APPLICATION OF THE HEALTHY FARM INDEX

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INTRODUCTION

Agriculture is dependent on economic, social, and natural capital. A focus on short-term production and maximizing single outputs leads to narrow decisions that risk long-term capital availability. Given the importance of agroecosystems, there is increasing interest in improving less tangible outputs of farm systems, including ecosystem services (Zhang et al., 2008). Many ecosystem services, however, are difficult to value and as a result are not included in farm assessment, design, or decision-making. With human population growth expected to reach 9 billion by 2050, pressure on agroecosystems will continue to increase. The resulting challenge is how to meet production needs while at the same time maintaining social and natural capital. Consequently, new measures of farm success, new means of assessing farm systems, and new decision support tools are needed.

Farmers have a good understanding of how single outputs can be maximized. Balancing multiple outputs, however, requires new assessment and decision making tools that recognize positive consequences of management decisions, address the multiple choices and constraints that farmers face, and recognize and reward farm systems for the ecosystem services they provide (Daily and Matson, 2008). These tools must seek to prevent arbitrary decisions and consider all options available to the farmer. As an integrated assessment and decision-making tool, the Healthy Farm Index (HFI) enables improved decisions by assisting farmers in measuring progress, beyond crop production, toward a diverse set of management goals.

DESCRIPTION OF TOOL

Past research has produced a broad range of applied management suggestions with the potential to improve farm design and enhance ecosystem services. Agroforestry, organic management, reduced tillage, mixed-farming systems, and farming with grass are examples that have been shown to enhance ecosystem services and build capital. In the end, however, 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.

Developing an assessment tool requires clear, relevant, and measurable indicators. An index of farm health needs to be adaptable to the location and the resources and labor available. The difficulty in placing an economic value on many parameters of a healthy farm necessitates multiple criteria analysis (Hajkowicz, 2008). The Healthy Farm Index allows economic value to be included as a criterion along with other suitable indicators. To ensure a holistic view of the agroecosystem, we selected indicators from multiple categories of ecosystem services to and from agroecosystems.

A target for each indicator is based on data collected through research, feedback from farmer advisory groups, evidence of the benefits of a practice, and a consideration that a farm needs to remain productive. These indicators fall under four categories – Production, Biodiversity, Quality of Life, and Environment. Ecological, biophysical, and socio-economic data collected during research in Nebraska and Kansas are used as the basis for the index, as it applies in the Great Plains.

Assessment of a farm using the HFI involves the farmer in collection of needed information for the four categories. The amount of food and fiber produced per unit of land is compared to the target of comparable production in the region. Economic resiliency is measured through the number of market opportunities in which the farm participates. Biodiversity estimates are developed from the number of different crops and livestock on the farm, and measures of bird and habitat diversity. Quality of life inputs assess farmer satisfaction with yields and profit and the farm system overall. The environmental measures are derived from functional land use and land cover patterns including; the percent of the farm in non-crop habitat, percent of fields and waterways protected by conservation structures and percent of the year that arable crop fields are protected by vegetation.

Following farm assessment, the HFI can be used to guide the decision making process in such a way that the multiple goals of the farmer and society are included. To meet these goals, farmers are faced with a revolving set of management decisions that are affected by economic and environmental stochasticity. Moreover, the temporal and spatial scales of farm management decisions vary. For example, some decisions are immediate (e.g., cultivation) whereas others require a long-term vision (e.g., windbreaks). Consideration of uncertainty does complicate management goals in managed ecosystems, but complete removal of uncertainty and complexity from farm management is not realistic. The use of structured decision-making (Gregory and Keeney, 2001) as a formal decision-making process, can present new methods, based on the best science, to farmers to address uncertainty and complexity in their farm management. Decisions made with inaccurate or incomplete information may not lead to the most efficient use of limited resources. Without a tool to assess current and future implications of these decisions, a full accounting may not be made.

DISCUSSION

The HFI allows farmers to use their resources efficiently, include and weigh all options in their decision making process, and maintain a healthy farm system that produces food and maintains ecological and socio-economic health. Preliminary assessment with the Healthy Farm Index (Quinn et al., 2009) demonstrates reflectance of sustainable farm design and propensity to reward positive management actions. Representing the overall condition, resiliency, and resistance of the farm, the Healthy Farm 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 on participating farms.

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