

Ecosystem Services & Wine Industry Initiatives

Eco-Winegrowing Symposium
July 19, 2011

Andrew Arnold - SureHarvest



CALIFORNIA
SUSTAINABLE
WINEGROWING
ALLIANCE

Presentation Topics

- What is an ecosystem service & why should I care?
- Broad ag industry initiatives
- CSWA performance metrics initiative
- Discussion

Ecosystem Services: The Concept

Ecosystems services = *benefits people obtain from ecosystems*

ECOSYSTEM SERVICES	
Supporting Services Nutrient cycling Soil formation Primary production	Provisioning Services Food (crops, livestock, wild foods, etc...) Fiber (timber, cotton/hemp/silk, wood fuel) Genetic resources Biochemicals, natural medicines, pharmaceuticals Fresh water
	Regulating Services Air quality regulation Climate regulation (global, regional, and local) Water regulation Erosion regulation Water purification and waste treatment Disease regulation Pest regulation Pollination Natural hazard regulation
	Cultural Services Aesthetic values Spiritual and religious values Recreation and ecotourism

The role of the farmers

In climate change mitigation

Carbon storage

Carbon sequestration in biomass

Carbon sequestration in the soil

In watershed protection services

Land management

Water quantity

Water quality

In biodiversity conservation

Preserving biodiversity

Reducing agricultural expansion

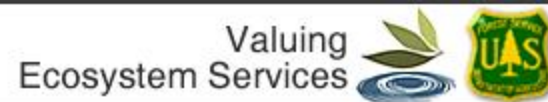
Enhancing on-farm wild biodiversity

Conserving agricultural biodiversity

Preserving agriculture landscape



Ecosystem Services: The Concept



Within the next 25 years, 44.2 million acres of private forests in the US will be at risk of conversion to developed uses.



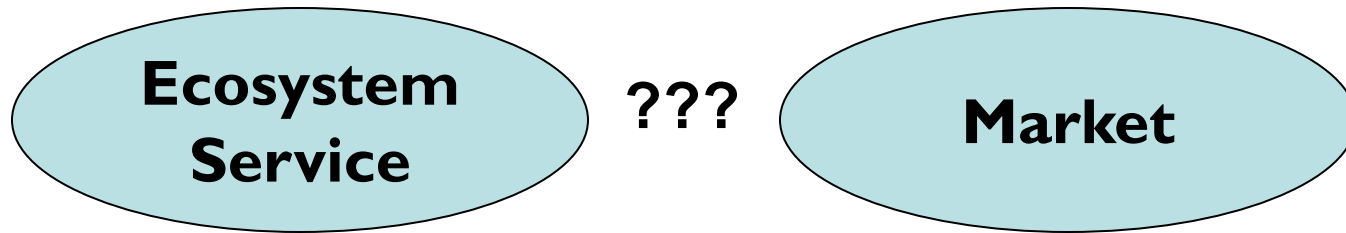
USDA Office of Environmental Markets

The **Office of Environmental Markets (OEM)** is a new office created within the U.S. Department of Agriculture to catalyze the development of markets for ecosystem services. OEM has a unique role in the federal government's efforts to develop uniform standards and market infrastructure that will facilitate market-based approaches to agriculture, forest, and rangeland conservation. OEM is bringing experts and stakeholders together with government agencies to build a robust, accessible, and scientifically credible market system that will protect and enhance America's natural capital into the future.

"Environmental markets leverage private investments that result in cleaner air, improved water quality, restored wetlands, and enhanced wildlife habitat," said Vilsack. "These markets have the potential to become a new economic driver for rural America, exactly what we need to support a bold, creative future for America's farmers, ranchers and rural communities."

The 2008 Farm Bill's Conservation Title directs the Secretary to facilitate the development of environmental markets and ensure the participation of America's farmers, ranchers, and forest landowners. As set forth by Congress in the Farm Bill, OEM will work across government and in consultation with experts and stakeholders to build a market-based system for quantifying, registering, and verifying environmental benefits produced by land management activities.

