

# Puget Sound: Washington State's Best Investment



January 2012

PUGET SOUND: WASHINGTON STATE'S BEST INVESTMENT

**Authors:**

Jennifer Harrison-Cox, David Batker, Zachary Christin, Jeremy Rapp

**Acknowledgments:**

Project team members included Jennifer Harrison-Cox, David Batker, Zachary Christin, Jeremy Rapp, Rowan Schmidt, Jonathan Kochmer and Noelani Kirshner. Editing support was provided by Jeff Mitchell and Leah Mitchell. Meghan Arntson provided layout support. Special thanks to Alana Knaster for reviewing this report.

The project team would like to recognize and thank the funders of Earth Economics' 21st Century Washington Initiative: The Bullitt Foundation, The Gordon and Betty Moore Foundation, The Harder Foundation and The Kongsgaard-Goldman Foundation. Without their leadership and 21st Century vision, the projects and tools described in this document would not have been possible.

The authors are responsible for the content of this report.



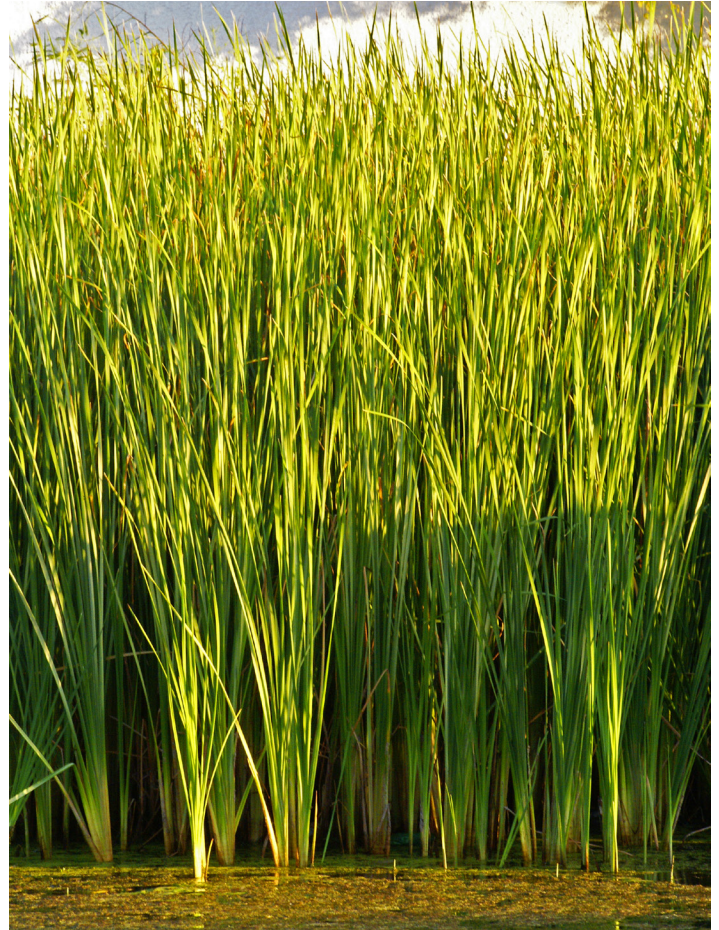
A 21<sup>st</sup> Century Washington State approach to economic development recognizes that long-term job creation and environmental restoration and investment must go hand-in-hand. When management of flood protection, fish and wildlife habitat, wastewater, drinking water, and other important natural and human functions are treated as whole systems at the scale of their physical boundaries, we gain dramatic improvements in economic efficiency. Healthy ecosystems provide raw materials and core infrastructure functions that simultaneously provide profound and direct positive benefits to Washington’s economy.

This paper explores how investing in Puget Sound recovery saves tax dollars and creates jobs for Washington State. By looking at Chesapeake Bay recovery efforts, we can apply valuable and proven approaches. We explore how to leverage natural capital for greater economic prosperity for all Washington State residents and provide specific examples that leaders can implement immediately.

## Natural Capital

A systems approach recognizes that our natural environment provides economically valuable goods and services that individuals, firms, and governments need, including oxygen, potable water, food, flood and storm protection, a stable climate, perpetuation of biodiversity, recreation, and more. These are what we refer to as **ecosystem goods and services** or benefits we receive from natural systems. **Natural capital** is our stock of minerals, energy, plants, animals, and ecosystems that yields a flow of ecosystem goods and services. Natural capital is an efficient producer of many goods and services, and it is largely self-maintaining and in some cases even appreciates over time, while built capital depreciates and eventually falls apart. For example, a forest provides water flow regulation, flood protection, aesthetic and recreational values, slope stability, biodiversity, drinking water filtration, and other services with little or no maintenance costs.

Natural capital assets such as forests, wetlands and marine waters, and the benefits they provide, such as water, flood protection, food and recreation, are far more stable in value than many other economic assets, such as stocks or real estate. **Natural capital provides for long-term, high-wage jobs that cannot be off-shored. The economic value of natural capital assets brings in hard revenue from outside Washington State, which supports economic development and a high quality of life.**



## Investment Opportunity

Our Puget Sound economy is built upon the land and waters of the Puget Sound Basin, where 1.6 million people, 70% of Washington State's population, work, live, and play.<sup>1</sup>

***Nearly 71% of all jobs and 77% of total income in Washington State are found in the Puget Sound Basin.<sup>2</sup>***

Fourteen out of twenty-three identified ecosystem goods and services provided by nature within the Basin provide benefits worth over \$10 billion in value every year. **If the basin were treated as an economic asset that provides this annual flow of goods and services, the asset value of the Puget Sound Basin would be between \$300 billion and \$2.6 trillion.<sup>3</sup>** Even at the low end of this estimate, the value of natural systems in the Puget Sound Basin is enormous. Yet this wealth is being lost.<sup>3</sup>

