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IMPACT STUDY THE COSTS NECESSARY TO CONSERVE BIODIVERSITY ON THE FARM "AGROZOOOTEHNICA ROSETI"

CHIIAIA ANISOARA¹, COSTAICHE GEORGIANA MELANIA², CHIIAIA OCTAVIAN³

Summary

Biodiversity embraces the variety of genes, species and ecosystems that constitute life on Earth. We are currently witnessing a steady loss of biodiversity, with profound consequences for the natural world and for human well-being. Appears necessary to increase the positive contribution of agriculture to the environment, the need to reduce pollution from agriculture and adoption of agricultural policy so that it takes account of the environment. Standards or requirements that farmers must meet to be eligible for subsidies contribute to maintain biodiversity. The purpose of this paper is to estimate the costs needed to implement environmental standards and their implications for farm profitability. This study was made in a farm in the south part of Romania. Compliance with these rules increases variable costs. Therefore, an appropriate method for measuring the profitability of farm production activities would be gross margin calculated for each type of farm activity. Even if it can be seen a increase of production expenses which lead to a light decrease of farms profitability, the long-term benefit of biodiversity conservation is considerably.

Key words: biodiversity, costs, gross margin, profitability, standards or requirements.

INTRODUCTION

Biodiversity - the extraordinary variety of ecosystems, species and genes that surround us - it's our life insurance, giving us food, fresh water and clean air, shelter and medicine, mitigating the effects of natural disasters, pests and diseases and helping to regulate the climate. Biodiversity is also our natural capital, providing ecosystem services that underpin the economy. Damage and biodiversity loss threaten the provision of these services: losing species and habitats and prosperity and jobs it generates nature, and endanger our own welfare.

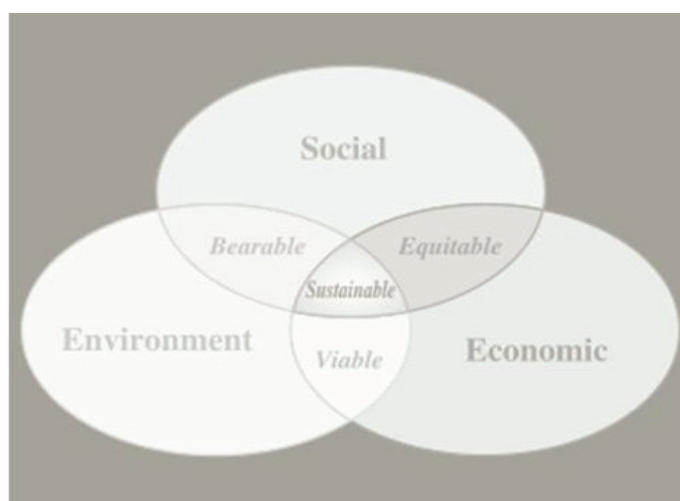


Figure 1. The concept of sustainable development

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(Source: European Environment Agency)

The biodiversity for sustainable agriculture is a potential solution for many of the problems associated with intensive agriculture, and for greater resilience to the environmental and socioeconomic risks that may occur in the future. The challenge is to understand the combined ecological and social functions of agro-biodiversity, determine its contribution to ecosystem goods and services and value for society at large, and evaluate options for the sustainable use and conservation of biodiversity across the agricultural landscape.

In addition to the intrinsic value, biodiversity and the services it provides have significant economic value which is rarely reflected in markets. Because it does not establish a price and is not reflected in the financial statements of companies, biodiversity is often victim competing demands on the nature and use her.

Although measures to halt biodiversity loss involve certain costs, loss of biodiversity is itself costly for society as a whole, especially for agricultural businesses that depend directly on ecosystem services.

Common Agricultural Policy (CAP) must adapt to the new challenges of European agriculture, such as climate change, water management and biodiversity protection. Adaptations provided allow farmers to take better account of market developments in order to guide production and contribute to rural development.