Ecosystem Services: The Concept



Is there a market for a specific ecosystem service?

How big?

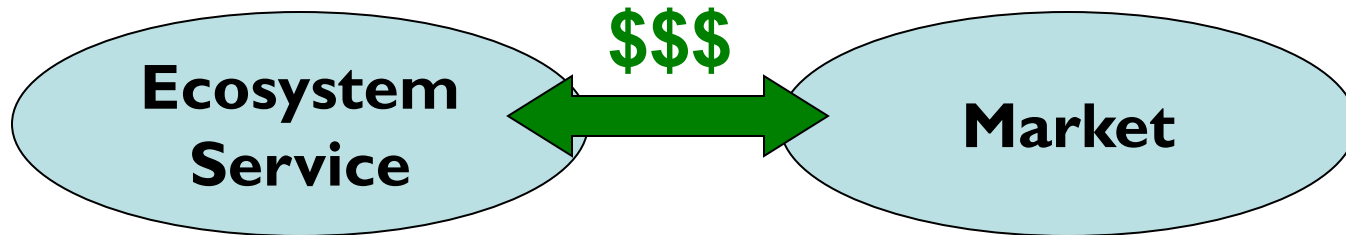
How does a grower/winery provide “added value” & participate?

How does a grower quantify his “product?”

How much \$\$\$ can a grower earn in this process?

All good questions! It’s hard to tell...

Ecosystem Services: The Concept



- **Quantify**
- **Register**
- **Verify**

Types of markets and payment mechanisms

- Public payments and support services
- Private contracts or deals
- Tax incentives and subsidies
- Trading of rights or credits under a regulatory cap
- Eco-labeling

The largest payment program in the United States is the NRCS' Conservation Reserve Program (CRP). Pays growers to:

- Reduce soil erosion & sedimentation
- Improve water quality
- Establish wildlife habitat
- Enhance forest/wetland resources

Ecosystem Services: The Concept

Ecosystem Marketplace

- search site -

SEARCH

HOME

NEWS & ARTICLES

OUR PUBLICATIONS

MARKETWATCH

LIBRARY & TOOLS

DIRECTORY

NEWSLETTERS

EVENTS

ABOUT US

BLOG

TOP STORY

Building Forest Carbon Projects

Building Forest Carbon Projects: a Step-by-Step Guide

Forest carbon can deliver tremendous economic...

MarketWatch

Carbon Mid-price* [3 month]



CARBON HOMEPAGE



State of the Voluntary Carbon Markets 2011

Carbon Markets Homepage

Ecosystem Marketplace

- search site -

SEARCH

HOME

NEWS & ARTICLES

OUR PUBLICATIONS

MARKETWATCH

LIBRARY & TOOLS

DIRECTORY

NEWSLETTERS

EVENTS

ABOUT US

BLOG

WATER MARKETS

WATER MARKETS

- ▶▶ United States Water Pollutant Trading and Offset (TMDL)
- ▶▶ Mexico Payment for Hydrological Services
- ▶▶ Costa Rica Water-Based Ecosystem Services
- ▶▶ Hunter River Salinity Trading Scheme

WATER SECTION

- ▶▶ News & Articles
- ▶▶ Our Publications
- ▶▶ Library
- ▶▶ Directory
- ▶▶ Events
- ▶▶ Special Interest
- ▶▶ Geographic Region
- ▶▶ Buyer's Listings

FEATURED PUBLICATION



State of Watershed Payments

Here, for the first time ever, we have an attempt at cataloguing the use of Payments for Watershed Payments ...

[[Go to publication](#)]

WHAT'S NEW IN WATER MARKET

News & Articles

▶▶ [View News & Articles](#)



New Tools Measure Corporate Water Risk

Climate change will one day wreak havoc on rivers, streams, and lakes – but today's water shortages flow from sloppy land ...

