A Comprehensive Valuation of Agriculture Lands: A Perpetual Investment in Oregon's Economy and Environment

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Between 15 million and 17 million acres of land in the state of Oregon is under farm or ranch operation. Roughly 38,000 operators manage these lands—planting and cultivating crops on approximately 5 million acres; raising livestock on pasturelands and rangelands of approximately 10 million acres; and managing forest and woodlands, wetlands, and other conservation resources on the remaining 2 million acres.

> ***This farmland, like other natural resources, does not exist as an unlimited supply as it was considered at the time of westward expansion.***

Table 5.—Oregon farmland acreage by type (2007).

Type	Acres	Share (%)
Grain farming	2,097,777	12.8
Vegetable farming	242,192	1.5
Fruit & nut farming	253,189	1.5
Greenhouse, nursery, & floriculture production	264,844	1.6
Other crop farming (hay, mint, other crops)	2,815,956	17.2
Cattle ranching & farming	9,409,053	57.4
Hog & pig farming	12,975	0.1
Poultry & egg production	41,530	0.3
Sheep & goat farming	205,664	1.3
Horse & other equine production	673,445	4.1
Other animal production	383,022	2.3
Total	**16,399,647**	**100.0**

Source: U.S. Department of Agriculture, *2007 Census of Agriculture*, Table 46 (February 2009).

Farmland is under constant pressure for re-development or conversion to other uses, especially the flatter croplands that have the highest production capacity. Some advocates of conversion and development argue that agriculture produces relatively low values of economic activity, and that residential, commercial, aggregate mining, or manufacturing use would benefit the community or the state more than agriculture use.

In the short-term, conversion of agricultural lands to other uses can, in many instances, generate substantial financial activity. But over time, it is questionable whether these other uses will equal the perpetual benefits of agricultural productivity – especially when accounting for ammenities that accrue beyond simple economic gains.

Land in any use can be converted to another use (perhaps at considerable cost) that may provide higher short-term economic gains — but such conversions may not always be in the best interest of the community or the surrounding environment.

Agricultural land use supplies many economic, ecologic, and cultural benefits to a community and a region. Most importantly, once converted to a non-farm use, it will likely never return to farm production.

The world population is projected to reach 9 billion in another 30-40 years, necessitating between 50-100% more food than is currently produced. Imagine – an entire additional world of food production needed from the same land (or less) than we have now! Food production capacity is a national security issue as much as anything else. The resources devoted to agriculture and food are national treasures that require preservation.

A viable agricultural land base also produces many other amenities that are only recently being credited with "valuation," including carbon sequestration capacity, wildlife habitat, viewscape, tourist attractions, and open spaces. Much of Oregon's wildlife spends up to 75% of its life on agricultural lands. Many planners, developers, and economists do not properly account for the value these perpetual benefits agriculture has to offer when evaluating land use comparison based on "snap shot" economics.

Agricultural land value cannot be measured simply or solely by a snapshot of what is growing on a parcel during any one production season, nor can it be accurately captured by a short-term comparison to other uses. It is also folly to look only at the value of the land in isolation, when in fact it is the land which connects so many other disparate parts of our economy.

OREGON AGRICULTURE LANDS ARE:

- Adaptive,
- Renewable,
- Sustainable,
- Efficient,
- Locally owned,
- Perpetual,
- Interconnected with the larger economy,
- Provide Numberous Amenities, and are
- Growing more important.

Adaptability: The crops and commodities produced at any land location may change over time in response to market signals, technology, climate, and consumer demand. Witness the rise in production of nursery products, wine grapes, blueberries, grains, and specialty vegetable and seed crops in the past decade even as there has been a decline in acreage devoted to grass seed, some commercial vegetable crops, strawberries, hops, and garlic.

To sharpen the point on this topic a bit, consider that wine grapes in the Willamette Valley are primarily grown on hillsides that were previously considered profitable only for sheep grazing. The comparative value of grapes to sheep demonstrates that a snapshot portrait of agriculture can

short-sell the adaptability and value of the land for agricultural purposes, even when still used for agriculture production.

***Renewable**:* Agriculture lands are THE source of renewable food, fiber, fuel, and many medicinal products — and if the land is protected and properly managed it will continue producing into perpetuity. Soils require proper management, and can be enhanced or depleted depending on cropping or grazing techniques used. Properly managed, they are "regenerative," that is to say, soils are a composit of organic and inorganic stuff -- minerals, rock, clay, decayed organic material, microbes, worms, etc. – which interact in a symbiotic relationship which can be enhanced and maintained far into the future.