The key to securing ecological sustainability, employment, and economic prosperity is investment. Today's investment in Puget Sound determines the physical nature of Washington State's economy tomorrow. As built capital has become more common and natural capital more scarce, natural capital has increased in relative value. Thus the returns from investing in natural capital have also risen. **Investing in the health of Puget Sound has a higher rate of return on investment (ROI) and more certain return than most built capital investments.**

## Lessons from Chesapeake

Much like Puget Sound, Chesapeake Bay is a regional economic and ecological backbone. The Bay is home to residents, recreation, commercial and military ports, and historically important (though declining) commercial fisheries.<sup>4</sup> Chesapeake Bay is also the largest estuary in the contiguous United States, providing a wealth of ecosystem services.<sup>5</sup>

## Forty Years of Recovery Efforts

The states of Virginia, Maryland, and Pennsylvania, and the District of Columbia, have promoted Chesapeake recovery for the past forty years. In the mid 1970s, studies showed pollution was increasing due to growing agricultural application of fertilizers and chemicals, population density, and sewage treatment plant discharge.<sup>6</sup> In 1976, the Environmental Protection Agency (EPA) began examining nutrient over-enrichment, influx of toxic substances, and the decline in submerged vegetation. The Chesapeake Bay Agreement of 1983 aligned the recovery efforts of the three surrounding states, the federal government, and the District of Columbia.<sup>7</sup> This agreement helped set the goals for recovery at the actual systems scale of the problem across jurisdictional boundaries and enabled coordinated action to solve common problems. One finds many parallels to the challenges now faced by the multi-jurisdictional context of Puget Sound.

The Chesapeake 2000 Plan was showcased as a model of ecosystem-based management, but so far the results of the plan's implementation have been mixed; moderate advances have been achieved in some areas, while declines have continued in others. Points of failure in the Chesapeake 2000 Plan can be attributed in part to misalignment of state agency goals and measurements.<sup>8</sup>

***As the ecological health of the Puget Sound Basin improves or deteriorates, benefits provided by natural systems for free and potentially in perpetuity will rise or fall to the benefit or detriment of Washington State's economy.***

The Puget Sound Action Agenda provides clear interagency goals, priorities, and reporting and correctly identifies solutions at the scale of the problem, however, there are still many lessons we can learn from the Chesapeake Bay example. Chesapeake takeaways for Puget Sound efforts include:

**1. Restoration and Economic Development**

**Go Hand-in-Hand.** Because healthy natural systems are essential to economic development, restoration should not be viewed merely as an amenity.

**2. Dependable Funding Mechanisms are Needed.**

Understanding the *economic benefits* that can be realized from restoration, mapping and quantification of real financial damages from degradation, and clearly identifying beneficiaries helps establish development of fair, rational, dependable, and sufficient funding mechanisms to pay for restoration. Without including the enormous value that Puget Sound ecosystems provide, restoration work will continue to be underfunded.<sup>9</sup>

**3. Goals and Measurements Must Be Aligned**

**Across Agencies and Jurisdictions.** Chesapeake Bay is 195 miles long, a 64,000 square mile watershed that spans six states and is home to 16 million people.<sup>5</sup> Because the health of the Bay is affected by actions of the individual and corporate residents of six states, effective coordination of their activities is paramount. This cannot be accomplished without an institution at the actual scale of the basin. Developing common goals, and determining a strategy to meet them, ensures that improvements in one area will not be offset by declines in another, and helps avoid overlapping efforts. Coordination of multiple stakeholders provides greater benefits in a far more cost-effective way toward achieving desired results. In Washington State, the Puget Sound Action Agenda addresses this need.

**4. The Public Must Feel Ownership and**

**Responsibility.** Communication, proper framing, and public engagement are critical to realizing shared goals. Relating the scope and articulating benefits of the effort to the public helps secure the political, behavioral, economic, and cultural changes needed. Showing the relationship between the costs and *total* potential benefits of restoration work builds public ownership, the required sense of public ownership and responsibility.<sup>10</sup> This includes demonstrating ecosystem service values, and the jobs they create, while also showing the public's role in restoration, such as reducing fertilizer application on lawns and in agriculture.

Because protection and conservation can be implemented by the public, the Chesapeake 2000 plan emphasizes individual and community stewardship of the Bay.<sup>11</sup> These include efforts to introduce every student in the watershed to the bay through direct interaction, a “government by example” commitment which includes pledges related to land-use and vehicle emissions reductions, and a citizen monitoring program which trains volunteers to perform water quality tests.<sup>11</sup> All of these efforts elevate public awareness and shared commitment.

**Recovery Cost Comparison**

The current cost of recovery of the Chesapeake Bay is estimated at \$18.7 billion.<sup>9;12</sup> One Maryland county estimates their costs through 2025 to be \$800 million, and like others, is searching for ways to fund this effort.<sup>13</sup> In comparison, Puget Sound recovery is estimated to be approximately \$9 billion<sup>14</sup>, with much of funding coming from Washington State, the federal government, and the 12 counties and 115 cities in the Puget Sound region.

The degradation functions of natural and built capital are different. The cost of restoring damaged or replacing lost ecosystems is high; habitat collapse has a non-linear and exponential cost when compared to lost functions of built infrastructure. Without positive restoration, there will be further deterioration, which will likely cause recovery costs to rise significantly.



An economy is the physical product of previous decades of investment.

## Advancing WA State's Economy

Economic advancement is driven by investment. An economy is the product of previous decades of investment. When committing resources to the building of our future economy, we must act with wisdom and responsibility to build solid infrastructure. From high-quality education for our children to transportation, emphasis is placed on developing social, natural, and built infrastructure that is equitable and provides the best return on investment. Billions of dollars in economic activity are created from the Puget Sound region; sustaining this asset in perpetuity contributes significantly to the economy in Washington State.