[[Go to Article](#)]



Companies Plunging Head First into Water Risk Challenges

Water shortages could dampen corporate profits around the world, but that could actually be good for the world's poor – if ...

BUYER'S LISTING

- > Pagos por Servicios Ambientales (PSA)
- > US Incentives for Conservation
- > Conservation Security Program
- > Wetlands Reserve Program

MOST POPULAR

- > State of the Voluntary Carbon Markets 2009
- > Podcasts From Poseidon: Palo Alto Audio Streams Now Online
- > K-16 Videoblog: Saving the Oceans by Quantifying Their Value
- > Streaming Video: Inside the Skoll World Forum 2010
- > Theory and Practice Collide in Efforts to Stack Multiple Ecosystem Values on One Piece of Land

On-Farm Examples

- **Carbon sequestration** – keeping carbon in the soil to prevent CO₂ emissions and reduce GHG effect
- **Habitat preservation** – improving biodiversity levels
- **Water quality** – improving water quality for benefit of humans and aquatic species
- **Water conservation** – preserving natural water cycle

Broad Ag Industry Initiatives



- No-till/conservation tillage farming
- Commitment to a time frame
- Carbon credits (sequestering carbon)
- Creates a **new farm profit center**



Ranchlands provide habitat for many wading and migratory birds

- Revise water mgmt practices
- Capture water (wildlife)
- Reduce phosphorous runoff
- Creates a **new ranch profit center**

Broad Ag Industry Initiatives (cont.)



- Pay-for-performance concept
- Water quality pilots
- Measure – improve – get paid
- EQIP & CRP are practice-based cost share

Water Quality Issue

Performance Measure

Phosphorus (P)


Iowa Phosphorus Index

Nitrogen

End-of-season Cornstalk Nitrate Test



World Resources Institute

WRI Main Site... 

NUTRIENT NET reducing watershed nutrient runoff

WELCOME to **NutrientNet** - first on-line market for improving water quality through nutrient trading

project of the World Resources Institute



Broad Ag Industry Initiatives (cont.)



Watson Partners Farm receives payments for planting a cover crop with its sugar beets as part of a phosphorus trading program within its cooperative. Cover cropping sequesters phosphorus and offsets discharge from the cooperative's wastewater facility.






[Brief](#) | [Diagram](#)



Buck Island Ranch is one of the farms in the Lake Okeechobee watershed supplementing its cattle sales with water retention services as part of a pilot project.

[Brief](#) | [Diagram](#)

Farm Revenue Sources (Gross), 2009

Source	Income	Customer
 Sugar beets	41 %	Southern Minnesota Beet Sugar Cooperative (processing)
 Corn	51 %	Local elevator (primarily)
 Soybean	7 %	Local elevator (primarily)
 Wetland and habitat restoration	< 1 %	USDA CRP and CREP, Reinvest in Minnesota
 Phosphorus reduction credits	< 1 %	Southern Minnesota Beet Sugar Cooperative

- Creative payment schemes
- Credits/offsets
- Additional revenue for beneficial land management practice changes

Measuring & Valuing Ecosystem Services

Winegrape Growers



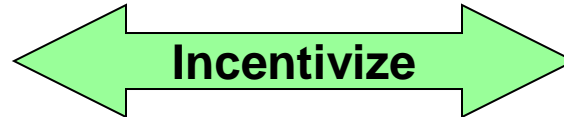
- **Practices**
- **Technologies**
- **Innovation**

Environmental Services
& Markets

Early stages for:

- Water quality trading
- Nutrient trading
- Carbon offsets
- Biodiversity offsets
- ???

USDA Office of Environmental
Markets (OEM)



Tools & Calculators?

Quantify services to participate in markets

Vineyard Possibilities?



