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# Agricultural Biodiversity and Ecosystem Services of Major Farming Systems

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## Introduction

Biodiversity, or the variety and variability of organisms at the genetic, species, and ecosystem levels, is crucial for maintaining the ecosystem's fundamental functions as well as its structure and processes. Agriculture and food production can be optimised by managing biodiversity to preserve or improve ecosystem services, support ecosystem resilience for risk reduction, and offer choices for agricultural output optimization. Indeed, diversification improves ecosystem services because parts that initially seem redundant when changes take place become crucial. Not just in the strictly biological sense of impact on production, but also in terms of meeting a variety of requirements of the farmer and society at large, biodiversity is a key regulator of agro-ecosystem functions. Farmers and other agro ecosystem managers can enhance, this is possible through effective agricultural methods that adhere to ecosystem-based strategies intended to increase the sustainability of production systems. They seek to satisfy consumer demands for goods that are nourishing, of the highest calibre, secure, and made in a way that is both socially and environmentally responsible. Sustainable farming techniques are built on the preservation and improvement of biodiversity in agricultural systems, both above and below ground (such as soil biodiversity). The structure and diversity of planned biodiversity have a significant impact on the types of linked plant, animal (for example, wild pollinators), and microbiological diversity [1,2].

Farm management that focuses on increasing biomass production leads to biological simplicity and, in the end, reduced future production potential. Despite the substantial and expanding body of research supporting the necessity of restoring biodiversity to farm systems, only a small portion of local agricultural land use decisions are taking biodiversity and ecosystem services into account. Lack of planned and linked biodiversity may weaken the adaptability of regionally managed ecosystems and raise management costs; nevertheless, greater diversity comes at the expense of higher management complexity and unpredictability for specific landowners. We created the Healthy Farm Index, a farm-scale tool that supplements existing farm assessment tools by integrating several indicators and outputs ideal for practical decision-making and annual evaluation, to help farmers manage biodiversity and to promote ecological thinking [3].

## Description

In the majority of biosphere reserves, farming systems provide difficulties due to concerns about biodiversity, ecosystem services, productivity, and production issues that hinder the advancement of human needs, wellness, and sustainable development. In this study, we evaluate the levels and trends of agro-biodiversity and ecosystem services provided by various agricultural systems in Ethiopia's Yayo Biosphere Reserve. A total of 120 farmers were interviewed, along with 16 key informants, 12 focal group discussions (FDGs), and data from ten plots of each main farming system were used to determine the species composition. The findings suggest that four farming methods can be distinguished: annual crop production (CP), plantation coffee (PC), semi-forest coffee (SFC), and home gardens (HG). A growing number of nations are making changes to their agricultural laws to enhance the environmental performance of farmlands, mostly by giving farms financial incentives. These fall into three categories, generally. The predominant strategy in nations like the US, Australia, and New Zealand focuses on compensation for land retirement from production since it is believed that when land is removed from farming and returned to its natural form, it will have a better environmental value. A second strategy relies on providing money to farmers so they can lessen their environmental impact while still using intense production methods [4,5].

## Conclusion

We created and evaluated the Healthy Farm Index, a multi-metric and descriptive farm assessment instrument, in order to promote and support a more thorough on-farm decision-making process that incorporates biological variety and ecosystem services (HFI). Farm assessment tools' primary goal has been to conserve agricultural resources, particularly the abiotic resources like water. For the creation of biomass to continue, soil and nutrients are required. Biodiversity and related ecosystem services are auxiliary measures that can be used. However, this strategy reduces the value of biodiversity. Incorporating biodiversity and ecological services will result in We use a necessary agricultural-environment management strategy to farm decision-making. In this post, we first provide an overview of the index structure and talk about how to choose the best measurements, targets, and weights. Second, we outline a case study of the HFI's first field deployment to a network of organic farms that worked together to construct the index and gather data. Third, we assess and explain the index's responsiveness to metric targets and weights using calculated metrics from the participating farms. As a conclusion, we recommend further application and development of the HFI as an evaluation instrument for adaptive management.

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