

# Developing a Land Use/Biodiversity Indicator for Agricultural Product LCA's

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# Why Should We Care about Land Use?

- ❖ Half of the world's wetlands were lost last century.
- ❖ Logging and conversion have shrunk the world's forests by as much as half (30% to agriculture)
- ❖ Some 9 percent of the world's tree species are at risk of extinction; tropical deforestation may exceed 130,000 square kilometers per year.
- ❖ Soil degradation has affected two-thirds of the world's agricultural lands in the last 50 years.
- ❖ Dams, diversions or canals fragment almost 60 percent of the world's largest rivers.
- ❖ Twenty percent of the world's freshwater fish are extinct, threatened or endangered.

*UNEP & WRI*

# Conclusions

- ❖ These losses are related to physical changes in land use, not to chemical releases
- ❖ Many of these losses are related to agricultural use of land
- ❖ LCIA indicators of land would therefore be very useful and essential for characterizing LCA's of agricultural products

# Approach

- ❖ In July of 2000, IERE and Defenders of Wildlife held a workshop on Biodiversity/land use indicators in Washington, DC.
- ❖ A broad group of US experts representing stakeholders in government, academia, industry and the non-profit sector met to discuss the issue, and develop preliminary indicators.

# Goal of the Meeting

- ❖ Develop a short list of indicators to be tested
- ❖ Indicators should be universally applicable and permit aggregation across space and time
- ❖ Indicators should be useful form many uses
- ❖ Focus was on agricultural systems, but other systems also considered

# List of Indicators

	<b>Biodiversity Indicators</b>	<b>Proposed Measures</b>
1	Protection of priority habitats/species	<p>Acreeage of habitat that is physically protected (i.e.; through fencing or other methods); habitat to be identified as including</p> <ul style="list-style-type: none"> <li>• 100 feet each side of rivers;</li> <li>• maps with location of T&amp;E species</li> </ul>
2	Soil characteristics: soil health	Concentration of organic carbon in the soil
3	Proximity to & protection of high priority vegetative communities	Acreeage of habitat set aside (not farmed) that is identified as "high priority" in TNC vegetative maps
4	Interface between water and terrestrial habitats/buffer zones	Total linear space of aquatic habitat (i.e. river, lakeshore, etc) protected via physical means vs. total area managed
5	Assimilative capacity of water and land (TMDL process); hydrological function;	Depletion of water resources (annual use versus recharge rate)
6	Percent coverage of invasive species (within protected areas)	For physically protected areas, density of non-native vegetation (area percent)
7	Road density	Miles of road per square mile
8	Percent native-dominated vegetation	Acreeage in native species dominated areas/total area managed
9	Restoration of native vegetation	Acreeage newly returned (in last 12 months) to native habitat
10	Adoption of BMP's linked to biodiversity objectives	Number of BMP's adopted
11	Distribution (patchiness; evenness, etc.)	<p>Size of native-managed acres vs. total acres managed</p> <p>Size of native-managed acres vs. average field size</p>
12	Connectivity of native habitat	On managed acres, percent of native-managed land units that has at least one adjacency to other native-managed land

# What we tried

- ❖ Working with individual farmers on our sustainable ag program didn't work-- too labor intensive to gather data
- ❖ Working with farmers cooperatives-- promising, but was taking too long to get data
- ❖ Survey of grass farmers: Worked great! But

# Survey Background

- ❖ Based on list of indicators
- ❖ Ignored one indicator (roads) which was a forested area indicator
- ❖ Electronic survey
- ❖ Selected list of farmers working towards sustainable agriculture through management-intensive grazing
- ❖ Response was amazing-- 42 percent return within 10 days.



# General Conclusions

- ❖ Most farmers do set aside some land for wildlife purposes
- ❖ The set-aside land is typically high eco-value, but typically not adjacent to other protected land
- ❖ Most farmers do not measure their water use or their soil organic matter