Farmscape services?
(beyond the vineyard footprint)



Composting



No/minimum till and cover crop

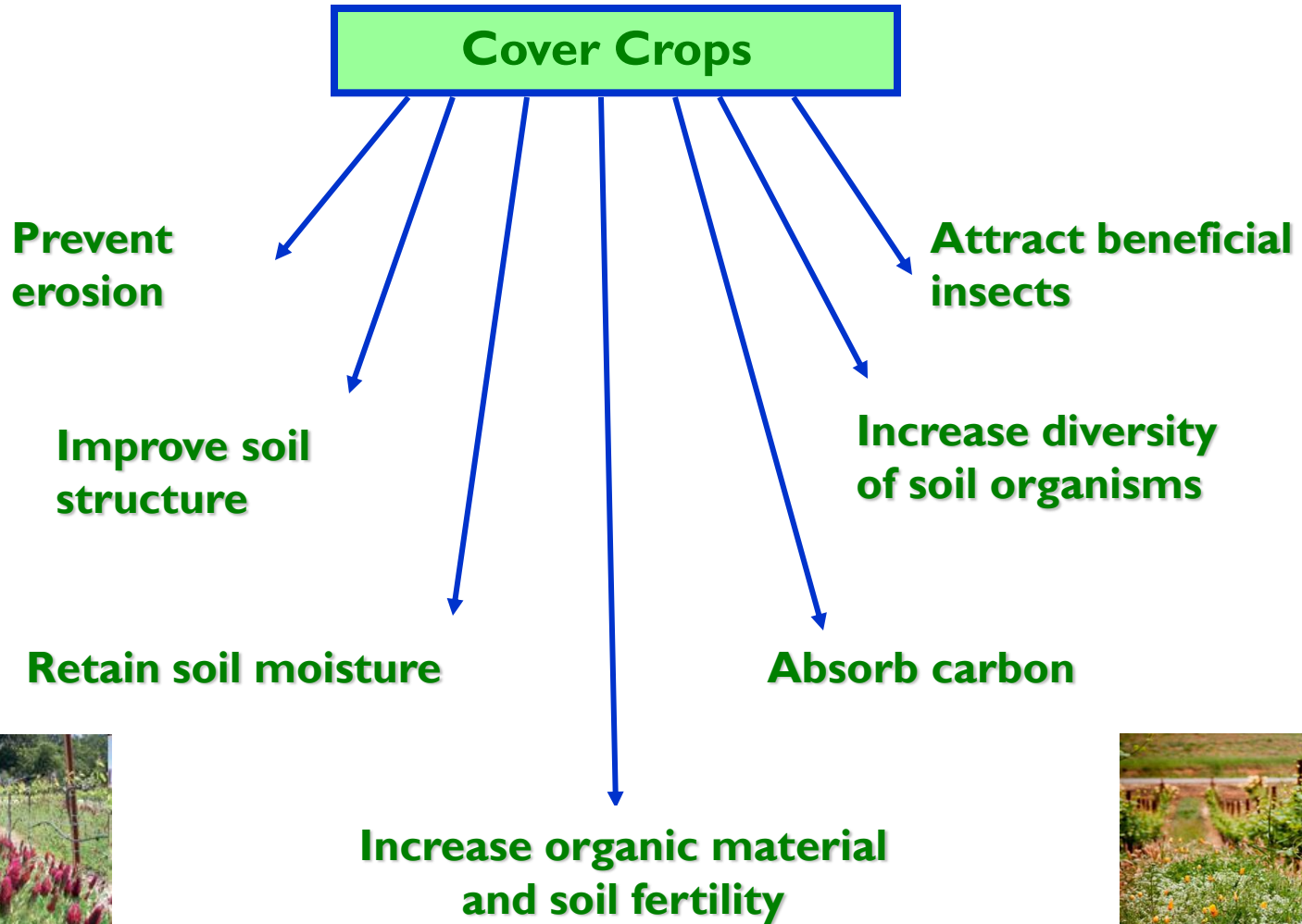
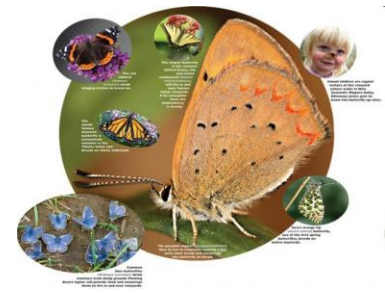