As we work towards developing a greener economy, we look at the retention or restoration of natural systems as a key component of investment. Green infrastructure can dually be “natural capital” like forests, wetlands, and Puget Sound, and green “built capital” such as green buildings, renewable energy or paper mills with low ecological footprints. Green infrastructure is likely best accomplished as a combination of natural and built capital. For example, flood protection is most effective when it utilizes a natural system, such as a wider floodway, in conjunction with built systems, such as properly

located buildings and the judicious use of levees and dams.

Wise economic decisions and infrastructure choices require good information. Improved economic analysis tools are now available to make the large-scale shift to sustainable green infrastructure a reality. Good investment provides greater returns to projects that internalize environmental and social costs.

**Good investment provides greater returns to projects that internalize environmental and social costs.**

Hundreds of billions of dollars will be spent on private and public investment in the Puget Sound Basin in the next 20 years.<sup>3</sup> Like the investments of past decades, this investment will determine the physical nature of the Washington State economy. It will also determine how the economy will impact the lands that house the cities, manufacturing facilities, people, wetlands, prairies, forests, rivers, and mountains of the Puget Sound Basin. Every dollar invested or spent



## Value of the Ecosystem Services in Puget Sound

In 2010, Earth Economics conducted a partial valuation of 14 ecosystem services across 17 land cover types in the Puget Sound Basin. This study showed the asset value of marine and terrestrial ecosystems in the Puget Sound Basin to be hundreds of billions of dollars, with benefits provided to the regional economy calculated at between \$9.7 and \$83 billion *per year*.

The natural systems in the Puget Sound Basin provide up to \$83 billion in economic benefits to the state's economy *per year*.<sup>3</sup>

Using a 3% discount rate, **the asset or present value provided by 14 ecosystem services in the Puget Sound Basin is as much as \$2.6 trillion.**<sup>1</sup> For conventional purposes, a positive discount rate accommodates for the nominal value of future goods. Unlike regular goods and services, however, natural ecosystems do not depreciate over time. Figure 1 (below) shows how the value of natural capital grows across time at an increasing rate relative to built capital, which depreciates. When using a 0% discount rate to reflect equal value, provided across time, over a span of 100 years, the asset or present value of ecosystem services in the Puget Sound Basin is \$8.3 trillion on the high end.<sup>2</sup>

1 Accounting for uncertainty, and the range of ecosystem services values, the net present value with a 3% discount rate calculated by Earth Economics is between \$305 billion and \$2.6 trillion.<sup>3</sup>

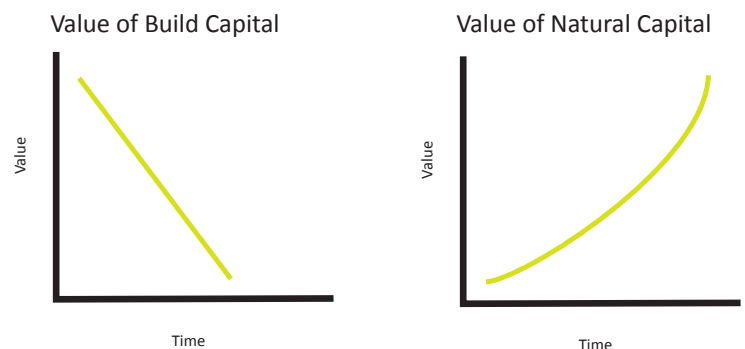
2 The net present value with a 0% discount rate calculated by Earth Economics is between \$967 billion and \$8.3 trillion.<sup>3</sup>

## Environmental Restoration and Economic Development

In restoration and conservation, the potential return on investment justifies significant investment. The rate of return on a particular restoration or green infrastructure investment depends on the physical and economics characteristics of the restoration work. Currently, the number of trees planted or miles of shoreline restored is tracked, but the economical impact of that work is not typically calculated. For example, the Thea Foss Waterway clean-up provided a 2:1 return: over \$300 million in new investment. This return on investment is expected to support over 1,036 jobs and return about \$134 million in additional tax revenue to the state over the next 20 years.<sup>15</sup>

The Thea Foss Waterway clean-up provided a 2:1 return: over \$300 million in new investment. This return on investment is expected to support over 1,036 jobs and return about \$134 million in additional tax revenue to the state over the next 20 years.<sup>15</sup>

Figure 1: Value of Built and Natural Capital over Time





The expected dollar value of ecosystem services provided by restoration or green infrastructure investments can be estimated in the same way benefits from built capital are estimated. Table 1 highlights some of the findings of the 2010 study showing a range of annual economic values for different vegetation covers. The great differences between minimum and maximum values reported

in peer reviewed studies can be contributed to great variation in health of the study site, date studied and methodology used. Generally, higher values can be associated with healthier functioning ecosystems. Like a house or business appraisal, there is a range of “comps” for estimating value.

**Table 1. Range in annual benefits per acre ecosystems provide to the state economy.**

Ecosystem Type	Minimum	Maximum
Salt Marsh	\$382.75	\$122,098.87
Beach	\$23,787.06	\$86,757.22
Wetland	\$14,377.14	\$71,103.69
Riparian Forest (Mid-Late)	\$3,706.70	\$27,004.81
Lakes and Rivers	\$77.71	\$22,022.28
Eel Grass Beds	\$5,860.22	\$16,410.10
Riparian Forest (Pole)	\$1,144.16	\$11,780.13
Late/Old Forest (30+ cm diameter)	\$426.17	\$2,578.20
Open Water Estuary	\$110.15	\$1,863.11
Mid Age Stage Forest (10 to 20 cm diameter)	\$83.28	\$1,163.45

When we compare restoration costs to the high value range, the return on investment is extraordinary. In Table 2, the restoration costs of salt marshes and estuaries are compared to the annual ecosystem service value of these land types in their pristine condition.

