Integrity, Stewardship, and Innovation

Capitalizing on the Oregon Brand in the Emerging Markets for Ecosystem Services

I. Introduction

Oregon has long been a leader in environmental stewardship, with efforts and programs to preserve, restore, and enhance the natural environment while building strong, sustainable communities and economic structures. We have taken the lead with other western states in addressing greenhouse gas emissions and climate change, from individual to industrial levels. Innovations in the state's water quality trading and wetland banking programs are nationally recognized.

However, there is a growing recognition – in Oregon and nation-wide – that to be truly effective, environmental stewardship efforts must link more closely with flexible, broadly based market structures. One of the fastest growing, most exciting concepts is that of an ecosystem services market, an organizational structure that facilitates economic transactions between those with the incentive or desire to fund ecosystem restoration and those engaged in such restoration.

With its brand values of integrity, stewardship, and innovation, Oregon is ideally positioned to capitalize on the emerging opportunities in the ecosystem services marketplace. Already, in Oregon, organizations and individuals are developing standards, protocols, and policies needed to support market-based approaches to solving environmental challenges. By embracing the concept and actively developing an ecosystem services marketplace, Oregon has an opportunity to draw revenue, jobs and talent to our region, while enhancing our leadership in sustainability.

This scan identifies some of the emerging economic opportunities for Oregon in the ecosystem services marketplace.

II. Opportunity Definition

Society benefits from a range of resources and processes that are supplied by natural ecosystems. Together, these benefits are known as ecosystem services. Conservation, restoration, and stewardship of our environment allows ecosystems to deliver critical services that clean our water and air, provide fish and wildlife habitat, lessen environmental hazards from floods, temper our climate from extremes of heat and cold, and control pests and disease. However, the beneficiaries rarely pay for these common services, and this lack of economic incentive does little to encourage us to conserve ecosystems and the services they provide.

As populations and the demand for resources grow, it becomes increasingly clear that ecosystem services are not free, invulnerable, or infinitely available. Climate changes are occurring. Natural systems are being disrupted.

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And these changes are even now resulting in increasingly compromised air quality, water quality, and biodiversity values, all of which directly threaten our communities and economies. The challenge of assigning economic value to ecosystem services is prompting a shift in how we think about sustainability and in how we manage our environment, social responsibility, and business opportunities.

Ecosystem services markets have emerged as a way to address these growing environmental challenges through market-based mechanisms. These markets arise when certain parties are willing to pay to establish, enhance, or reduce impacts to a particular natural function, and other parties are willing or able to provide these benefits. For example, a coal-fired power plant that emits harmful greenhouse gases could purchase offset credits from companies developing and implementing emission reducing technologies. Or, a builder wanting to develop land could choose to mitigate unavoidable environmental impacts by paying a nearby land manager to take restoration actions to replace lost ecological value. Ecosystem services markets, then, can help incentivize technological innovation and strategic conservation of ecosystems, while stimulating local and regional economies.

III. Current State of the Market

A. What Are Ecosystem Services Markets?

As people become increasingly aware of the value provided by naturally functioning ecosystems, it is possible to identify incentives for entities and individuals to pay for these ecosystems' restoration and maintenance. An ecosystem services market is an organizational structure that facilitates transactions between those with the incentive or desire to fund restoration and those engaged in restoration. Such a market must accomplish two things: it must create a mechanism to facilitate transactions, and it must ensure that restoration activities are credible and contribute to ecosystem recovery.

The incentives that constitute the demand side of ecosystem services markets range from new regulations that require mitigation offsets or that allow cap-and-trade approaches for compliance, to purely voluntary transactions made for economic advantage or from moral consciousness.

The market infrastructure must include an exchange platform, an accounting system to measure transactions, and a ledger to track credits over time. In addition, protocols for ensuring credit quality and performance must be in place and verified by independent parties. The complexity of ecosystem credits in multiple markets, across multiple geographies and multiple vesting periods, creates numerous business opportunities.