Buffer areas & riparian restoration

Insectary vegetation



Cover crops and their effects in vineyards

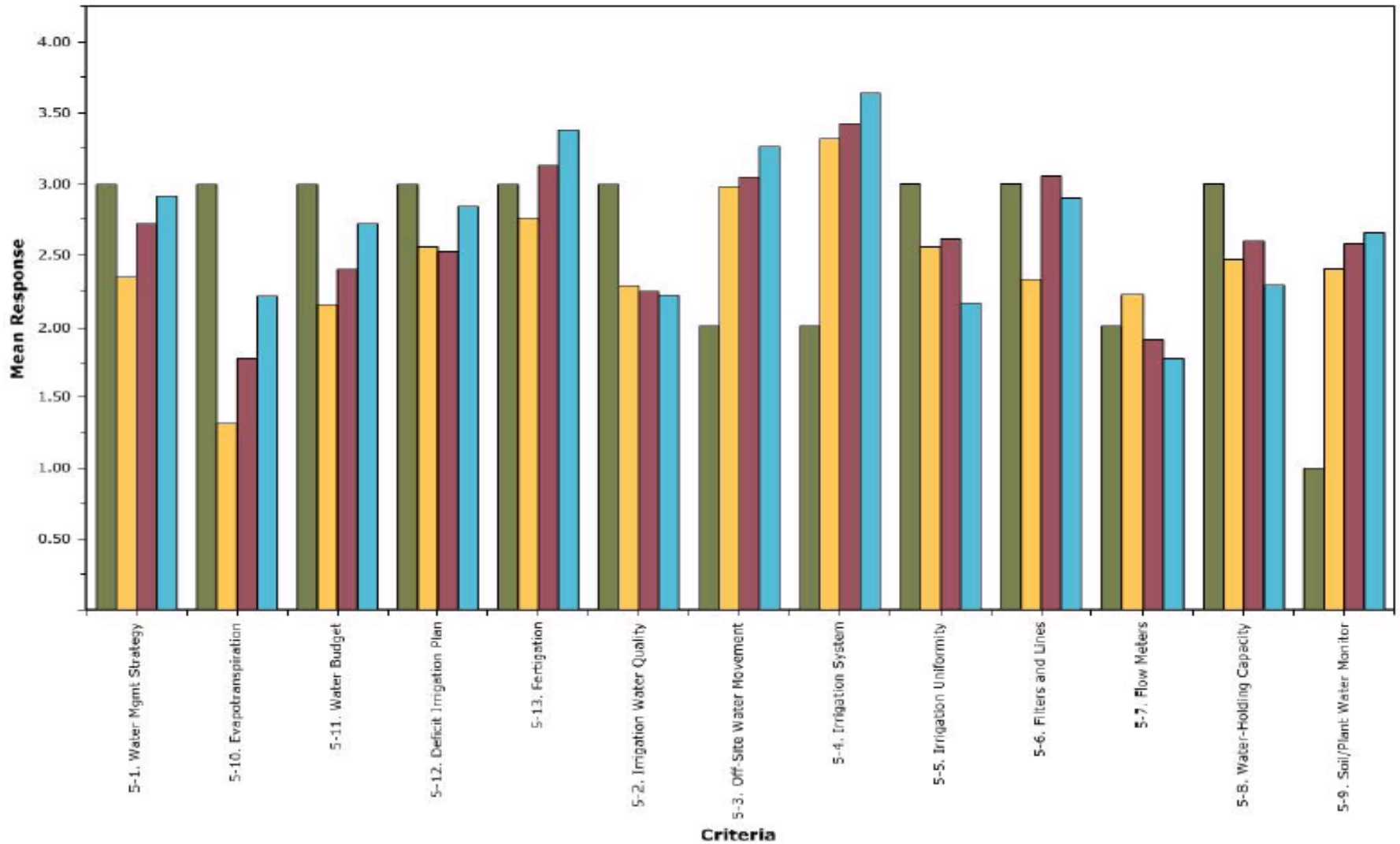


CSWA Performance Metrics Initiative Update

SWP – Practice Assessment

Chapter 5 Vineyard Water Management

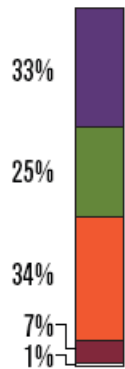
■ 2007 Home Ranch Criteria ■ 2007 Santa Cruz Mountains Vineyard Criteria Mean
■ 2007 51-250 Acres Vineyard Criteria Mean ■ 2007 California Statewide Vineyard Criteria Mean



SWP – Practice Improvement

Benchmark Data

Growers



5-1. WATER MANAGEMENT STRATEGY

Development and implementation of a water management strategy is key to making effective and efficient vineyard water use decisions. 92% of the growers have defined comprehensive water management strategies and grape-growing goals, with

58% having in place the tools to accomplish those goals and 33% having implemented the strategy for over one year. 7% of the growers have not developed a water management strategy for their vineyards. Less than 1% of the growers replied N/A, not applicable or information not available.

STRENGTHS AND OPPORTUNITIES FOR IMPROVEMENT

STRENGTHS	MIDDLE GROUND	MOST OPPORTUNITIES
Viticulture	Vineyard Water Management	Energy Efficiency
Soil Management	Pest Management	Materials Handling
Wine Quality	Winery Water Conservation & Quality	Waste Reduction
Ecosystem Management	Human Resources	Environmentally Preferred Purchasing
	Neighbors & Community	
	Air Quality	

SWP – Performance Improvement?

But what about quantifying impacts on resources?

- Water use?
- Energy efficiency?
- Fertilizer use?
- Air quality?
- Pesticide non-target impacts?

What are the measurable outcomes from practices used by individual operations and the industry?



“If you can’t measure it, you can’t manage it...”

Performance Metrics – What are They?



Welcome to the California Sustainable Winegrowing Performance Metrics

