A Healthy Farm Index

John E. Quinn[1], James R. Brandle[1], Elizabeth Sarno[1], & Ron J. Johnson[2]

[1]University of Nebraska- Lincoln, School of Natural Resources & [2]Clemson University, Department of Forestry and Natural Resources

INTRODUCTION

Assessment and communication of the value of less tangible outputs of a farm system is an essential step towards ensuring resilient agroecosystems now and in the future. As an outcome of a broad research program in organic agroecosystems at the University of Nebraska-Lincoln, we have developed the Healthy Farm Index (HFI). The HFI assesses and communicates the value of biodiversity, ecosystem services in addition to farm production.

Past research has produced a broad range of applied management suggestions with the potential to improve farm design and enhance ecosystem services.

In the end though, what all these practices are measured against is yield and profit. While it is essential that we maintain yield and profit, it is equally important that farm assessment include other indictors of farm health or success. This process needs to occur at the farm level, empowering the individual to understand the full range of outputs or services provided from their land.

NEED AND GOALS

- New assessment and decision making tools are needed that…
  - Recognize positive consequences of management decisions
  - Address the multiple choices and constraints that farmers face
  - Recognize and reward farm systems for the ecosystem services they provide
  - Prevent arbitrary decisions and consider all options available to the farmer
- As an integrated assessment and decision-making tool, the HFI allows farmers to make the best decisions by measuring outcomes beyond crop production toward a diverse set of management goals

TARGET VALUES AND WEIGHTS

Category	Indicator	Target Values	Weight w/in category	Weight w/in index	Final Score
Food Production	Alternative market opportunities	3	0.1	0.25	
	Crop production	100	0.9		
Biodiversity	Richness of domestic diversity	6 species	0.3	0.25	HFI Score
	Richness of indicator bird species	3 sp/ habitat	0.25		
	Avian diversity index	1	0.2		
	Habitat diversity index	1	0.25		
Environment	% in non-crop habitat	15%	0.25	0.25	
	% of year arable land covered in crops or cover crops	100	0.25		
	% of waterways buffered	100	0.25		
	% of farm fields protected w/ soil conservation structures	100	0.25		
Quality of Life	Satisfaction with profit	100	0.5	0.25	
	Satisfaction with farm system	100	0.5		

PARTICIPATING FARMS

Model Landscape Assessment

	Food Production score	Biodiversity score	Env. Quality score	Quality of Life score	Final HFI score
Average Scenario	85.85	62.36	40.5	50	59.68
Maximum Production	88.47	37.85	21.68	50	49.5
Wild Biodiversity	68.51	91.96	75.67	50	71.53
Environmental Quality	86.1	87.07	83.63	50	76.7

METHODS

- The HFI, by integrating and communicating interdisciplinary data, reflects a new vision of sustainable agriculture
- Indicator are sensitive to change and easily collected by the farmer or land owner
- Twelve indicators have been selected. Designed structure allows future additions
- Target values incorporate multiple criteria and are based on data and inputs from working farms and research
- A preliminary model landscape assessment (below) based on 4 model farms shows promise
- Initial measures of the Biodiversity Enhancement category are based on bird and vegetation surveys from participating farms
- The Environmental Enhancement category measures soil and water protection through land cover and land use. Target points are based on recommended land use and land cover patterns
- Food and Fiber Production and Quality of Life categories are based on data provided by participating farmers

LAND USE AND LAND COVER PATTERNS

Land use and land cover patterns vary among farms, especially among diversified and organic farms with a heterogeneous landscape mix of diverse crops and natural features. The HFI is designed to account for landscape variation among farms and across agroecozones.

DISCUSSION

A healthy farm sustains farming, biodiversity, and ecosystem services for current and future generations. As a tool, the HFI suggests optimal land use and land cover patterns by communicating tradeoffs that result from farming management choices.

Preliminary assessment with the HFI demonstrates it reflectance of sustainable farm design and propensity to reward positive management actions. Representing the overall condition, resiliency, and resistance of the farm, the index is a valuable tool for farmers, stakeholders, and policymakers. The current index structure provides a framework in which to add additional indicators developed through future research. Current indicators will continue to be evaluated with participating farms.
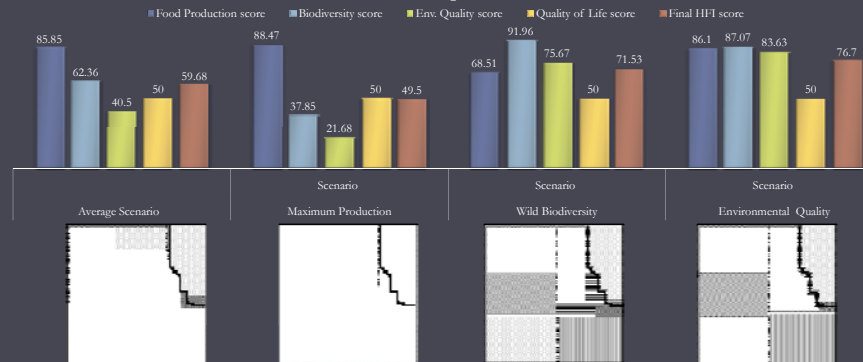
SELECTED REFERENCES

Hajkowicz, S. 2008. Sustainability Science, Practice, & Policy 4:17-24.
Krebs, J.R., J.D. Wilson, R.B Bradbury, & G.M. Siriwardena, 1999. Nature 400:611-612.
MEA (Millennium Ecosystem Assessment). 2005. Washington DC: Island Press. Also available at: http://www.millenniumassessment.org/en/Framework.aspx
Matson, P.A., W.J. Parton, A.G. Power, & M.J. Swift, 1997. Science 277:504-509.
Quinn, J.E., J.R Brandle, & R.J. Johnson. 2009. Development of a Healthy Farm Index to assess ecological, economic and social function on organic and sustainable farms in Nebraska's four agroecoregions. Pages 156-170 In: Franzluebbers, A.J., ed. 2009. Farming with Grass: Achieving Sustainable Mixed Agricultural Landscapes. Ankeny, IA: Soil and Water Conservation Society.
Perrings, C., and 7 others. 2006. Conservation Biology 20:263–264.

For more information please visit our website: http://hfi.unl.edu