B. Ecosystem Services Markets vs. Commodity Markets

Ecosystem services markets are distinct from commodity markets. In traditional commodity markets like wheat or corn, once a transaction is complete, the seller has no interest or responsibility for the product and the buyer has complete freedom as to how and where the product is used.

In an ecosystem services market, offset credits are the unit of trade. Offset credits can be measured in a variety ways, such as tons of carbon, acres of wetlands, or pounds of nitrogen. Like commodities, an offset credit has standards and criteria specific to its function and market. However, unlike a commodity, an ecosystem services offset credit is derived from a project that must be managed and maintained over decades and that must be constantly performing its service to have value. An acre of wetland sold as a mitigation offset credit only maintains its validity as long as it is performing the specific ecological function for which it was purchased. This ongoing management, monitoring and reporting required to confirm the ongoing validity of offset credits sold in ecosystem services markets is the fundamental characteristic that distinguishes an ecosystem services offset credit from a commodity. As a result, ecosystem services markets will require additional and unique infrastructure to ensure credit validity and quality.

C. Benchmarking Efforts

Using market-driven economic incentives for ecosystem restoration and enhancement is a relatively new practice, and the range of services addressed to date is rather limited, with most programs focusing on single-credit systems with limited geographical or institutional scopes. The challenge of the future will be to broaden this approach to implement multi-credit programs that encompass a wider range of services, geographies, and institutions. However, a number of successful programs are already in place, both within the United States and internationally. The following three programs exemplify the range of ecosystem services that have been addressed by these markets.

1. Acid Rain Trading Program

In the 1990s, the public became more aware of the effects of sulfur dioxide (SO2) emissions from fossil-fuel burning power plants in the United States. The Acid Rain Trading Program was a cap-and-trade system designed to reduce emissions by providing economic incentives for pollution controls. Federal regulators issued allowances in the form of annual emission cap levels. Power plants that fell below their annual caps could then sell their allowances. The program did not include offsets, but it did give extra allocations to encourage renewable power generation and some

specific pollution control measures. Over time, the cap was tightened while still preserving the value of banked allowances.

This program has been successful in total reductions, while the associated costs have been lower than originally predicted. One key part of the program was that the cap was set at a below business-as-usual level to create market demand for allowances. The private sector played an important role in providing information technology, brokerage services, and analysis critical to making the market work. The SO2 market caused regulated companies to restructure their business planning and freed up resources for federal regulators to focus on accounting, verifying, and proving performance at the program level.

2. Chesapeake Bay Nutrient Trading

Excess nutrients and sediment are one of the leading causes of water quality problems in the Chesapeake Bay. Under a 2000 interstate agreement, participating states agreed to limit pollution and achieve nutrient reductions by 2010. Regional stakeholders have looked to market-based mechanisms to help them achieve these reductions. States like Pennsylvania and Virginia use their departments of environmental quality to assign nitrogen and phosphorous load caps in point sources' permits. Those facilities that emit less than their permitted cap are allowed to sell nutrient credits to other facilities that may be over their limit. A unique feature of the program is that non-point polluters like farmers can create and sell credits to facilities by implementing measures such as erosion control and manure management. So far, state agencies, in conjunction with the World Resources Institute, have been the leads in maintaining the trading network and credit certifications (see http://pa.nutrientnet.org/). Private companies have also emerged to help farmers create offset credits and market them to treatment facilities (see http://www.redbarntrading.com/).

3. European Union's Greenhouse Gas Cap and Trade

The world's largest fully operational system for greenhouse gas (GHG) emissions trading is the European Union's (EU) cap-and-trade program. Growing out of the Kyoto Protocol, the 25 member countries limit carbon (CO2) emissions from 12,000 facilities (e.g., utilities and major industrial sectors) that together produce nearly half of the EU's CO2 emissions. The EU has also included options for creating and trading carbon credits from projects in developing countries, as regulated and certified by the United Nations.