**Table 2 - Costs of restoration and benefits of ecosystem services for salt marshes and open water estuaries.**

Land Type	Restoration Cost <sup>16</sup>	Note
Salt Marsh	\$900 per acre (minor project) to \$9,000 per acre (major project)	Minor project example: Removal of invasive plant species. Major project example: Large-scale sediment removal. This figure does not include septic system upgrades.
Open Water Estuary	\$8,000 per acre (minor project) to \$250,000 per acre (major project)	Minor project example: Removal of invasive plant or animal species. Major project example: Removal of contaminants and restoration from an oil spill.
Land Type	Ecosystem Service Economic Benefit <sup>3</sup>	Note
Salt Marsh	Up to \$122,098.87 per acre, per year	Salt marshes serve as storm buffers by acting as a sponge for large storm surges and heavy rainfall.
Open Water Estuary	Up to \$1,863.11 per acre, per year	Estuaries provide a safe haven and spawning grounds for a diverse list of animals including birds and fish.

### Restoration Impact on Jobs: Shellfish Example

Healthy riparian areas directly support the Washington State economy by providing beneficial ecological functions for downstream shellfish beds. Proper salinity levels and limited pollution from storm water runoff and septic systems are key to sustaining healthy conditions for beds of Manila clams and other commercial mollusks found in Puget Sound mudflats and estuaries.

Restoring watersheds will reverse the decline of harvestable shellfish beds. The Puget Sound Action Agenda sets a 2020 goal to restore 10,800 acres of shellfish bed to harvestable quality. That adds jobs and economic value to the Puget Sound Basin (see Table 3).



Shellfish bacterial and pollutant contamination has devastated the industry, which has led to the closing of thousands of acres of beds due to harvesting, further eliminating nearly half of the industry’s jobs in Washington State since 2000.<sup>17</sup>

**Table 3 - Jobs associated with shellfish fishing in Puget Sound.**

	2011 Current Status <sup>(1)</sup>	Note
Jobs currently supported by shellfish fishing in Puget Sound	311 jobs per year	This figure does not include jobs associated with shellfish farms due to data availability difficulties.
Jobs currently supported elsewhere in the Washington State economy by shellfish fishing	467 jobs per year	This figure includes jobs associated with production of shellfish like truck drivers who deliver harvested shellfish to workers who process them for food.
	Restoration of Shellfish Beds <sup>(2)</sup>	Note
Short term jobs created from restoration of 10,800 acres of shellfish beds by 2020	1,469 jobs total	This figure includes planning, construction, planting, and monitoring jobs created by shellfish bed restoration projects.
<b>Annual</b> Increase in shellfish fishing jobs after restoration	22 jobs per year	These jobs will be permanently created from the increased acres of shellfish beds.
Jobs supported elsewhere in economy from post-restoration creation of shellfish fishing jobs	25 jobs per year	Similar to above.

(1) Current job figures are available on the Bureau of Labors Statistics website<sup>17</sup> and supported jobs were provided by a collection of job multipliers.<sup>18</sup>

(2) Using shellfish bed restoration 2020 goals from the Action Agenda,<sup>19</sup> job multipliers were used to calculate job creation.<sup>20</sup> All jobs figures are based on the assumption that 1,080 acres are restored each year until 2020 for discounting purposes(using a 4.125% discount rate).

## Employment Security

Economies work when people work. Employment is a necessity. Besides paying for food and rent, jobs deliver personal satisfaction. Work enables the surplus available for leisure and essential collective investments such as schools, roads, and health care, which in turn fuel greater economic productivity and a rising quality of life. Surveys show that even our level of happiness relies on the productivity of our own labor.<sup>21</sup>

The Puget Sound Basin provides significant employment in Washington State. As of October 2011, there were over 3.17 million people working in Washington State.<sup>22</sup> Nearly 71% of all jobs and 77% of total income in Washington State are found in the Puget Sound Basin.<sup>2</sup> These jobs include manufacturing, services and shipping. Over 100,000 jobs are considered “green jobs” under a traditional definition of contributing to energy efficiency, renewable energy, environmental restoration, pollution reduction, and environmental awareness. Through the financial crisis, while traditional jobs shrank, green jobs expanded in Washington State and the Puget Sound Basin. From green technology to salmon restoration, businesses in the Puget Sound Basin are creating sustainable jobs with a healthier environment.<sup>23</sup>

Through the financial crisis, while traditional jobs shrank, green jobs expanded in Washington State and the Puget Sound Basin.

Importantly, investments in the conservation and restoration of Puget Sound cannot be sent overseas. The full economic benefits of healthy forests, marine waters, and all the goods and services they provide, are garnered right here in Washington State, and directly employ Washington State workers. Products derived from Puget Sound contribute to a positive and sustainable trade balance for Washington State.

Investments and jobs in the conservation and restoration of Puget Sound cannot be sent overseas.

Products derived from Puget Sound contribute to a positive and sustainable trade balance for Washington State.

Building a well-rounded and sustainable Washington State economy is dependent upon healthy natural systems in the Puget Sound Basin. Boeing and Paccar, for example, are two of the state’s largest manufacturers. Both are fully dependent upon the flood protection and abundant water supply provided by natural forests, wetlands and riparian corridors in the Snohomish, Cedar and Green River watersheds where their manufacturing plants are located. In addition, these and other companies such as Microsoft, Google, Real Networks and Amazon are able to attract a highly skilled labor force to the Puget Sound area because workers are attracted to the beauty, clean environment, outstanding outdoor opportunities and high quality of life provided by a healthy Puget Sound Basin.

### Steps for Washington State’s Leaders:

1. Support health measures and track progress vis-à-vis the Puget Sound Action Agenda.
2. Question if natural capital is correctly accounted for in projects, planning and forecasting.
3. Create state standards for improved jobs analysis for restoration.
4. Get jurisdictional scales right.
5. Support changes in Benefit-Cost Analysis.
6. Strengthen Watershed Characterization studies.