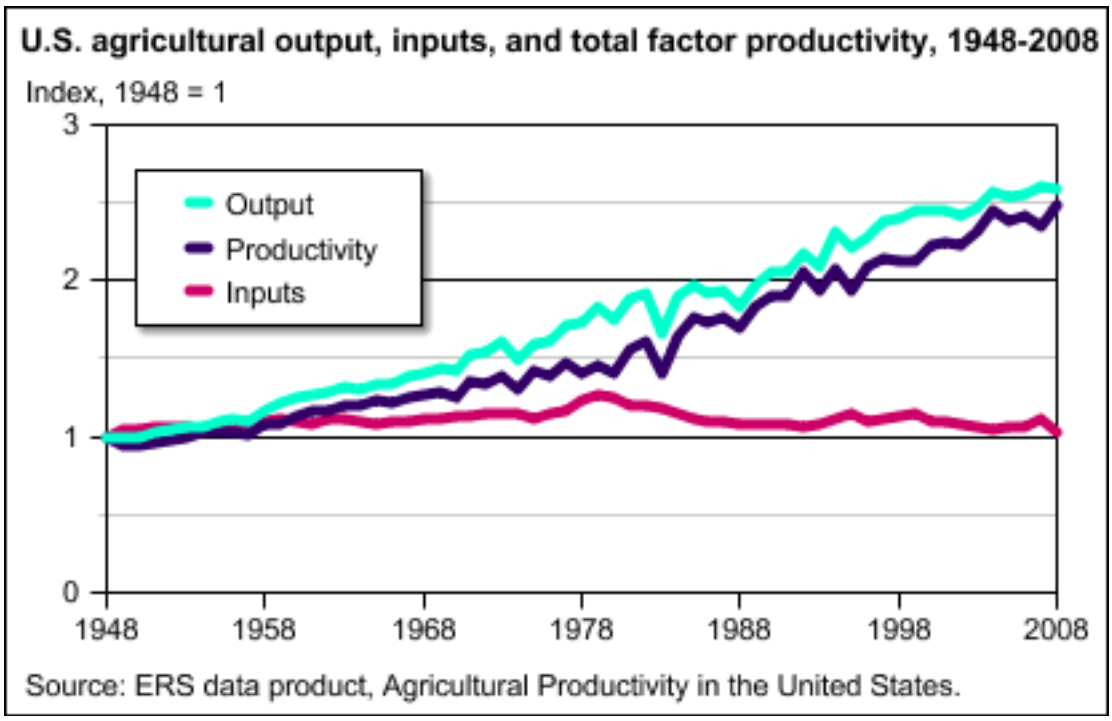
Further, agriculture lands can be the intersection or nexus for many associated economic activities, such as renewable energy. We see this most clearly demonstrated with wind turbines spread across north central and eastern Oregon. The "footprint" of wind turbines are relatively small, but provide farmers or ranchers with an additional source of income, while still being able to grow wheat or raise livestock in conjunction with this new use that has minimal disruption to the agriculture operation.

Sustainability: Agriculture is one of the most constant and stable economic engines our economy has, while also producing many ecological and community benefits:

- More than 1,100 farms in Oregon have been operated by the same families for over 100 years; 22 for more than 150 years. <u>There is no other industry in the state with that type of sustainable, long-term record of operation</u>.
- Properly managed, agricultural soils can continue producing crops, livestock, fiber and other materials, and providing carbon sequestration, wildlife habitat, open spaces, and other amenities critical to human subsistence and enjoyment for generations to come.
- On-going research with seed genetics, management practices, and a conservation mindset enable growers to utilize fewer inputs, such as fertilizers and pesticides, on their operations.

Agriculture efficiency is another factor that has increased dramatically over time and will undoubtedly continue in the future, making any measure of future productivity based on a single point in time a simplistic approach. Today the average American farmer can feed as many as 155 people, compared to 27 in 1950. Developments in technology, mechanization, agronomy, water conservation, hybrid seeds, and other applications make agriculture a continually evolving and effective means of generating more output (economic activity) on existing farmlands in increasingly environmentally friendly ways.