Emissions monitoring in Europe is similar to financial reporting in the United States. Firms report their emissions annually, but a third-party must verify the accuracy of the emissions data. A number of companies have

been started specifically to help companies create and trade carbon credits (see http://www.EcoSecurities.com).

Initial price fluctuations in the test phase of the EU carbon market were due in part to over-allocations of allowances. With an absence of reliable emissions data, the cap was set too far above business-as-usual standards and did not create sufficient demand. As more data have become available, the allowance allocation has been revised for the second phase, which starts in 2008. While there are challenges to overcome, the EU has produced a functioning market system in a short time with high compliance.

D. Basic Market Structures

1. Regulated Buyers

In ecosystem services markets, regulatory agencies set goals to achieve a desired environmental condition (e.g., a cap on air or water pollution). Demand for credits is created when parties are unable to meet regulatory requirements through avoidance and minimization efforts. Caps must be set at a below business-as-usual level to create demand. Conversely, regulated organizations can create credits by reducing or eliminating impacts, often with technological controls, and then benefit from selling the excess credits. Alternatively, they can buy offset or mitigation credits from other parties, or employ a mix of both strategies.

Current and future regulations are a major driver in the creation of demand for ecosystem credits. For example, an ecosystem services market would include a large number of regulated companies or agencies as potential customers. If governments cap CO2 emissions, any utility or industry that emits CO2 would be a potential buyer of carbon credits. Current regulations for wetland mitigation, water quality, and listed species have already created single-credit markets. Developers and agencies like the Oregon Department of Transportation are required to mitigate the effects of transportation projects on wetlands and listed species. Water and sewer agencies would be potential customers of water quality or temperature credits.

2. Voluntary Buyers

The voluntary market in ecosystem services is expanding rapidly. Early adopters include companies and individuals who voluntarily utilize markets to offset their environmental impacts. This has been happening most notably in the carbon market, for example, with companies joining the Chicago Climate Exchange. In addition, there is a growing demand, driven by industry and the development community, for ecosystem and/or biodiversity offsets as a means to achieve a competitive advantage for business sector marketing and community relationship purposes. This need is stimulating the emergence of new firms that help companies and individuals voluntarily purchase credits to offset their own environmental impacts.

3. Ecosystem Services Credit Sellers

Governments set pollution limits for regulated entities. If an entity reduces emissions below its limit, it can sell the balance as credits. Credits are created when entities, individuals or organizations go above and beyond what regulations require. For example, restoration of forest lands that provide carbon sequestration could generate credits that could then be sold to regulated industries. The expansion or restoration of a riparian buffer to provide cleaner water could also create credits, which could be purchased by a regulated waste treatment facility. Nor are benefits limited to large metropolitan or industrial areas. Farmers or private property owners could also implement measures – erosion control or reforestation practices, for example – to create credits. A farmer could plant trees in a riparian area on his property, thereby creating credits that could be sold to a utility that needs water temperature offsets. Practices such as these could significantly increase the flow of revenue into local and rural economies. And all of these actions could generate a portfolio of credits for sale in individual markets.

4. Credit Exchanges and Credit Registries

An exchange is a transaction platform for ecosystem services credits, an electronic meeting place of buyers and sellers to trade credits (negotiate price, quantity, and other terms of trade). Exchanges for trading ecosystem credits have been set up and run by federal and state governments, for both for-profit and non-profit organizations.

Ecosystem credits can be traded like commodities, but they differ from commodities in terms of their complexity, both before and after the trade. Actions and technologies that create offset credits must meet specific and rigorous performance standards to be sold in ecosystem service markets, and it requires significant work to document and verify credit attributes and performance, both before a credit is sold and for many years – even decades – afterwards. Because the basic value and credibility of an individual offset or mitigation credit depends on rigorous verification and ongoing monitoring of performance, a centralized credit registry is a necessity. The registry consists of two parts: an institution that inventories and accounts for all credits available and sold within a market by documenting their generation, ownership, and trade; and the resulting database of information. A credit registry must be transparent to regulators, the public, and market participants. And, it must be supported by user-friendly technology and backed by the financial resources necessary to protect against accounting errors.