Creating a robust demand for employment with higher wages, greater resiliency, health, wealth, and diversity in the 21<sup>st</sup> century Washington State economy requires investing in the coordination of investment within, restoration of, and conservation of the Puget Sound Basin.

## Achieving Sustainability and Economic Prosperity

Shifting investment requires accounting that includes the value of natural capital, improved measures and tracking, jobs analysis, better benefit-cost analysis, and accessible economic incentives that reward green investment.

### Puget Sound Health Measures

Many human activities threaten the health of Puget Sound ecosystems. There is agreement among regional scientists and community leaders that loss of habitat and rising pollution levels are the top two threats facing Puget Sound health.<sup>19</sup>

In 2006, the Washington State Legislature directed the Puget Sound Partnership (“The Partnership”) to work closely with existing state, regional and local organizations as well as at all levels of government to develop and implement the scientifically sound Action Agenda to achieve recovery of Puget Sound by 2020.<sup>19</sup> The Partnership was authorized to provide assistance to watershed groups implementing the Action Agenda. It was also charged with improving coordination among the jurisdictions and actors to improve efficiency and accelerate the implementation of the Action Agenda. The Partnership also helps set and monitor goals.

The Action Agenda sets a plan at the actual scale of the problem and aligns stakeholders, jurisdictions and other partners. This clear plan, along with management and assessment by various state agencies (including the Washington State departments of Ecology, Department of Natural

Resources and Fish and Wildlife) has delivered significant federal investment in Puget Sound recovery. In the first three years since the formation of the Partnership in 2007, nearly \$440 million has been invested in Puget Sound. In 2010, over \$90 million in federal funding was allocated to Puget Sound recovery.<sup>1</sup> In 2010 alone, state, federal and organizational investment in Puget Sound generated roughly 6,494 Washington State jobs.<sup>2</sup>

In 2010 alone, state, federal and organizational investment in Puget Sound generated roughly 6,494 Washington State jobs. Measuring and reporting progress vis-à-vis the Action Agenda is key to ensuring significant federal investment continues.

**RECOMMENDATION:** Measure and report the economic benefits of Puget Sound restoration progress, under the Action Agenda framework: jobs created, ecosystem value and ecosystem health. Currently, the Partnership’s website features a Vital Signs dashboard that allows tracking of progress on restoration goals from the Action Agenda, and perhaps it could be updated to include more information on the economic benefits of the various restoration projects proposed and underway.

1 This dollar figure was derived from a collection of 2010 grant data from the Pacific Coast Salmon Recovery Fund, the National Fish and Wildlife Foundation, Northwest Straits Commission and the Environmental Protection Agency.

2 The job figures here were calculated by deriving the millions of dollars distributed to each project type (restoration type, land acquisition, maintenance, etc) and using a variety of multipliers specific to these project types.<sup>18; 20; 24-28</sup> In some cases, many job multipliers were averaged.

## Natural Capital Accounting

Watershed-filtered water utilities like Seattle Public Utilities and Tacoma Water contribute billions of dollars to local and regional economies by managing lands that provide ecosystem services such as fresh water filtration, storage and supply, flood protection, habitat and recreation. Currently, natural capital is not recognized as a capital asset that is measurable within standard accounting systems. As a result, these assets are undervalued and investment in the form of capital improvements, maintenance, and operations are insufficient.

In addition, funding mechanisms such as bonding are not available for restoring natural capital. Washington State and the counties of the Puget Sound Basin can lead the way initiating changes in national accounting rules to accommodate the economic value that natural capital provides. Earth Economics has identified concrete steps agencies can take to properly account for natural capital and is currently engaged in discussions with the Government Accounting Standards Review Board (GASB) to discuss rule changes for government agencies. Steps include disclosure to the public on financial transmittal letters and description of natural assets in financial footnotes.

**RECOMMENDATION:** Disclose the value of natural capital in annual reports, in annual financial transmittal letters and in communications to the public. Agency finance directors can contact Earth Economics ([info@eartheconomics.org](mailto:info@eartheconomics.org)) for example transmittal letter text.

## Jobs Analysis for Restoration

Currently, jobs for restoration projects are measured in terms of shovels in the ground, not in terms of the long-term jobs created as a result of restored ecosystems. Restoring salmon populations, for example, increases recreational, commercial, and tribal jobs, as well as wholesale and retail jobs. As Table 4 shows below, estuarial and riparian restoration creates more jobs per \$1 million spent than infrastructure projects such as road work.

Job creation from land and estuarial restoration is significant because natural areas produce ecosystem goods (like increased salmon yields) which contribute to the economy both through industry and recreation. Creating jobs is increasingly important for the allocation of federal funds, therefore counting jobs created by restored ecosystem services is a vital part of any restoration effort.

**Table 4 - Job Multipliers by Type**

Definitely	Jobs Created per Million of \$ Invested (2010 \$)
General Construction <sup>28</sup>	11.95
Highway & Street Construction <sup>28</sup>	11.94
Land Acquisition <sup>27</sup>	13.9
Sewer & Water Construction <sup>28</sup>	14.68
Management & Administrative (Education) <sup>28</sup>	17.16
Land Restoration <sup>18; 24; 25</sup>	18.5 (average)
Estuary & Riparian Restoration <sup>26; 29</sup>	23.5 (average)

**RECOMMENDATION:** Washington State should have the capacity to calculate job growth resulting from natural system restoration for any projects in the Puget Sound Basin or in the state.

## Correct Jurisdictional Scale

Single-purpose investments often create “infrastructure conflict,” where one infrastructure investment frustrates the single-purpose goals of other infrastructure investments. Coordinating the investment of single-purpose districts within watersheds, and then within the Puget Sound Basin, could provide far greater benefits at less cost. Where ecosystem services such as clean water and flood control are lost, new single-purpose tax districts such as shellfish districts, storm water districts, and flood districts are created, with investments that can undermine each other.