A recent study demonstrates that productivity growth over the 1947-85 periods accounted for 82 percent of the economic growth in agriculture, compared with only 13 percent in the private non-farm economy Moreover, the rate of productivity growth over this period in agriculture (1.58 percent) was nearly four times the corresponding rate in the private non-farm economy (0.44 percent).
("U.S. Agriculture, 1960-96: A Multilateral Comparison of Total Factor Productivity," V. Eldon Ball, Jean-Pierre Butault, and Richard Nehring: Technical Bulletin 1895, May 2001, USDA/ERS)



http://www.ers.usda.gov/Data/AgProductivity/

Oregon had the highest average annual productivity change between 1960 and 2004 of any state in the entire U.S., demonstrating the inginuity, creativity, specialized knowledge, and dedication of Oregon's agriculture and associated support sectors.

The productivity increases in agriculture are not an argument in favor of farmland conversion due to the ability to generate more output on less land. Quite the opposite. Increased productivity means that agriculture lands are increasingly valuable, and provide an ever-diversified array of products which humans require to sustain and improve quality of life.

Efficiency also means the consumer in the USA spends less time earning enough money to buy food than in any other country in the world at any point in history — on average, less than 9% of disposable income goes for food in the United States. Consumers in Japan will pay nearly 21%; Germans pay out over 18% of disposable income; the French, nearly 16%; and in developing countries, roughly 50% of income goes for food. Countries that have small production bases relative to population, and which import large portions of their food supply pay significantly higher prices.

Here is clear relationship demonstrating that loss of farmland is not without a price to the larger population. While developers of farmland may benefit in the short-term, the cumulative cost to society grows. Retaining a viable agriculture base through appropriate land use planning and protection is a long-term investment strategy in food security and economic sustainability of a community and a nation.

Locally owned*:* In Oregon over 60% of agriculture land is owned and operated by local farm families. A large portion of the remaining acreage is owned by retired farmers or widowed landlords who rely on rental income from other farmily farmers as a significant source of their retirement proceeds. Local ownership means dollars are retained and circulated more in the local

economy.

- ***More than 98% of Oregon farms are operated by families, with 88% being sole proprietor single-family operators, 5% being family partnerships, and about 5% operated as family-held corporations. Very few non-family corporations own or operate farms in Oregon.***

A rising interest in locally grown food and fiber are also creating new markets and additional social linkages as well.

Interconected with the Larger Economy:

Oregon State University Department of Agriculture and Resource Economics conducted a comprehensive analysis of the agriculture industry cluster in 2011 (based on 2009 data).

This report highlights the fact that the production sector of agriculture – crops, livestock, and other outputs – serves as the nexus of many industries. Linked together, these associated sectors make up the agriculture "cluster," consisting of seven categories:

1. Production
2. Processing
3. Agriculture Support Services
4. Wholesale Trade
5. Transportation & Warehousing
6. Food Services & Drinking Places
7. Retail Trade

The aggregate direct economic output, employment, and value added of the agriculture cluster comprises over 10% of Oregon's entire economic output, and 1 of every 8 jobs (12%).

Oregon agricultural output, employment, and value added (2009).

Aggregated sector	Output—Sales ($000)	Employment (full- & part-time jobs)	Value added ($000)
Production	4,321,666	54,120	1,607,990
Processing	12,355,613	31,308	2,232,797
Ag. support services	238,105	7,762	182,820
Wholesale trade	2,568,297	12,958	1,689,559
Transportation & warehousing	743,518	4,859	356,620
Retail trade	980,933	16,369	828,492
Food services & drinking places	7,696,380	133,365	4,026,638
Total agriculture	**28,904,512**	**260,742**	**10,924,917**
Total all Oregon sectors	**278,803,857**	**2,177,594**	**153,024,613**
Portion agriculture (%)	10.4	12.0	7.1

Source: Oregon Agriculture and the Economy: An Update, (Table 8) Oregon State University Extension Service**, R**ural Studies Program February 2011, Bruce Sorte, Community Economist; Paul Lewin, Doctoral Candidate; Pamela Opfer Analyst. http://ruralstudies.oregonstate.edu/sites/default/files/pub/pdf/OregonAgEconomyAnUpdate.pdf

Provide Numerous Amenities:

Environmental Amenities

- open space
- soil conservation
- biodiversity
- wildlife habitat
- recreational opportunities
- scenic vistas
- isolation from congestion
- watershed protection
- flood control
- groundwater recharge

Rural Development Amenities

- rural income and employment
- viable rural communities
- diversified local economy

Social Amenities

- maintaining traditional country life
- maintaining a [family] farm structure
- maintaining local cultural heritage and link to history.