Several organizations have emerged to satisfy specific exchange and credit registry functions. However, no existing organizations are designed to accommodate multiple ecosystem services credit types across jurisdictional boundaries. And, none has been created with an independent mission of accounting for and tracking credits over time to ensure transparency and

quality. As discussed later, this limitation creates a unique opportunity for development of a diversified ecosystem marketplace in Oregon.

The following discussions outline four existing exchanges/registries, including their strengths and limitations. These programs can provide initial models and valuable lessons as Oregon moves to embrace ecosystems marketplace trading.

a. Chicago Climate Exchange (CCX)

The Chicago Climate Exchange is an entrepreneurial attempt to capture value from the carbon market. In the absence of a federally mandated greenhouse gas cap-and-trade system, CCX has established a voluntary but legally binding emissions allowance trading system. Companies and organizations that join the exchange make a voluntary, legal commitment to meet annual GHG emission reduction targets. Those who reduce below their targets have surplus allowances to sell or bank, while those who exceed their allowances comply by purchasing allowances from others. CCX also issues tradable credits to owners or aggregators of eligible projects on the basis of sequestration, destruction or displacement of GHG emissions.

Several criticisms of CCX are: that it is in the position of both certifying credit projects and trading them, creating a potential conflict of interest, that it lacks transparent protocols, and that it verifies by sector rather than by specific project. CCX provides a model for development of registries – both in terms of what works and lessons learned.

b. California Climate Action Registry & The Climate Registry

The California Climate Action Registry (the Registry) was established as a non-profit voluntary registry for GHG emissions. The purpose of the Registry is to help companies and organizations with operations in the state to establish GHG emissions baselines against which any future GHG emission reduction requirements may be applied. The same non-profit group has formed The Climate Registry, a group of some 38 states committed to a common set of standards and protocols for reporting and reducing carbon emissions. The Registry's core is a set of detailed emissions reporting protocols for various industrial sectors. Emissions are tracked via CARROT, the Registry's online reporting tool. Entities sign up to voluntarily register their emissions and are guided through an online set of questions to gather information. That information is verified by one of the Registry's approved verifiers. Verifiers must complete a Registry training program to be approved. More recently the Registry has developed protocols for emissions reductions projects. CARROT does not currently support tracking of emissions reduction projects, but the staff is planning a second release in winter 2008.

c. The New Zealand Carbon Exchange (NZCX)

NZCX, an emissions trading intermediary, was formed in 2004. After its principals were each approached by existing clients needing advice on carbon trading, they realized the need for a company with the full range of skills necessary to effectively service clients in this emerging emissions trading area. NZCX has an exclusive relationship with CantorCO2e, the world's leading provider of transaction services for greenhouse gas markets, with an international network of over 70 brokers and advisers. Together with CantorCO2e, NZCX helps companies address climate change issues by delivering market-based solutions.