This is the launch page for winegrowers to access scientifically sound tools to learn about and measure natural resource use, carbon footprints, pesticide risks, and more. Why care? You should because transparency of “content” behind products is important in today’s marketplace. Many farmers and processors insufficiently track information about their business practices. However, information such as measurements (metrics) of environmental and social performance to better manage business operations and to learn about smart options for improvement.

Each resource area offers opportunities to learn more, test calculators and compare the environmental performance of your business to peers for key elements of each metric. Or, sign up and “get serious” about comprehensively calculating and tracking performance for continuous improvement. Your experiences and results will increase business viability by improved efficiency and reduced risk and liability.



Energy + Carbon

Many factors affect the carbon footprint of an agricultural operation or product but energy use often is most important. Calculate your energy use and its associated carbon footprint, and then learn how to reduce both.

[Start Now](#)



Water

Few things can sink your business as fast as running out of water. Calculate water used by your operation and determine cost-effective practices for conserving this vital resource.

Note: This tool has not been developed yet

[Learn More](#)



Soil

Many factors affect the carbon footprint of an agricultural operation or product but energy use often is most important. Calculate your energy use and its associated carbon footprint, and then learn how to reduce both.

Note: This tool has not been developed yet

[Learn More](#)

- Water
- Energy
- Nutrients
- Greenhouse Gases
- Air Quality
- Waste
- Pesticides
- Biodiversity
- Human Resources



A SYSTEM FOR MEASURING
SUSTAINABLE PERFORMANCE
THROUGHOUT THE SPECIALTY
CROP SUPPLY CHAIN.



“The project will offer a suite of outcomes-based metrics to enable operators **at any point along the supply chain** to benchmark, compare, and communicate their own performance.