"These rural amenities are often a byproduct of the agricultural production process. Ensuring the continued availability of these rural amenities may be the most important reason for farmland protection, especially for farmland protection near urban areas. Consequently, information on the relative importance of these rural amenities can be useful when considering the current state and future direction of farmland protection programs."
http://www.ers.usda.gov/briefing/landuse/urbanchapter.htm

Perpetual and Growing*;* History has shown that agriculture lands can be productive year after year — and increasingly so at an accelerated pace. It would be a mistake to minimize agriculture's future contributions to society as being of little or no value due to analysis based on a constant time value of money with a constant income stream i.e. the same amount of income year after year. Oregon agriculture is not stagnate. Land in agriculture production is renewable, perpetual and adaptive. These characteristics coupled with scientific and technological advances, increased demands and increased yields have led to annual increases in gross revenue per acre that has enabled agriculture production not only to be sustainable in perpetuity but also to continue to grow.

Oregon's agriculture industry has a history of growth. Annual increases in productivity spurred Oregon's agriculture total output to grow (in nominal dollars) from $428 million in 1964 to $4.4 billion in 2010 – a 10 fold increase! That equates to an annual increase of 4.93% compounded annually, accounting only for value of production increase and no other amenities or external benefits.

It is prudent to expect agriculture to continue to grow and contribute more to the country's economy in the future. Even while the world's consumers (population) is continuing to grow,

the amount of high value farmland is decreasing; yet, new technologies are creating increased production per acre and all of this on top of a steady general inflation rate. Again, it would be a mistake, however, to use productivity increases to argue that less farmland is needed.

Even though the projection of a continued annual increase in gross production and revenue per acre is evident, such an analysis is based only on the productive value of the asset, and misses many other significant contributions that are necessary to consider in any valuation of farmland.

ECONOMIC MULTIPLIER / AGRICULTURE FOOTPRINT

Agriculture's economic contribution does not begin or end at the farm gate. Oregon agriculture supports many local and regional businesses with millions of dollars spent on seed ($158 million); fertilizer and soil conditioners ($245 million); feed ($455 million); hired labor (over $900 million); fuels ($191 million); chemical products ($166 million); supplies, repairs and maintenance ($312 million); construction and repair for farm buildings, animal housing, and equipment (~$50 million); machine hire and custom work ($75 million); veterinary services; transportation services, warehousing/storage and wholesale marketing ($225 million); business services, such as accounting, legal services, payroll services, banking and financial services; crop consultants; farm equipment repairs and parts ($206 million); product inspection and certification services, licensing and other services ($50 million) … and much more. Processing adds about $2 billion to the value of the farm products (packaging, labor, shipping, etc.).

Much of Oregon's agricultural and processed food products (over 80%) are shipped out of state, thereby generating export dollars. The high percentage of agriculture products that are exported make the concept of Traded Sector Economics very important in evaluating the relative contribution agriculture provides to our economy. "New" dollars generated into the economy by exporting add real growth in Oregon's economy. After considering these factors, most agricultural economists use a multiplier between 2 and 8, depending on the breadth of the cluster reach used in the analysis. The following analysis uses a conservative multiplier of 6. Referencing the farmgate sales to total agriculture impact by the OSU analysis generates multipliers between 7 and 9.

When combined, the direct, indirect, and induced expenditures associated with the agriculture cluster are even more significant – nearly 18% of the total economic sales, 20% of employment and 15% of value added. And this is not accounting for any of the amenities discussed elsewhere.

Table 9.—Oregon agriculture's economic footprint (2009).

Aggregated sector	Output—Sales ($000)	Employment (full- & part-time jobs)	Value added ($000)
Production	5,745,810	62,885	2,622,376
Processing	20,541,299	98,815	6,991,892
Ag. support services	501,025	9,847	325,967
Food services & drinking places	14,610,626	188,036	7,944,652
Subtotal—Production, processing, ag. support services, and food services & drinking places	*41,398,759*	*359,583*	*17,884,887*
Wholesale trade	4,636,806	30,368	2,928,210
Transportation & warehousing	1,418,687	10,873	759,378
Retail trade—Food and beverage	1,641,518	22,067	1,223,297
Total agriculture	**49,095,771**	**422,891**	**22,795,773**
Total all Oregon sectors	**278,803,857**	**2,177,594**	**153,024,613**
Portion agriculture (%)	17.6%	19.4%	14.9%