d. The Australian National Environment Registries

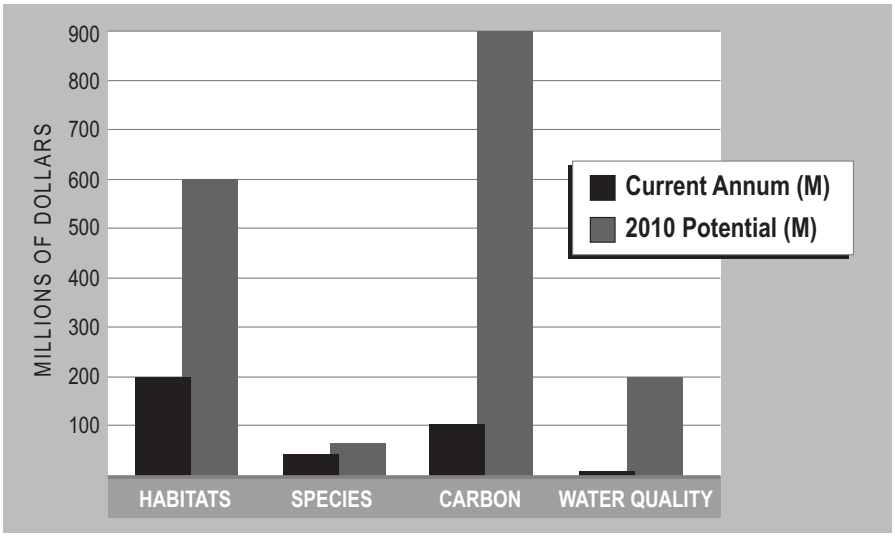
The Australian National Environment Registries is a private-sector registry platform developed as a joint venture between FEX Climate Pty Ltd and the Australian Water Exchange, which serves 70% of the regulated water quantity trades in Australia. FEX Climate is the carbon and environmental arm of Financial and Energy Exchange Ltd, a platform launched in September 2007 for trading sustainability and cleantech stocks, as well as financial, energy, carbon and environmental commodities and derivatives. The registry currently serves the voluntary carbon exchange and the regulated water exchange in Australia. It has placeholders for a biodiversity registry and a salinity registry to serve those emerging markets in Australia.

IV. Challenges and Opportunities

While there are considerable challenges in implementing an integrated ecosystem services marketplace, stepping up to these challenges could provide Oregon with significant economic benefits, as well as establishing Oregon as a center of ecosystems trading innovation. Economically, it is difficult to estimate the potential revenue inflow into the state, but market volumes for the currently active individual resource markets provide some clues. The Katoomba Group's Ecosystem Marketplace (see http://ecosystemmarketplace.com/) tracks documented global transactions in a variety of markets, including conservation banking, wetland banking, water quality trading and carbon trading. These respective emerging markets have generated – at a minimum – the following volumes during their initial years of existence:

- Conservation banking in the U.S. from 1992 to 2005 - $40,773,590 (worldwide the number was $375,908,799)
- Wetland banking in the U.S. from 2000 to 2005 - $289,659,866
- Water quality trading (TMDLs) in the U.S. from 1994 to 2005 - $11,293,926
- Carbon trading worldwide from 1987 to 2007 - $92,344,370

In 2005 the Ecosystem Marketplace estimated that these respective markets will have the following volumes by the year 2010 (wetlands are included in the habitat category):



As markets for ecosystem services grow, they will share common opportunities and challenges. If these markets are to succeed, they need a functional, transparent, and credible method of ensuring credit quality and validity. The economic viability of these markets is dependent on transaction efficiency, which requires mechanisms for buyers and sellers to easily find each other, set prices, close trades, and demonstrate performance to regulatory agencies and third party verifiers.

Currently, markets are fractured along individual ecosystem services lines (e.g., the carbon market or the water quality market), as well as along geographic and jurisdictional lines. These boundaries limit opportunities to leverage collective knowledge, investment efficiencies, and economies of scale. Major gaps that will limit the efficiency, effectiveness, and credibility in ecosystem services markets have emerged and present significant economic opportunities for Oregon.

Any ecosystem services marketplace must include five essential elements. These elements are discussed below.

A. Credit Registry

A centralized credit registry is the core of an ecosystem services marketplace, providing both the information and the credibility required for a successful marketplace. The centralized registry would operate a credit ledger and the accounting tools that track credits and debits of ecosystem services The registry consists of (1) an accounting system to register, certify, bank, and track ecosystem credits; and (2) a database to record and track this information. Parties generating credits need an efficient system to register

credits and have them certified by a third party. Such a database and accounting system would need to accommodate credit definition and verification protocols across ecosystem services, geographies, and jurisdictions.

Such a registry does not currently exist. To date, various organizations have attempted to fit ecosystem services credits into traditional commodity exchange platforms. But ecosystem services credits differ from traditional commodities in that they have very strict performance standards, as well as long contractual performance periods that require regular and rigorous verification.