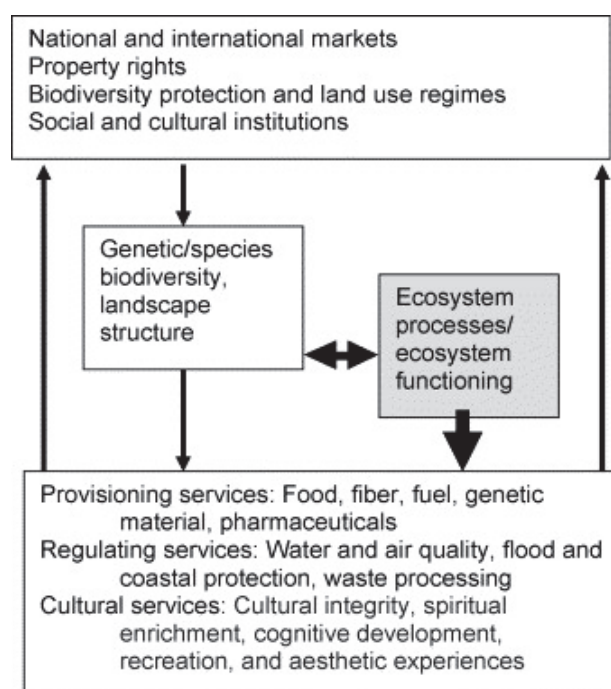


Figure 2 Flow chart showing that knowledge of ecosystem processes and functions aid in the accurate assessment of the value of biodiversity in agricultural landscapes. (Adapted from a diagram by L.E. Jackson, U. Pascual, T. Hodgkin - Utilizing and conserving agro biodiversity in agricultural landscapes. *Agriculture, Ecosystems & Environment*, Volume 121, Issue 3, July 2007, Pages 196–210.)

Three steps are highlighted in such process: demonstration (valuation), capture and sharing of conservation benefits (mechanism design). This information is then used to examine the potential success of nascent market creation incentive mechanisms for biodiversity conservation, including: (i) payments/rewards for ecosystem services, (ii) direct compensation payments, (iii) land use development rights, and (iv) auctions for biodiversity conservation [3].