For example, 16 cities in the Green/Duwamish River Watershed have built storm water systems, generally directing water more quickly into the Green River. This has increased peak flows and flood damage, including damage to levees. Both higher levees and current storm water systems have contributed to salmon mortality and a reduction in water quality, thereby damaging Puget Sound. Alternatively, multiple benefits are produced through allowing a flood district to pay the marginal difference between a green infrastructure storm water option that puts water back into the ground water. In turn, this handles storm water, which reduces flooding and contributes to higher flows in low-flow periods for salmon.

**RECOMMENDATION:** The determination of the scale of any natural capital district should be informed by the nature of the watershed, the area that provides the service, actions that damage the service, and the location of the beneficiaries. Appropriately recognizing the scale of jurisdictions would vastly reduce costs and provide greater benefits to Washington State’s citizens.

## Watershed Investment District Example

Seeing a tremendous opportunity to turn single-purpose investments into win-win watershed investments that improve water quality and the health of Puget Sound, the Green/Duwamish River

Watershed (WRIA 9) is pursuing a funding model that will serve as a case study for other watersheds in Washington State. WRIA 9 is one of the state’s most developed watersheds that is home to major industries (Boeing), agricultural development and over 600,000 people.

With unanimous support from 16 cities, King County, the business community and non-profit groups within WRIA 9, Earth Economics held and participated in a series of discussions among city agencies, counties, businesses, NGOs and other members of Puget Sound Watershed Resource Inventory Areas 7, 8, 9, 10, 11 and 12 between 2008 and 2010. Through these engagements we developed the concept of creating an institution to be organized and operated at an appropriate (watershed) scale. The Watershed Investment District (WID) would facilitate an integrated approach to watershed and natural capital management.

As watershed ecosystem services tend to conform to natural boundaries, this scale for a WID would be an appropriate scale for integrating planning, funding and management of services such as flood control, storm water management, and carbon sequestration. Such an integrated approach is consistent with 86.15.035 RCW specifications for involving flood control districts, cooperative watershed management actions and with 39.34.200 RCW, which establishes a general precedent for watershed management partnerships.

King County, in partnership with a cross-WRIA coordination team, has created a rough draft of state legislation that would authorize the development of this integrated WID approach. The WID could be designed as a tax district to restore natural capital, just as the Transportation Department restores and maintains roads. It could also help coordinate investment within the watershed between utilities and other institutions. Finally, for some counties, particularly rural counties, a WID framework could allow for the creation of a district that encompasses several institutions or jurisdictional efforts, such as a flood district, salmon restoration and storm water management.



**RECOMMENDATION:** Review and consider supporting the legislation enabling the creation of a Watershed Investment District.

### Benefit-Cost Analysis

Benefit-Cost Analysis, also known as Cost-Benefit Analysis, is the economic tool used by federal, state, and local agencies when making decisions about projects and programs. However, Benefit-Cost Analysis does not include the contributions of natural ecosystems in the protection and economic security of communities. Excluding the services of ecosystems will allow those services to degrade, ultimately harming communities and Washington State's economy. Including these services - which is now possible and inexpensive to do - will give far better results.

### Flood and Community Response Example

During a storm, a forest will retain rainwater, soil, and debris, which are valuable ecosystem services to flood-risk communities. Since the current methods of Benefit-Cost Analysis do not place value on these services, the flood protection the forest provides is often ignored. As a result, the forest will be cleared or degraded. The community will lose the flood protection services provided by the forest and will be at greater risk. This often strains the community's aging, engineered flood protection infrastructure.

By not fully counting the benefits of natural floodplains, the current Benefit-Cost Analysis used by federal, state and local agencies tends to support repeat flooding and house reconstruction and repairs, rather than the purchase and removal of houses within the floodway.

Washington State is experiencing increased severity of flooding hazards, growing population, large-scale landscape alterations and rising stresses on critical ecosystems. As a result of increased risks from flooding, communities, businesses and ecosystems have incurred greater costs as they rebuild homes and livelihoods in the wake of flood events. The National

Ocean and Atmospheric Administration (NOAA) reports that 2010 floods in the United States caused nearly \$5.114 billion in damage. Of that total, \$1.118 billion was in agricultural crop loss.<sup>30</sup>

The impacts of flooding on communities can last for decades. Flooding displaces rural households and small businesses. The agricultural landscape is altered and crops are depleted. Infrastructure is destroyed. Lives are disrupted. Jobs are lost.

**RECOMMENDATION:** The State of Washington could lead the way by instituting changes in State Benefit-Cost Analysis protocols, using Puget Sound Basin projects as an example. Agencies can now request improvements in Army Corps of Engineers and other federal agency Benefit-cost Analyses to include ecosystem services. Better Benefit-Cost Analysis tools are available to apply to this approach in Puget Sound and across Washington State.



## Watershed Characterization Studies

Watershed characterization studies are important to understanding the physical nature of watersheds. Watershed characterizations, salmon habitat plans, and other watershed-based analyses can be informed by an ecosystem service analysis. It is also important that state agencies, particularly the Department of Natural Resources and Department of Ecology (which have supported ecosystem service analyses), adopt this analysis as a normal part of operations.

To date, several watershed inventory areas (WRIAs) have included ecosystem service analyses in decision-making, including the Snohomish River Watershed, Green River/Duwamish Central Puget Sound Watershed, Puyallup White River Watershed, Nisqually River Watershed, and the Skykomish, Tolt, and Snoqualmie sub-watersheds.

Earth Economics is developing tools and training for consulting companies, government agencies, and non-profits to conduct and update ecosystem service analysis at very low cost. We expect these tools to be available for inclusion in watershed characterization studies and for other uses in late 2012.