B. Exchange Platform

A trading platform is needed to freely trade credits that may be local, regional, national or international. An exchange is a centralized administrative and electronic system that tracks and reports transactions between buyers and sellers. This centralized exchange would help credit buyers and sellers find each other, and would facilitate efficient exchanges through the use of pre-approved credit verification and certification procedures. It would also support credit standards to ensure the integrity of credits for the protection of the participants, especially those using credits as part of a regulatory or contractual compliance strategy.

C. Protocols and Standards

Protocols and standards for a variety of ecosystem services credits need to be established and applied consistently across the various offset families. For ecosystem services markets to operate efficiently, the validity of individual credits must be certain. Credits for various markets can be created in numerous ways. For example, to create stream temperature reduction credits, investors might plant streamside shade trees, restore wetlands, or make technological upgrades. For these credits to be exchanged in a market, buyers, sellers, regulators and the public need to understand and agree to the measurement criteria, performance standards, and verification protocols for each credit-generating activity. An over-arching organization is needed to convene local, regional, and global experts to establish standards for credit measurement, performance, and verification in global markets, and to establish procedures for local markets.

D. Third Party Verifiers

Measurement and verification firms are also critical to the success of ecosystem markets. Each market type will require credible experts to certify that credit performance standards and criteria are met. A credible entity and venue is needed to work with regulatory entities, local experts, and other stakeholders to train, certify, and monitor verification entities and to audit procedures for all ecosystem markets. The credibility of credits in

Specific Opportunities for Revenue

SELLER SERVICES

- Credit creation, aggregation, and marketing; long-term site management
  REVENUE: Credit sales, fees collected from sellers

BUYER SERVICES

- Portfolio advising, credit acquisition
  REVENUE: Fees collected from buyers based on fixed rate or % of transaction

TRANSACTION SERVICES

- Credit verification and monitoring
  REVENUE: Fees collected from buyers and/or sellers
- Underwriting/risk management
  REVENUE: Premium collected from buyers and/or sellers based on measured risk

MARKET SERVICES

- Market standards and tool development
  REVENUE: Fixed rate based on cost, licensing fees, fees collected from users
- Market information
  REVENUE: Fee for use, advertising
- Registry operation
  REVENUE: Fee based on membership or by transaction, % based on transaction value and/or volume
- Exchange operation
  REVENUE: % based on transaction value and/or volume
- Policy and public affairs
  REVENUE: Fee for service
- Credit certification and transaction auditing
  REVENUE: Fee for service
- Transaction re-insurance and credit reserves
  REVENUE: Premium based on measured risk and market volume

an ecosystem market depends on the integrity of credit verification and certification.

E. Risk Assurance

Risk assurance provisions to safeguard against project and market failures can be handled through assurance pools. An assurance pool is funded by taking a percentage of total credit sales from an individual credit market to invest in ecological restoration projects and conservation activities. The assurance pool thus creates a bank of credits that protects the public interest in the event of project or market failure. The portfolio of assurance credits would be geographically and functionally sufficient to cover the transactions in the market, and like any portfolio, would be managed by one or more independent entities.

V. Innovation for Oregon

Oregon has a tremendous environmental and economic opportunity. Already a leader in sustainability, we are uniquely positioned to create a viable ecosystem services marketplace. To be successful, a marketplace must have credible infrastructure that supports efficient and legitimate transactions. This, alone, will provide tremendous entrepreneurial opportunities for both profit and non-profit organizations. Once established, this infrastructure will catalyze the growth and health of businesses focused on environmental and technological innovation by providing access to emerging local, regional, and global markets. This emerging marketplace will leverage existing investments already made by our state, businesses, and environmental partners. Leadership now will draw new revenue, jobs and talent to our region.

Oregon has spent decades developing its unique brand of integrity, stewardship, and innovation. As a result, we are poised to capitalize on a credible ecosystem services marketplace that will create a powerful new economic engine that supports our economy and communities while addressing our most pressing environmental problems. Change is coming and Oregon is ready to capture this opportunity to solidify our role as a leader in sustainability.