



Integral valuation of ecosystem services and environmental benefits in livestock farming

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INTRODUCTION

- Livestock systems are socioecological systems that generate different ecosystem services and environmental benefits. We have prioritized seven ecosystem services and three environmental benefits of interest.
- Integral valuation is a method that allows to assess the ecological, economic, and social value of ecosystem services and environmental benefits. Information generated from this method is amenable to benefit cost analyses for evaluating the returns on investment for introducing interventions in livestock systems.
- Knowing the integral value of the interventions allows us to demonstrate to stakeholders their economic, environmental, and social viability, and persuade them to contribute to the financing of more sustainable livestock farming models.

OBJECTIVE

To identify the main ecosystem services and environmental benefits in livestock farming, to propose an integral valuation strategy, and to incorporate these values into economic evaluation methods. This integral valuation strategy will allow us to evaluate the impacts of interventions by comparing situations before and after an intervention or between intervened and non-intervened systems.

METHODOLOGY

This integral valuation strategy was designed based on an extensive literature review, discussions by an ecosystem services advisory group with experts from CIAT, ILRI, and ICARDA, and field studies in Colombia.

RESULTS

Based on the functioning of the socioeconomic system in livestock farming, we identified the main seven ecosystem services and three environmental benefits generated on these ecosystems. We designed an integral valuation strategy, and we piloted it in three field studies in Colombia.