**RECOMMENDATION:** All watersheds in the Puget Sound Basin should have an ecosystem service analysis completed and updated every five years. The appropriate staff from government, private firms, and non-profits should have ecosystem service training and the capacity to apply ecosystem service tools in their work.

## Conclusion

Our Puget Sound economy is built upon the land and waters of the Puget Sound Basin, and it contributes to a healthy and growing Washington State Economy. We cannot continue to advance economically and socially without the ecosystem services the Puget Sound Basin provides. The tax revenues provided within the Puget Sound Basin help support Washington State, as they support roads, schools, police, parks, and other benefits for all citizens. Rural communities throughout Washington State see jobs and services decline when tax revenues from the Puget Sound Basin fall.<sup>31</sup>

Restoring Puget Sound generates jobs, goods, and services, in addition to drawing in greater investment. For example, the Thea Foss Waterway clean-up provided a 2:1 return, over \$300 million in new investment. This return in investment is expected to support over 1,036 jobs and return about \$134 million in additional tax revenue to the state over the next 20 years.<sup>15</sup> Thanks in large part to the vision of Washington State's leadership and the focused goals provided by the Puget Sound Partnership, this example is being replicated all over Puget Sound and is contributing to Washington State in hard economic times.

The citizens of Washington State are on the threshold of seeing ecological economics play a significant role in infrastructure and planning at all levels of government. Imagine Washington State fostering a robust, holistic approach to urban and rural watersheds based on ecosystem services:

- An approach where investments in storm water management, flood protection, drinking water, salmon
- Habitat, biodiversity preservation, forestry, and conservation are integrated to provide greater benefits at lower costs —the foundation of a 21<sup>st</sup> century green economy in Washington State.
- An approach where land-use planning, systems modeling, GIS mapping, and new ES tools can help decision makers recognize ecosystem value and provide critical guidance for legally sound action in project and planning efforts.
- An approach where agencies and jurisdictions have reliable funding mechanisms for conservation and restoration, based on the science and economics of ecosystem services, eliminating dependency on competition for scarce federal restoration grants.
- An approach that acknowledges that it is less costly to protect now than restore later; where the true cost of polluting is not only calculated but incurred allowing for more spending now on protection in order to avoid unnecessary high payments required by restoration in the future.

This vision is possible and it starts with Puget Sound. Investment can be shifted on a large scale to secure sustainability in watersheds, for both urban and rural areas. This new model is already underway in many Western Washington watersheds that feed Puget Sound, including the Cedar, Green River-Duwamish, Puyallup, Snohomish, and Nisqually. This vision is supported by critical stakeholders including Snohomish, King and Pierce County staff, the academic and scientific community, state agencies and Puget Sound Partnership, and community-based non-governmental organizations.

Washington State is a national leader in smart investment in natural capital. But there is still more work to do and there are advancements to be made in terms of policy, implementation, and tracking. With focused effort from leaders at the state, regional, and local levels, together we can ensure a healthy, prosperous 21<sup>st</sup> Century Washington.

## References

- <sup>1</sup>Washington State Department of Ecology, 2008. Focus on Puget Sound: Economic Facts. Available at: <http://www.ecy.wa.gov/pubs/0601006.pdf> (Accessed December 2011). Publication Number: 06-01-006 (rev. 10/08).
- <sup>2</sup>U.S. Department of Commerce Bureau of Economic Analysis, 2012. Regional data: GDP & Personal Income. Available at: <http://www.bea.gov/iTable/iTable.cfm?ReqID=70&step=1> (Accessed January 6, 2012).
- <sup>3</sup>Batker, D., Kocian, M., McFadden, J., Schmidt, R., 2010. Valuing The Puget Sound Basin: Revealing Our Best Investments. Earth Economics, Tacoma, WA, USA.
- <sup>4</sup>Boesch, D.F., 2006. Scientific requirements for ecosystem-based management in the restoration of the Chesapeake Bay and Coastal Louisiana. *Ecological Engineering* 26, 6-26.
- <sup>5</sup>Chesapeake Bay Foundation, Building blocks for emerging environmental non-profit organizations: Lessons from the Chesapeake Bay Foundation. Available at: <http://www.cbf.org/document.doc?id=203> (Accessed December 2011).
- <sup>6</sup>United States Environmental Protection Agency, 2011. Chesapeake Bay. Available at: <http://www.epa.gov/oagqs001/gr8water/xbrochure/chesapea.html> (Accessed December 2011)
- <sup>7</sup>Bocksteal, N.E., McConnell, K.E., Strand, I.E., 1989. Measuring the Benefits of Improvements in Water Quality: The Chesapeake Bay. *Marine Resource Economics* 6, 1-18.
- <sup>8</sup>Chesapeake Bay Program, 2011. Status of Chesapeake 2000 Commitments. Available at: <http://www.chesapeakebay.net/statusofc2kcommitments.aspx?menuitem=51573> (Accessed December 2011)
- <sup>9</sup>Chesapeake Bay Commission, 2003. The Cost of a Clean Bay: Assessing Funding Needs Throughout the Watershed. Available at: <http://www.chesbay.us/Publications/C2Kfunding.pdf> (Accessed December 12, 2011).
- <sup>10</sup>Van Cleve, F.B., Simenstad, C., Goetz, F., Mumford, T., 2004. Application of “best available science” in ecosystem restoration: lessons learned from large-scale restoration efforts in the USA. Puget Sound Nearshore Partnership Report No. 2004-01. Published by Washington Sea Grant Program, University of Washington, Seattle, Washington. Available at: <http://pugetsoundnearshore.org> (Accessed December 2011).
- <sup>11</sup>Chesapeake Bay Program, 2002. The State of the Chesapeake Bay: A Report to the Citizens of the Bay Region. Available at: [http://www.chesapeakebay.net/content/publications/cbp\\_13112.pdf](http://www.chesapeakebay.net/content/publications/cbp_13112.pdf) (Accessed December 2011).
- <sup>12</sup>Chesapeake Bay Partnership, 2011. Facts and Figures. Available at: <http://www.chesapeakebay.net/factsandfigures.aspx?menuitem=14582> (Accessed December 2011)
- <sup>13</sup>Giles, B., November 27, 2011. Chesapeake Bay Cleanup could cost Prince George’s \$800 million. <http://washingtonexaminer.com/local/maryland/2011/11/chesapeake-bay-cleanup-could-cost-pg-800-million/> (Accessed December,2011), Washington Examiner.
- <sup>14</sup>Puget Sound Partnership, 2006. Sound Health, Sound Future: Protecting and Restoring Puget Sound. Available at: [http://www.psparchives.com/publications/about\\_us/psi\\_reports/final/final/Final\\_wAPPx\\_lr.pdf](http://www.psparchives.com/publications/about_us/psi_reports/final/final/Final_wAPPx_lr.pdf) (Accessed December 2011), p. 95.
- <sup>15</sup>Washington State Department of Ecology, 2010. Economic Vitality and Environmental Cleanup in Washington State: Qualitative and Quantitative Case Study. Publication no. 10-09-046. Available at: <http://www.ecy.wa.gov/biblio/1009046.html> (Accessed December 2011). Toxics Cleanup Program, Washington State Department of Ecology, Olympia, Washington, USA.
- <sup>16</sup>Coastal Resources Management Council, 2012. Restoring Coastal Habitats for Rhode Island’s Future: Cost Analysis. Available at: [http://www.edc.uri.edu/restoration/html/tech\\_sci/socio/costs.htm](http://www.edc.uri.edu/restoration/html/tech_sci/socio/costs.htm) (Accessed December 2011).