Source: Oregon Agriculture and the Economy: An Update, (Table 9) Oregon State University Extension Service**, R**ural Studies Program February 2011, Bruce Sorte, Community Economist; Paul Lewin, Doctoral Candidate; Pamela Opfer Analyst. http://ruralstudies.oregonstate.edu/sites/default/files/pub/pdf/OregonAgEconomyAnUpdate.pdf

CASE STUDY: WASHINGTON COUNTY AGRICULTURE METRICS

Since Washington County is often at the heart of the debate about land use and additional agricultural lands being brought into the urban growth boundary, this analysis will examine the benefit stream from agricultural lands and production in Washington County, and the costs associated with converting the land to non-farm use. A similar analysis could be conducted for any country, or the state as a whole.

Number of Farms (Washington County):	1,900 (2002 Census of Agriculture)	1,761 (2007 Census of Agriculture)
Land in Farms:	130,683 acres, or 28.3% of the land in the County	127,984 acres, or 27.7% of the land in the County
Land Loss Rate:	Washington County has lost 58,000 acres of farmland in the past 28 years –1.3% per year conversion rate and increasing.	2,700 acres lost from agriculture between 2002 and 2007, 2% of the ag land base.
Financial Investment:	Each farm represents an average investment value of $538,000, a **total of over $1 billion countywide in land and building assets**. Another $90 million is invested in machinery	$740,000/farm avg. investment in land and buildings = **$1.3 billion countywide assets.** Additional $80 million in machinery & equipment.
Gross farm sales (market value):	$223 million (2003)	$311.4 million (2007)
Economic Multiplier	6	6
Economic Impact:	$1.3 billion	$1.9 billion

Approximately $1.3 billion in land and attached assets (farm land) are generating nearly $2 billion dollars per year in local and regional economic activity. Every year this land asset is

generating a perpetual, renewable economic value throughout the community that is greater than the value of the land itself. This output is in the form of real products derived from the input (demand) of real products and services, not simply appreciation or changes in valuations. The land is the genesis of our food and fiber – things people need to survive and thrive.

Farms in Oregon are largely single owner, proprietary, entrepreneurial operations. Individually, depending on size, they may not affect Oregon's economy much. Collectively, farm production value, food processing, warehousing, transportation, marketing, and all other aspects of services and related functions in the industry equates to nearly $50 billion in economic value – a significant part of Oregon's overall economy, and second only to the high tech industry.

It is critical to note that the loss of productive capacity from individual farms and associated land converted to other uses translates into loss of demand for inputs, services, equipment, processing, and related activities. The impacts ripple through the economy and affect other farming operations. There is a tipping point where processing can no longer be supplied, or demand for services and equipment is not sufficient for support businesses to be justified.

In Washington County, each of the 1,761 farms, on average, represent an annual stimulus of $1.87 million to the County's economy (using average farm sales of $311,000 and the multiplier of 6).

Employing an annual productivity growth factor increase of 2.5% (Oregon's average agriculture annual growth factor from 1948 to 2004), projected over the next 50 years (anticipating increased productivity, efficiencies, new technological developments, and adoption of renewable energy), **the projected economic stream amounts to a minimum of $64 million for each farm over this period just from productivity growth.**

One must realize that some soils are more productive than others and therefore the contribution from the best soils will be higher than this average and the poorer soils may be lower — but this is not a static measure, as wine grapes are now grown on what was previously considered less productive soils on hillsides and nursery crops are grown in containers on land that may not otherwise be productive for row crops. Several factors influence the productivity of agricultural output, including the managerial adeptness of the farmer and the adoption of new technologies and practices. The **availability** of the land resource to adjust to these influences is the critical issue.

COST OF A SHRINKING INFRASTRUCTURE:

In addition to the obvious direct cost to the economy, the loss of farmland can create a hidden cost or drag to the remaining farm community. The efficiencies of the remaining farms may be adversely affected by the shrinking land base. "Cluster" development is well understood to have a cumulative benefit to productivity; so it is that a large enough land base for viable commercial agriculture production enables the volume of products in sufficient quantities to attract processing companies, distributors, equipment dealers, service providers, suppliers, and other businesses. In addition, farmers depend on surrounding operators for custom work, machine rentals, markets for hay, plants, seed, land trades, and land rentals. As the volume of agricultural lands is reduced, the cumulative and symbiotic reliance of this cluster structure is undermined and precipitates the decline of general agriculture viability in an area. It goes beyond the individual farmland that is lost.