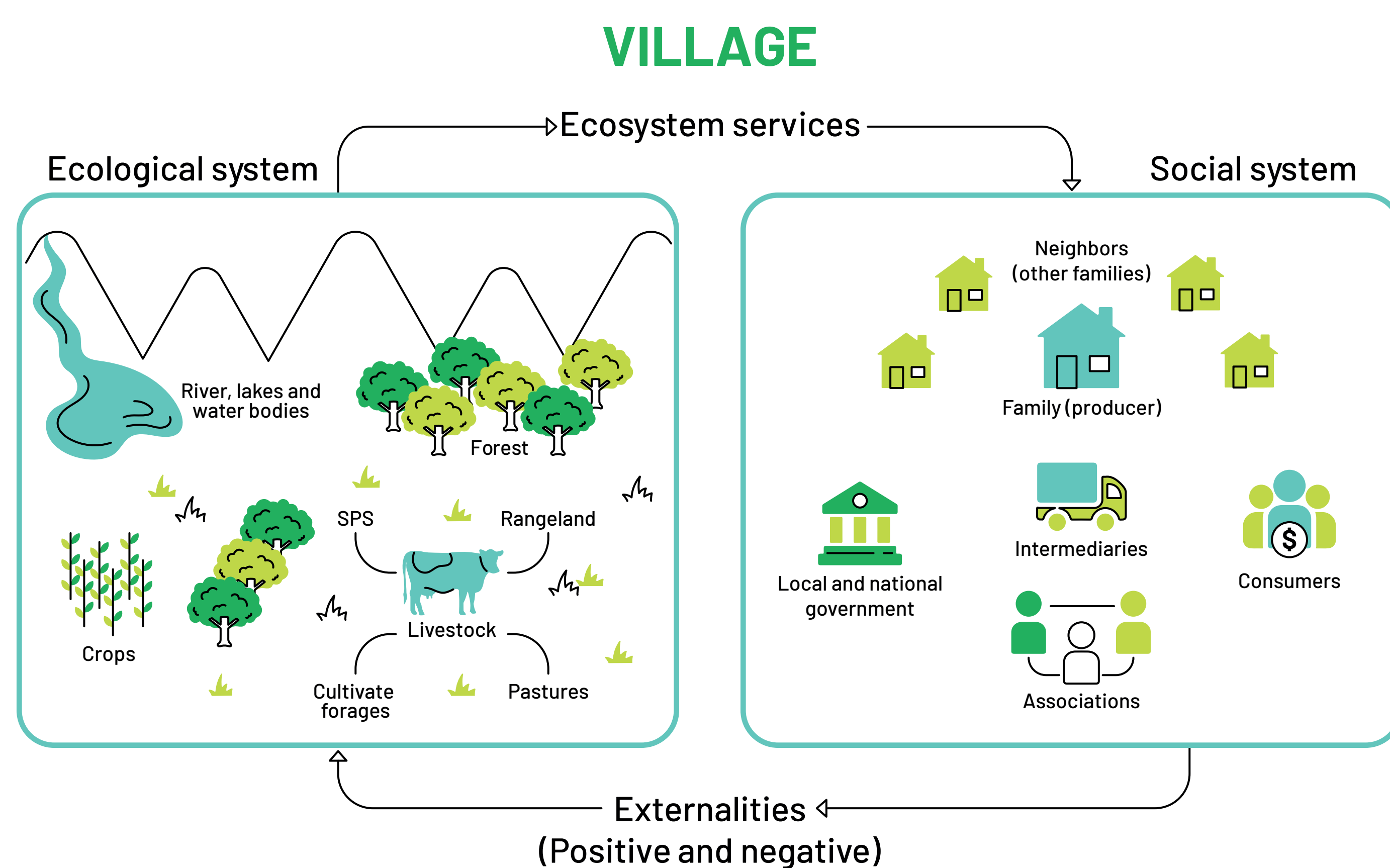


Figure 1. Socioecological system in livestock farming.

Table 1. Identification of ecosystem services and environmental benefits in livestock farming

| NAME | TYPE | PASTURES | CULTIVATED FORAGES | RANGELANDS | AGRO-SILVO-PASTORAL SYSTEMS |
|----------------------------------|-----------------------|----------|--------------------|------------|-----------------------------|
| Food | Ecosystem service | ✓ | ✓ | ✓ | ✓ |
| Feed | Ecosystem service | ✓ | ✓ | ✓ | ✓ |
| Carbon storage and sequestration | Ecosystem service | | ✓ | ✓ | ✓ |
| Micro-climatic regulation | Ecosystem service | | | ✓ | ✓ |
| Soil fertility | Ecosystem service | ✓ | ✓ | ✓ | ✓ |
| Habitat for species | Ecosystem service | | ✓ | | ✓ |
| Aesthetic appreciation | Ecosystem service | | | ✓ | ✓ |
| Methane emissions reduction | Environmental benefit | ✓ | ✓ | ✓ | ✓ |
| Water use reduction | Environmental benefit | | | ✓ | ✓ |
| Land use reduction | Environmental benefit | ✓ | ✓ | ✓ | ✓ |