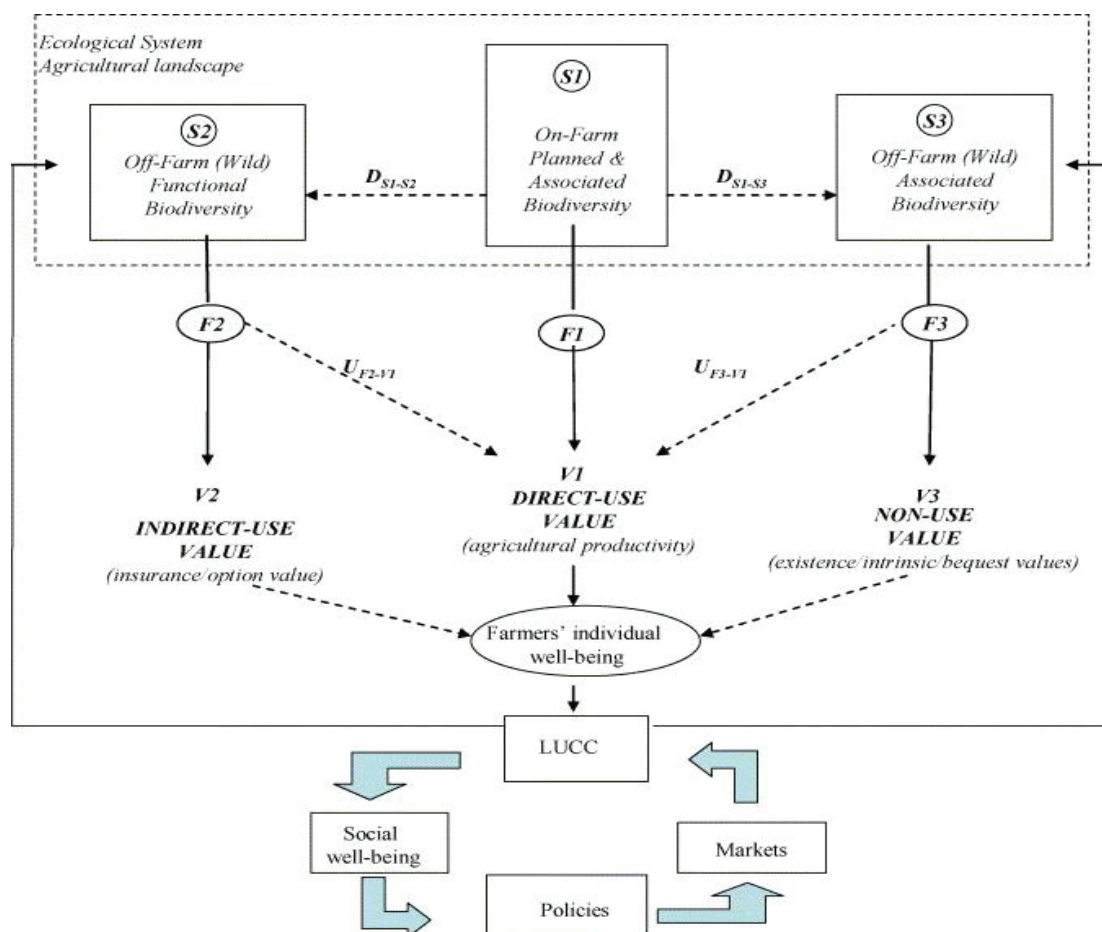


Figure 3 A stylized framework of the linkages between biodiversity levels (stocks, *S*), flows of ecological services (*F*) and economic values (*V*) in agricultural landscapes leading to LUCC and policies that aim at aligning the private and social values of agro biodiversity. The ecological system governing the interaction between on- and off-farm biodiversity stocks within agricultural landscapes provides flow of ecological services that benefits individual land users and society as a whole in different ways. Individual land users compare the directly perceived benefits of conservation and the opportunity costs to decide their privately (decentralized) optimal land use and the level of (dis)investment in biodiversity. This in turn affects social wellbeing and policies are sought to change such perceived net benefits.

Direct payments are benefits granted directly to farmers under support schemes listed. Direct aids are subject to the "cross-compliance" principle that farmers must meet that of requirements to qualify for such payments.

Table 1. Good agricultural and environmental conditions

Subject	Obligatory standards	Optional standards
Soil erosion Protect soil by appropriate measures	Minimum soil cover	Land terracing to strengthen
	Minimum land management reflecting local conditions specific	
Soil organic matter: Maintain soil organic matter levels through appropriate	Arable stubble management	Standards for crop rotation
Soil structure: Maintain soil structure through appropriate		Appropriate machinery use
Minimum level of maintenance	Retention of landscape features,	Minimum livestock stocking rates

Ensure a minimum level of maintenance and avoid the deterioration of habitats	including, where appropriate, hedges, ponds, ditches trees in line, in group or isolated and field margins	and / or arrangements adequate bond
		Establishment and / or retention of habitats
	Avoiding the encroachment of unwanted vegetation on agricultural land	Solitary tree clearing prohibiting
	Protection of permanent pasture	Maintaining plantations of fruit trees and grape vines in good vegetative condition
Protection and water management	Establishment of buffer strips along watercourses	
Protect water against pollution and run-off and management water use	If using water for irrigation is subject to authorization, the procedures for obtaining permits	

MATERIAL AND METOD

The adoption of biodiversity-based practices for agriculture, however, is only partially based on the provision of ecosystem goods and services, since individual farmers typically react to the private use value of biodiversity, not the “external” benefits of conservation that accrue to the wider society.

Evaluating the actual value associated with goods and services provided by agrobiodiversity requires better communication between ecologists and economists, and the realization of the consequences of either overrating its value based on ‘received wisdom’ about potential services, or underrating it by only acknowledging its future option or quasi-option value.

Agrobiodiversity is most likely to enhance agroecosystem functioning when assemblages of species are added whose presence results in unique or complementary effects on ecosystem functioning, e.g., by planting genotypes with genes for higher yield or pest resistance, mixing specific genotypes of crops, or including functional groups that increase nutrient inputs and cycling. Simply adding more species to most agroecosystems may have little effect on function, given the redundancy in many groups, especially for soil organisms.

These additions on ecosystem functioning and application of the principles of variable cross-compliance increases variable costs. Therefore, an appropriate method for measuring the profitability of farm production activities would be gross margin calculated for each type of farm activity [1].

Knowing farm income and variable costs, gross margin can be calculated by subtracting all variable costs of production related revenues one production unit; relationship for calculating the gross margin is:

$$\text{Gross margin} = \text{Revenue} - \text{Variable costs}$$

At the level of a firm that carries out several activities (with several branches of production), by adding together the gross margins of all branches of production, total gross margin is obtained. Usually, it offers a image more complex on farm profitability, but for the image to be complete, it requires the correlation of the total gross margin with amount of fixed costs [4].