The Stewardship Index will not seek to provide standards, but will instead provide a yardstick for measuring sustainable outcomes.”

--SISC Introduction and FAQ, approved 12/1/2008

Performance Metrics – Vineyards

Nutrients

Nitrogen applied

$$\text{Nitrogen applied} = \frac{\text{Pounds Nitrogen Applied}}{\text{Unit of Production}}$$

Water

Simple Irrigation Efficiency

$$\text{Simple Irrigation Efficiency} = \frac{\text{Crop evapotranspiration}^*}{\text{Volume of applied water per acre}}$$

*Crop Evapotranspiration (ET_c) can be measured, calculated, or referenced from agronomic tables.

Water Use Efficiency

$$\text{Water Use Efficiency} = \frac{\text{Crop yield per acre}}{\text{Volume of applied water per acre}}$$

Greenhouse Gases

Total Greenhouse Gas Emissions

$$\text{Total GHG Emissions} = \text{Total tons CO}_2 \text{ equivalents}$$

Greenhouse Gas Emissions Per Unit

$$\text{GHG Emissions} = \frac{\text{Total tons CO}_2 \text{ equivalents}}{\text{Unit of Production}}$$

Energy

Total Energy Use

$$\text{Total Energy Use} = \text{Total BtU}$$

Energy Use Per Unit

$$\text{Energy Use} = \frac{\text{Total BtU}}{\text{Unit of Production}}$$

Performance Metrics – Wineries

Water

Water Use Efficiency

$$\text{Water Use Efficiency} = \frac{\text{Total Volume Water Used}}{\text{Unit of Production}}$$

Greenhouse Gases

Total Greenhouse Gas Emissions

$$\text{Total GHG Emissions} = \text{Total tons CO}_2 \text{ equivalents}$$

Greenhouse Gas Emissions Per Unit

$$\text{GHG Emissions} = \frac{\text{Total tons CO}_2 \text{ equivalents}}{\text{Unit of Production}}$$

Energy

Total Energy Use

$$\text{Total Energy Use} = \text{Total BtU}$$

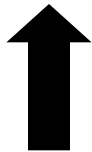
Energy Use Per Unit

$$\text{Energy Use} = \frac{\text{Total BtU}}{\text{Unit of Production}}$$

GHGs, Efficiencies & Potential Markets

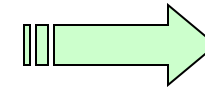
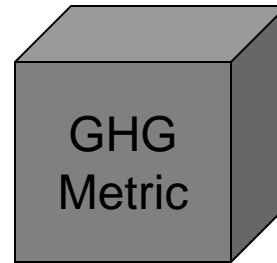