SOCIETAL COST OF FARMLAND DEVELOPMENT:

In addition to the loss of economic activity associated with agriculture use, there are also increased societal costs in converting land to non-farm purposes.

One way of calculating the net economic impact resulting from conversion of farmland to residential development is to compare the costs of providing community services for residential versus farmland on a per acre demand for public (tax) services. For example, new uses will likely increase demands for social programs, public health and safety, highway construction and maintenance, public works, schools, etc. Some of these already were provided to agricultural land, but with conversion to urban uses there will be an increase in support levels which denser development brings.

Cost-of-community-service studies have recently been developed to measure the costs of providing public services to various land uses. Costs of public services are apportioned according to demands generated by land use category. These costs are then compared to the revenues from each land use category. Residential costs typically exceed revenues while commercial/industrial and farm/open land categories generate more than they use. (The Economics of Maintaining Land in Agriculture in Fresno County*,* Dennis L. Nef, CATI Publication #960802, August 1996,)

This study reports: "Assuming land values represent the capitalized value of income from the land, an acre of development in the [study] area results in losses of $3,840-$7,900. Using a multiplier of 3.5 yields additional losses of $13,445-$27,670 to the county from lost agricultural sales. Thus, total costs in terms of lost agricultural production are in the range of $17,250 to $35,500 per acre."

In evaluating fiscal impacts to government and associated costs (taxes and fees), this report concludes: "The costs and returns to government agencies of developing a particular site can be quantified (Burchell and Listoken). The costs of streets, sewer, water and solid wastes systems, parks and recreation, police, fire and government must be considered. Revenues from developers' fees, increased property taxes, other taxes and charges are also calculated. Based on community plans for adjacent areas, expected growth patterns were determined for each study site. These growth patterns were then used to estimate the needed infrastructure. Costs and revenues from developer fees were then calculated based on current fee structures… development costs exceed fees in all 3 [study] locations…"

Based on information developed by the American Farmland Trust (Cosgrove 1994), for every dollar spent in taxes for community services in New York State (schools, infrastructure, etc.), residential lands cost $1.32, while agricultural lands cost $0.21. This assessment is based on farm use valuation, which makes it even more impressive.

Developed lands require 6.3 times more in public tax dollars to support and maintain in public services than the same land in agricultural use.

*In other words**, residential development requires more public expenditures than land in agricultural use, and places a greater burden on taxpayers.***

One might argue that increased residential development brings in more tax payers to support the higher costs. The costs, however, continue upward as urbanization brings the need for additional police, higher crime rates, social service needs, and so forth.

According to a 1997 study in Onondaga County, in New York State, the net economic impact from the sale of 100 acres of farmland for the development of twenty, 5-acre home plots was a loss of $32,800. Maintaining the land in agriculture equaled a net gain of $2,383 (Onondaga County Farmland Protection Board 1997).

Nef explains the unmeasured costs and benefits in this manner: “The benefits from converting agricultural land to other uses obviously outweigh the costs to developers or they would not continue to develop farmland. The losses in terms of productivity must be fully covered or the farmer would not have sold the land for development. If society finds development of farmland to be a significant loss, it must value the losses more highly than the market, which means that the market is missing something. In such a situation, developers are not paying the full costs of development. In economic terms, an externality is involved. An externality can exist if there is some unpriced aspect of the land such as amenity value. Society may value the open space (or other benefits) associated with agricultural land, but this is not fully taken into consideration in private market transactions between buyers and sellers when the property is developed. Government can overcome this problem by "internalizing" the externality. That is, the full costs of development must be apparent to those making the decisions.”
http://www.cati.csufresno.edu/Cab/rese/96/960802/

Studies have been conducted to document the value that the public places on farmland preservation, giving some indication of the non-market price for the entire “package of amenities and benefits” that occur with operating farms and ranches. Many states, and recently the federal government, have directed public resources at farmland preservation, purchasing easement or development rights that will enable agriculture land to operate without development pressures.

ENVIRONMENTAL COSTS OF FARMLAND DEVELOPMENT:

Conversion of farmland to developed uses may also present new environmental costs.