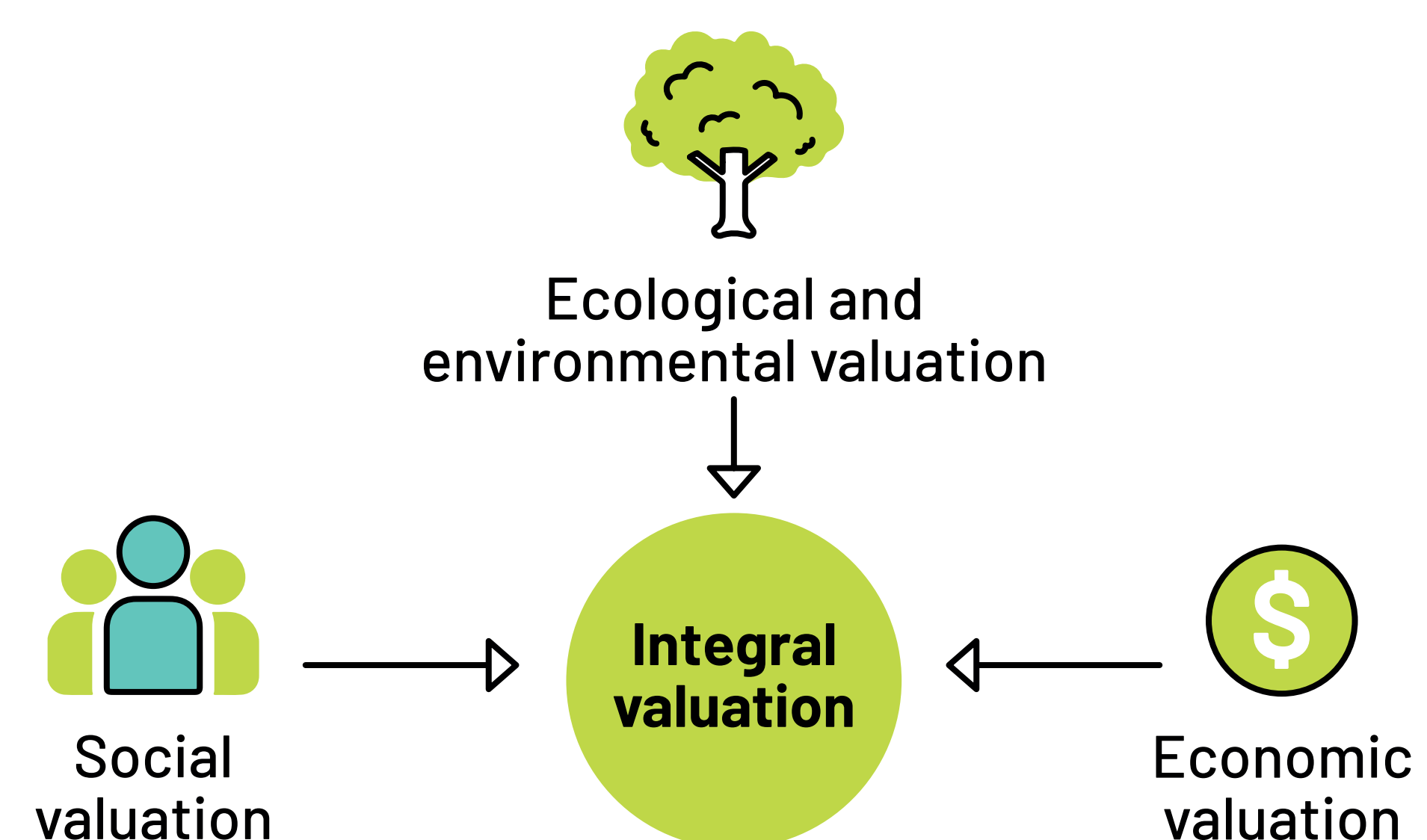


Figure 2. Integral valuation strategy

Table 2. Results from field studies conducted by CIAT in Colombia.

| REFERENCE* | IMPLEMENTATION | ECOSYSTEM SERVICES AND ENVIRONMENTAL BENEFITS | ECOLOGICAL VALUE | ECONOMIC VALUE \$US |
|-----------------------------------|--|---|--|---------------------|
| Sandoval et al., (2023) | Silvopastoral system and improved pastures | Methane emissions reduction | 144 KgCO ₂ eq/animal/year | 6 |
| | | Microclimatic regulation | Shade coverage 60.4%/ha/year | 2,026 |
| Gonzalez-Quintero et al., (2023a) | Silvopastoral system and improved pastures | Milk carbon footprint reduction | 1,813 KgCO ₂ eq/animal/year | 58 |
| | | Microclimatic regulation | Shade coverage 5.9%/ha/year | 411 |
| Gonzalez-Quintero et al., (2023b) | Improved pastures and good cattle husbandry and pasture management practices | Beef carbon footprint reduction | 239 KgCO ₂ eq/animal/year | 9 |

*References taken from Florez et al. (2023).

CONCLUSIONS

The integral value of ecosystem services and environmental benefits will provide crucial support for informed decision-making on specific restoration initiatives, considering the project's objectives and the potential return on investment. In particular, integral valuation represents an opportunity for the design of economic instruments that allow financing sustainable technologies, for example carbon credits, biodiversity bonds, and Payment for Ecosystem Services (PES).

REFERENCES

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