- <sup>17</sup>Bureau of Labor Statistics, 2012. State and County Employment and Wages. Available at: <http://data.bls.gov/pdq/querytool.jsp?survey=en> (Accessed December 2011).
- <sup>18</sup>Alderman, D., Catani, K., Fister, J., Huber, G., McCormick, E., Tchivzhel, A., Wood, E., 2010. Measuring the Economic Benefits of America's Everglades Restoration. Prepared for the Everglades Foundation. Available at: [http://everglades.3cdn.net/8edd03d0943ae993fe\\_e0m6i4gx2.pdf](http://everglades.3cdn.net/8edd03d0943ae993fe_e0m6i4gx2.pdf) (accessed December 2011).
- <sup>19</sup>Puget Sound Partnership, 2009. Action Agenda (May 2009 update). Available at: [http://www.psp.wa.gov/downloads/AA2009/Action\\_Agenda\\_FINAL\\_063009.pdf](http://www.psp.wa.gov/downloads/AA2009/Action_Agenda_FINAL_063009.pdf) (Accessed December 2011).
- <sup>20</sup>Oaks, D., December 23, 2012. Personal Communication. Available at: (Accessed December 2011).
- <sup>21</sup>The Happiness Initiative, 2011. Happiness Survey. Available at: <http://happycounts.org/survey/GNH> (Accessed December 2011).
- <sup>22</sup>U.S. Bureau of Labor Statistics, 2011. Economy at a Glance. Available at: <http://www.bls.gov/eag/eag.wa.htm> (Accessed December 2011).
- <sup>23</sup>Hardcastle, A., 2010. 2009 Washington State Green Economy Jobs. Available at: [http://www.workforceexplorer.com/admin/uploadedPublications/10258\\_Green\\_Jobs\\_Report\\_for\\_Web\\_2009.pdf](http://www.workforceexplorer.com/admin/uploadedPublications/10258_Green_Jobs_Report_for_Web_2009.pdf) (Accessed December 2011).
- <sup>24</sup>Pincus-Nielson, M.a.M., C., 2009. A Preliminary Estimate of Economic Impact and Job Creation from the Oregon Watershed Enhancement Board's Restoration Investments, Institute for a Sustainable Environment, University of Oregon. Available at: <http://www.roguebasinwatersheds.org/files/estimate%20of%20economic%20impact%20and%20job%20creation.pdf> (Accessed December 2011).
- <sup>25</sup>Vaile, J., 2010. Restoring the Rogue: A Plan to Prioritize Restoration on Federal Lands in Rogue River Basin., Klamath-Siskiyou Wildlands Center. Available at: [http://kswild.org/what-we-do-2/restoration-and-collaboration/RRR.FINAL\\_SM.pdf](http://kswild.org/what-we-do-2/restoration-and-collaboration/RRR.FINAL_SM.pdf) (Accessed December 2011).
- <sup>26</sup>Buckley, M., 2010. Getting the Demand Right for Valuing Urban Ecosystem Services in the Pacific Northwest, ECONorthwest. Available at: <http://conference.ifas.ufl.edu/aces10/Presentations/Tuesday/C-/pm/Yes/0350%20M%20buckley.pdf> (Accessed December 2011).
- <sup>27</sup>Department of Interior, 2011. The Department of the Interior's Economic Contributions. Available at: <http://www.blm.gov/or/socioeconomic/files/DOI-Econ-Report-6-21-2011.pdf> (Accessed December 2011).
- <sup>28</sup>Washington State Recreation and Conservation Office, 2012. Washington State Input Output Model.
- <sup>29</sup>Restore America's Estuaries, 2011. Jobs & Dollars: Big Returns from Coastal Habitat Restoration. Available at: <http://www.estuaries.org/images/stories/rae17.pdf> (Accessed December 2011).
- <sup>30</sup>National Oceanic and Atmospheric Administration, 2011. Economic Costs: Annual U.S. Flooding Summary. Available at: <http://www.economics.noaa.gov/?goal=weather&file=events/precip&view=costs>
- <sup>31</sup>Batker, D., et. al. 2012. EverGreen Jobs: Sustainable Employment in Washington State. In Press.