Land that generated oxygen and sequestered carbon (CO_2) through plant/crop production, farm forest, pasture, or other agricultural use becomes impervious when paved over or covered with buildings. This creates more runoff into waterways, carrying pollutants from cars, trucks, and

industrial wastes over these surfaces that previously absorbed rainfall. Development also generates more traffic, resulting in more air degradation, less open space, and reduction in wildlife habitat.

Of course all human activity impacts the environment in some manner — this is a matter of course in order to survive as humans to obtain materials used to house, feed, and clothe ourselves, and to develop products that we use every day for business, home life, and entertainment.

But the bigger the footprint of development (urban, residential, commercial, etc.), the more impacts and costs to the environment. As much as 75% of Oregon wildlife spends part of its life on a farm or ranch. With habitat loss due to urban encroachment, these harbors of open spaces for wildlife are reduced. Wildlife is crowded on to the remaining farms and forests, which can result in damage to crops and natural environments, even in urban settings.

Based on a $20-per-ton "price" ($3 to 4 dollars per acre) for storing carbon to reduce greenhouse gas emissions, the farmland acreage in Washington County (128,000) represents approximately $450,000 in annual value of sequestered carbon that is benefiting the region.

Farmland also provides a sense of local heritage and history, open space, and scenic beauty — all non-market or "unpriced" amenities derived from this resource.

ALTERNATIVE TO AGRICULTURAL LAND CONVERSION:

Most land uses competing for farmland have viable alternatives. When the farmland is gone, agriculture will be gone. Planners and policy makers would be assisted greatly by conducting a needs analysis that calculates the costs to society that will result from the additional conversion of farmland and compare this costs to the marginal cost of alternative locations for other land uses. Careful analysis of alternative sites likely will show there is only a small additional cost associated with avoiding farmland conversion. Because competing land uses have alternatives, only the additional cost of moving to another site should be balanced against the total loss resulting from farmland conversion.

Planners can assist in protecting the high-value farm soils by locating competing uses first within commercial or urban zones that are underutilized. The result of this option will be that both the farms and the competing use can contribute to society into perpetuity. Society gets the benefits of both uses in exchange for only the additional cost of locating the competing use elsewhere. Only when underutilized locations are exhausted should planners look outside urban boundaries, and then to less productive soils.

Planners and policy makers should make every effort to evaluate alternatives to farmland conversion. Such alternatives might include;

1. Increasing urban densities by expanding vertically instead of horizontally.
2. Directing new developments onto in-fill and non-productive soils.
3. Using quarry rock instead of gravel derived by stripping high value farmland soils.
4. Constructing compact sewage treatment facilities that can capture methane and produce natural gas for productive use, instead of large man-made, natural treatment wetlands on high-value farmland soils.

5. Routing utilities and conveyance infrastructure to avoid high-value farmland soils.
6. Locating parks and golf courses away from high-value farmland soils.

In some cases it might be advantageous for policy makers and society to provide economic incentives for business and industry to locate off high-value farmland soils, or to create a system development charge to compensate for the "externalities" which are lost as a result of the conversion of farmland. In other cases it will be important to make investments in transportation systems and networks that facilitate movement of agriculture and other goods while minimizing impacts on farmland.

Society must carefully weigh the short-term development cost savings that attract developers to high-value farmland soils against the value to society of the economic, ecologic, and cultural benefits that agriculture offers.

CONCLUSION:

This analysis is not an argument against development. Rather, it attempts to outline the breadth of benefits to society that acrue due to agricultural lands, and to itemize the total costs to society resulting from the conversion of farm lands. The costs can be categorized into the loss from agricultural production and surrounding support businesses, the weakening of the infrastructure and potential loss of processors, the "extra" cost sink of urban or commercial development, the increased impacts to the environment, and loss of scenic beauty and tourism value. *All these impacts should be fully calculated and evaluated by public officials, business interests, and communities when considering where to focus development. All other options must be considered prior to identifying productive farmland as a site for development.*

Public officials, city and county leaders, economists, home builders, aggregate miners, business leaders, farmers, and others involved in economic development and decisions related to land use need to recognize the broad benefits to society through farmland preservation and efforts to minimize development impacts on agricultural lands.

Agricultural lands – even in urban areas – are critical drivers that contribute substantially to the region and the State's economic engine and identity. These assets represent perpetual, renewable, adaptable, and sustainable economic, cultural, and ecological values.