Inputs




- Fuel
- Electricity
- Water
- Fertilizer
- Crop protection

- Climate
- Soil
- Plant



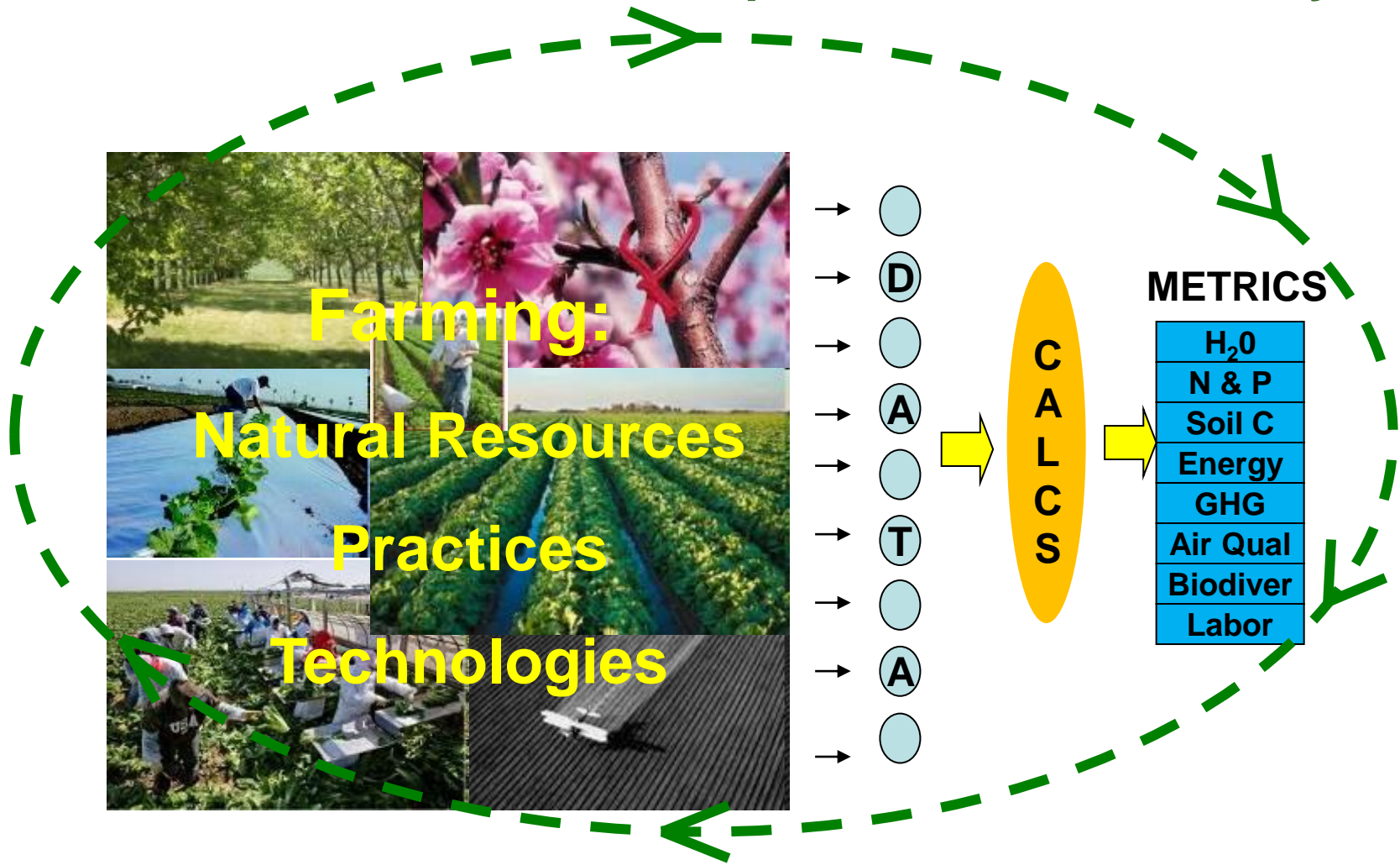
\$X (?)

Carbon
Offsets/Credits

Efficiency =  **Costs**

OUTCOMES???

What are the results on People, Planet, Profitability???



Data Collection & Mgmt Platform



Summary & Discussion

- Practices + Performance = future of sustainability programs
- Ecosystem services concept is complex and still developing
- Ag is definitely part of the solution
- Don't quit your day job...yet

The main message is that we want to keep it simple, if possible... not a lot of data, just more general overview of the concepts... and what potential future there is for growers and wineries in this arena... and in particular, what growers can do to keep involved and to improve their potential to benefit from measuring or enhancing their ecosystem services.



<http://www.swcs.org/index.cfm?nodeID=24669&audienceID=1>

2010 SWCS Carbon Mkts presentations

The ppt presentations by Lal and Hepperly are quite interesting. I particularly like the list of ecosystem services that Lal includes any details on whether/how these services can be valued and recognized in ag production systems

Ecosystem Services: The Concept

Measuring and valuing ecosystem services in agriculture

ecosystem services in agriculture, including:

- general concepts
- the issue of carbon sequestration
- whether there really are prospects for farmers to gain “added value” from this in the future

<http://www.fao.org/es/esa/pesal/AgRole.html>