# More general conclusions

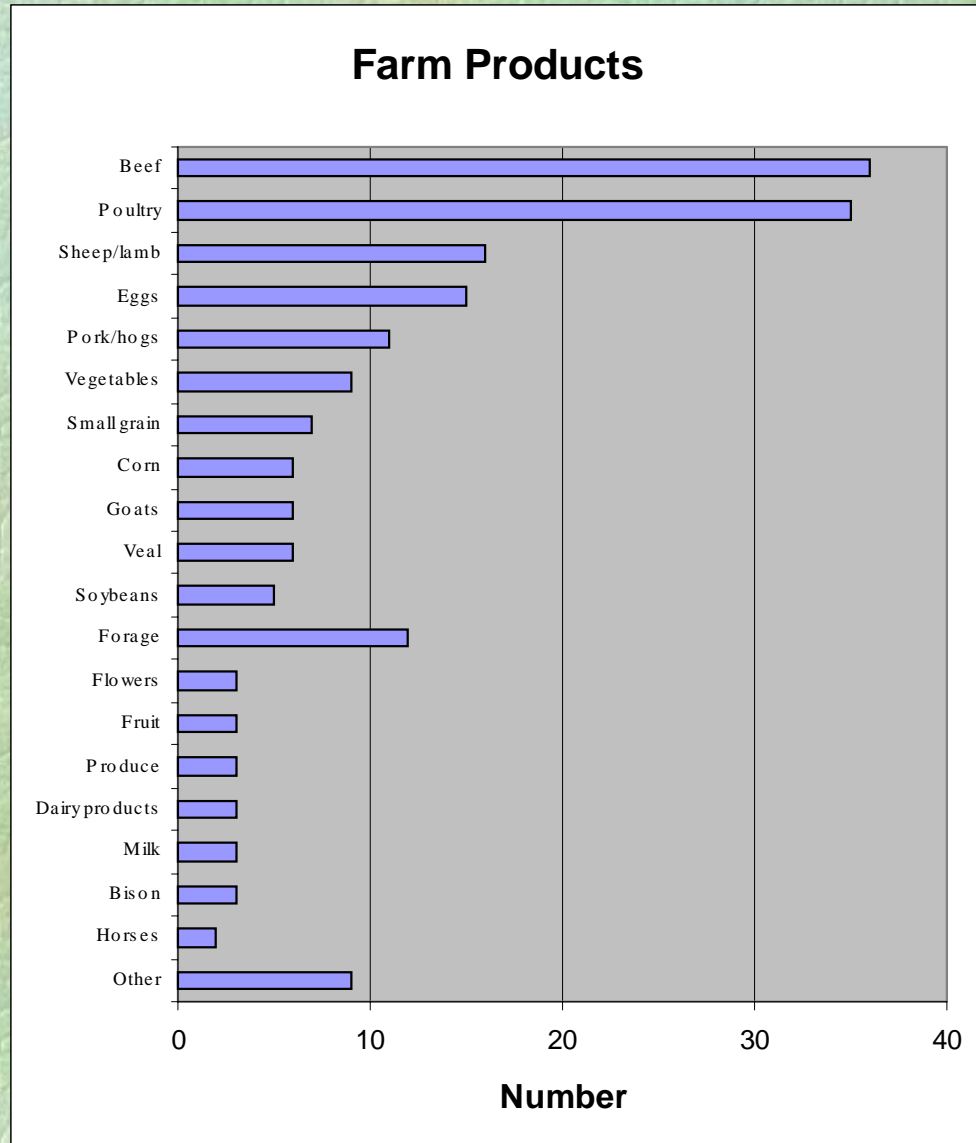
- ❧ There is a large range of understanding of the environmental impacts of farming among even this rather dedicated group of farmers.
- ❧ Most responders had trouble with numbers--providing ranges when asked for single points, or making responses in different locations that did not add up

- ❧ **Size of farms diverse, median of 70 ha, but range from 3.6 to 5900 ha**
- ❧ **Median size of field or management unit was 5 ha, but ranged from 0.1 to 36 ha**



**Farm  
Products  
Very Diverse**

**Most farms  
produce  
several  
products**



# Statistics/Indicator

## Survey Results

- Area of habitat that is physically protected habitat to be identified as including
  - 30 meters each side of rivers;
  - location of T&E species

- Concentration of organic carbon in the soil

- Median: 6 ha.  
Median 1.2 ha near water  
T&E species unknown

- average: 3.6%  
median: 3.15%

# Survey Results

- ❧ Area of habitat set aside (not farmed) that is identified as "high priority" in TNC vegetative maps
  - ❧ **Not known**
- ❧ Total linear space of aquatic habitat (i.e. river, lakeshore, etc) protected via physical means vs. total area managed
  - ❧ **Median: 213 meters**
- ❧ Depletion of water resources (annual use versus recharge rate)
  - ❧ **Not Known**
- ❧ For physically protected areas, density of non-native vegetation (area percent)
  - ❧ **average: 17%**
  - ❧ **median: 0%**

# More Survey Results

- Area in native species dominated areas/total area managed
  - Average: 11%
- Area newly returned (in last 12 months) to native habitat
  - Median: 0
  - Average: 23 ha
- Number of BMP's adopted
  - 3
- Size of native-managed vs. total area managed
  - Median: 11%
- Size of native-managed area vs. average field size
  - Median 100%
- On managed acres, percent of native-managed land units that has at least one adjacency to other native-managed land
  - Median: 0

# Conclusions

- ❖ Variability in agriculture in US is huge
- ❖ Some proposed indicators were not helpful for farmers because they did not know what they meant (e.g. threatened and endangered species; high-value habitat)
- ❖ Protection of waterways was common. This goal appears to be possible across the country with relatively little more effort



# Follow-on work

- ❖ **Developing a survey tool for our website [www.iere.org](http://www.iere.org)**
- ❖ **Working to try out indicators on Vashon Island**
- ❖ **Developing web-based information for farmers about the impacts of their management decisions.**
- ❖ **Additional workshop planned for Fall, 2001-  
- seeking European input!**

# Vashon Island

67 square kilometers

10,000 people

mostly intact  
ecosystems

Approach on a  
community level, not  
individual landowner  
level.





Invasive Species  
in the US are  
Often Eurasian  
in Source

for example,

this  
English Ivy  
strangles trees  
in the Pacific  
Northwest

# Interested in collaborating?

✂ Contact me at:

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# American Center for Life Cycle Assessment



**Mission: to build capacity and disseminate  
knowledge about Life Cycle Assessment**