified by industry leaders and students.

A Core Curriculum

The Bachelor of Arts and Bachelor of Sciences degree will share a core curriculum focused on topics such as human use of energy; the business of delivering energy; the economic and environmental impacts of energy use, and a capstone course. The capstone course will provide an "applied learning" experience in which interdisciplinary teams of students collaborate to solve real-world energy related problems.

Shared Fundamentals

Students pursuing either degree will be required to take a group of courses that provide a solid foundation. The fundamentals of a wide range of science, economics, policy and business will be covered through courses taken by all students. Students who pursue a BS degree will take extra courses in the science and technology of energy. Those who pursue a BA degree will take additional energy related courses in policy, economics and business.

In Depth Learning

After completion of the core and fundamentals series, students will deepen their knowledge and experience within their degree through additional credits required by the major. During this phase of the program,

opportunities for "hands on" learning will continue, with internships and applied research experiences conducted in partnership with government, NGO's and industry.

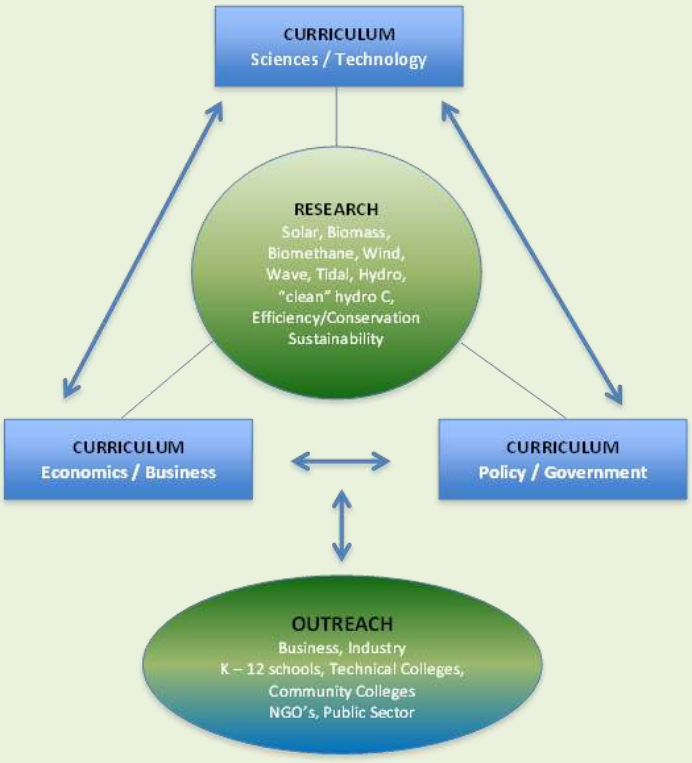
An Option to "Minor" or "Master"

Industry leaders have indicated that a "minor" in renewable energy would have substantial value for students wishing to major in policy, economics, business or a specific science. The minor will be particularly valuable for individuals who seek leadership roles in business, government or research institutions. Western's program will include a minor in science and technology and a minor in policy, economics and business. The program will also develop graduate degrees in both the sciences and arts.

Which Colleges are involved?

Three colleges are collaborating to provide an integrated program of learning, research and regional involvement.

The College of Business and Economics was established in 1976 and is a selective admission college with undergraduate and graduate programs fully accredited by AACSB International - The Association to Advance Collegiate Schools of Business. The College is known for its quality undergraduate programs in business administration, economics, accounting, and manufacturing and supply chain management; its MBA program is listed among the top 100 in the world for coverage of ethical, social, and environmental issues by the Aspen Institute, and its Department of Economics has nationally recognized faculty specializing in environmental and resource economics.



Huxley College of the Environment was established in 1969, leading the way in the academic study of the environment with an interdisciplinary approach that combines social science and policy analysis with the rigors of scientific investigation. Huxley College programs have long set the standard for education in the fields of environmental science, toxicology, planning, and policy. It is a selective admission college with undergraduate and graduate degrees in the arts and sciences.

The College of Sciences and Technology was established in 2003 when seven science and technology departments were brought under the leadership of a new dean. The College is nationally known for its outstanding programs in Biology, Chemistry, Computer Science, Engineering Technology, Geology, Mathematics, Physics/Astronomy and Science Math and Technical Education (SMATE). It is a recognized leader in the area of advanced materials science

engineering (AMSEC) and home to the award winning Vehicle Research Institute, whose Viking 45 car recently placed in the top ten in the 2010 Progressive Automotive X-Prize Challenge competition.

When will the program be available?

The research component of the program is already in place with funding for several projects. Private funds are being raised to support the new curriculum and the goal is to launch the minor in the fall of 2011 and enroll students in the major within the next few years.

How will the program be funded?

The WWU Foundation is currently seeking donors who are interested in funding named endowments to support the program. The University is also working with state and federal legislators to secure some permanent public funding. The vision is a publicly supported and privately enhanced program that provides the highest possible return on the public's investment. (See last page for details)

What are people saying about the program?

"Alaska Airlines has made great strides in minimizing the impact of our flying on the communities we serve, and we are committed to doing more. We believe finding an environmentally sustainable and commercially viable alternative to petroleum-based jet fuel is very important. The university's innovative new program, unique in the country, will provide students a strong foundation to solve the complex challenges associated with finding energy solutions for aviation and other sectors of the economy. This program will prepare students to compete in the green economy and help position the state as a leader nationally in the next wave of economic expansion and innovation."

Bill Ayer, Chairman and CEO
Alaska Airlines and Alaska Air Group

"This exciting new program combines the four essential components needed to address our critical national and global energy security and climate-disruption challenges: Science, Technology, Policy and Business. *Science* helps us define the urgency and importance of these challenges; *Technology* provides the physical basis for addressing the changes we need to make; *Policy* helps create incentives to encourage use of those technologies; and *Business*, perhaps the most underappreciated component, is critical if we are to achieve the scale needed to reach our energy and environmental goals. Western Washington University is to be congratulated for positioning itself in the heart of this most important emerging area of education."

Gil Masters Ph.D., Professor (emeritus) & Author
Civil and Environmental Engineering, Stanford University
Renewable and Efficient Electric Power Systems (2004)
Energy for Sustainability: Technology, Policy and Planning (2008)

"Western is ideally situated to provide exceptional education in the area of clean and renewable energy and energy efficiency. It is located in a dynamic, entrepreneurial environment with

industry partners at all scales and in all corners of sustainable energy activity. It has forged a strong foundation of collaboration among faculty and colleges within the university. And it has crafted a robust and innovative curriculum that displays both a clear priority on learning by doing and commitment to the integration of science, technology, and key social sciences. Each of these building blocks is critical for providing an educational experience that will prepare tomorrow's workforce in every dimension of clean and sustainable energy systems. Graduates who pursue this carefully designed program at Western Washington University will hit the ground running, ready to lead - and not a moment too soon."

Amanda Graham, Director of Education
Massachusetts Institute of Technology Energy Initiative