By calculating gross margins to the branches of farm, can be obtained and observed trends of final financial results (profit or loss), practically, gross margin values allow the separation of information on:

➤ *Profitability of the branches of production;*

In the branches of production profitable, gross margin will be positive and the production unprofitable branches may have negative gross margin. Gross margin, calculated for each species or

category (gross margin / cow / pig / poultry etc..) or for each type of crop (gross margin / ha maize silage / ha barley / rape etc ha.) allows the branches hierarchy according to their profitability.

➤ **Profitability of farm;**

We believe that gross margin is a barometer of profitability, positive margin is an indication that the activity is worthwhile and that business can continue in this direction. Conversely, negative gross margin could portend financial deficit. In achieving gross margin, are included many expenses of the farm and so can be shown, projected or demonstrated the effect of any changes.

RESULTS AND DISCUSSION

Farm located in the south of Romania is organized as a limited liability company. The main activity is the crop production cultivated agricultural area of 1480 ha is fully leased. Technical equipment of the unit is very good, 8 tractors and 4 combine the majority performing and relatively new equipment.

The crops efficiency from economically is proven trough gross margin comparison of different activities, in our case, different crops. Farmers will have to turn to those cultures which assure a positive gross margin, profit and give up increase to the crops with negative gross margin, leading to financial losses.

Table 2 Structure influence on gross margin per farm crops

Crop	Surface		Gross margin RON/ha	Gross margin/activity RON
	ha	%		
Wheat	1034	72	190	196460
Corn	209	14,5	1516	316844
Sun flower	60	4	797	47820
Rape	138	9,5	1030	142140
Total Farm	1441	100	-	703264

Analyzing crop structure is observed the high percentage of gross margin to maize achieved in gross margin the total holding, while the share in crop structure is 14.5%. All activities have positive gross margin, which indicates a profitable activity. Unit profitability may increase if changes crops structure are in favor to maize, sun flower and rape.

Variable costs at the farm level there are to RON 1,882,611 or a percentage 48.5%. of the total expenditure structure.

Specific expenses for biodiversity conservation were made to achieve the following objectives consistent cross compliance and good agricultural and environmental conditions:

- purchase of seed material with high productive potential, resistant to drought, pests and diseases, adapted to local conditions, to reduce the number of phyto-sanitary treatments performed;
- the cover with winter crops at least 20% of the total arable land of the farm (72%);
- the maintenance to the fallow land in winter in good agricultural and environmental conditions;
- respect for the crop rotation so as to not cultivate sunflowers on the same plot for more than two years;
- avoid installing unwanted vegetation on the entire farm;
- combating invasive alien species.

An analysis to the variable holding costs structure reveals that the percentage for achieving these objectives is approximately 30 %.

There are possibilities for the agriculture exploitation profitability in conditions of biodiversity conservation, as follows:

- further cultivation of varieties with high productive potential, resistant to drought, pests and diseases, adapted to local conditions.
- compliance plan of crop rotation on the farm;
- application of modern technologies;
- sampling and analysis of soil samples, periodically, to determine the exact amount of nutrients needed by fertilizer be given without making waste;
- reducing chemicalization by finding new solutions to fertilize soil: manure, green manure;
- rational use of equipment;
- severe selection of suppliers based on reliability and price as the better;
- creating opportunities for more advantageous market capitalizing to the products and thus increase of gross margin, profit growth and the rate of profit;
- improving crop structure., after the comparative analysis of of gross margin achieved on different activities;
- applying for eco-environmental measures and if possible conversion to organic farm.

CONCLUSIONS

The activity of the farm is a profitable, under compliance to the cross - compliance measures for biodiversity conservation. This is possible in conditions of granting of subsidies. Lack of subsidies for the vegetal sector would reduce the profitability of agricultural holdings.

Exist the possibility increase crop yield of the farm under biodiversity conservation by increasing gross margin and reducing variable costs.

In the first case this is possible by increasing production per hectare by using varieties with high yield potential, resistant to drought, diseases and pests, adapted to local conditions, or by products valorification at a favorable price.

Reduce variable costs per hectare can be done by: negotiation of the purchase price; reduce the amount used for various inputs; use of performance equipment and technologies and finding new solutions to reduce the amount of fertilizer per hectare (manure, green manures)

Partnerships between researchers, farmers, and other stakeholders to integrate ecological and socioeconomic research help evaluate ecosystem services, the tradeoffs of different management scenarios, and the potential for recognition or rewards for provision of ecosystem services.

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