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Sustainability assessment for decision-making in agriculture: a comparison of methods

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Background and objectives

Several methods for sustainability assessment in agriculture have been developed. They share four main limitations:

1. the multi-functionality is often not addressed (Rossing et al., 2007);
2. there is an imbalance in favour of the ecological dimension of sustainability (vs social ad economic one) (von Wirén-Lehr, 2001);
3. research has too often omitted the step towards utilization and implementation of assessment knowledge (Rossing et al., 2007);
4. conflicting goals and the interaction between indicators have not been sufficiently considered (Morse et al., 2001).

Different approaches perform differently in relation to these four shortcomings. A comparative analysis allows for highlighting their advantages and disadvantages, and opportunities for improving the practice of sustainability assessment in agriculture.

Method

We compared seven indicator-based methods for sustainability assessment in agriculture in terms of the normative, systemic, and procedural dimensions (Figure 1).

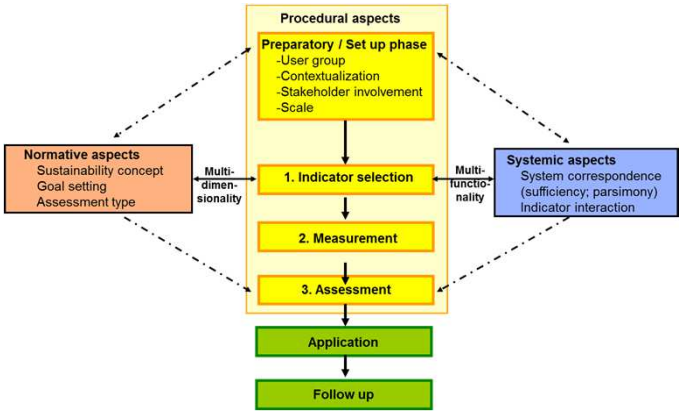

Figure 1. The interrelationship of the normative, systemic and procedural dimensions within the assessment process.

Seven methods were selected for comparison (Table 1, Figure 2).

Table 1. Overview of the selected approaches.

Method	Aim	Reference
Indicateur de Durabilité des Exploitacions Agricoles (IDEA)	To provide an operational tool for sustainability assessment at farm level.	Zahm et al (2006)
Indicator of Sustainable Agricultural Practice (ISAP)	To operationalize agricultural sustainability in order to support policy making.	Rigby et al (2001)
Response-Inducing Sustainability Evaluation (RISE)	To provide a simple and cheap but holistic tool to: 1) evaluate the degree of sustainability at farm level; 2) visualize potentials and failures, thus inducing management responses.	Häni et al (2003, 2007)
Framework for the Evaluation of Sustainable Land Management (FESLM)	To guide analysis of land use sustainability, through a series of scientifically sound, logical steps. It is: integrative (considering all the interacting factors), concerned with evaluation, systematic.	Smyth and Dumanski (1993)
Multiscale Methodological Framework (MMF)	To assess multiscale sustainability with emphasis on peasant agriculture and natural resources management.	Lopez-Ridaura (2002, 2005)
Sustainability Assessment of the Farming and the Environment (SAFE)	To identify, develop and evaluate agricultural production systems, techniques and policies.	Van Cauwenbergh et al (2007)
Sustainability Solution Space for Decision Making (SSP)	To identify the sustainability solution space in which stakeholders can take solutions and the system remains or becomes more sustainable.	Wiek and Binder (2005)

Results

We grouped the methods into three types:

Top-down, farm assessment (RISE, IDEA, ISAP), characterised by: focus on farm or field level; farmer or industry as user group; no stakeholder participation; top-down derivation of indicators; tendency to focus on the ecological dimension; no consideration of multi-functionality of agriculture and of indicators interaction; composed indicators; results that can relatively easily be discussed with farmers, and allow for monitoring and benchmarking across regions.

Top-down, regional assessment with stakeholder participation (FESLM, SAFE), characterised by: focus on regional level, or applicable to the farm and regional level; stakeholder participation; multiple stakeholders as user group; inclusion of the ecologic, economic and social dimension; no consideration of indicator interactions.

Bottom-up, integrated participatory or transdisciplinary approach (MMF, SSP), characterised by: focus on the regional level; multiple stakeholders as user group; stakeholder participation throughout the process, including the goal setting process; consideration of indicator interactions that allow for trade-off analysis; combination of quantitative and qualitative techniques. The bottom-up process favours the application of the results and method adaptability to different contexts, but makes benchmarking across regions difficult.

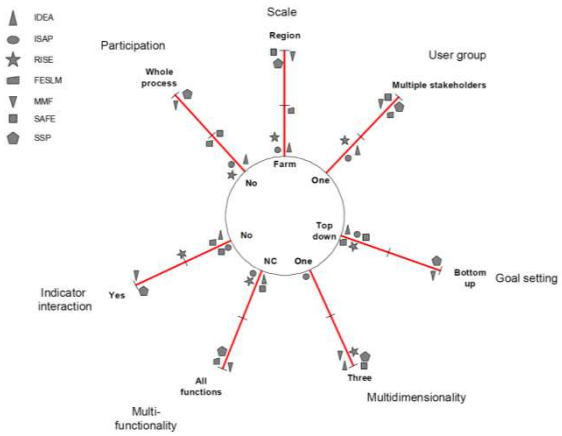

Figure 2. Comparison of the seven approaches with respect to the principal aspects of the normative, systemic and procedural dimension.

Conclusions

Three types of indicator-based approaches were identified each of which has specific advantages and disadvantages. However, transdisciplinary integrated assessment (e.g. the Sustainability Solution Space) seems to be best placed to overcome the most common limitations of current approaches.

Reference

Binder, C.R., Feola, G., Steinberger, J. 2010. Considering the normative, systemic and procedural dimensions in indicator-based sustainability assessments in agriculture. *Environmental Impact Assessment Review*, 30(2):71-81.

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