Comparing the usefulness of assessment tools for environmental impacts evaluation of organic greenhouse horticulture

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How to assess?

Booklet by our action

Tools described

Life Cycle Assessment (LCA) and Social Life Cycle Assessment (S-LCA)

Social Impact Assessment (SIA)

Social Return on Investment Methodology (SROI)

SMART - Sustainability monitoring and assessment routines

Public Goods tool (PG)

Ecological Footprint

Carbon footprint calculators

Two tools one case study

Life Cycle Assessment (LCA) - Public Goods tool (PG)

United Kingdom, England, near Reading to the West of London

Organic horticultural farm Iain Tolhurst (Tolly),
www.tolhurstorganic.co.uk

Vegan organic standards

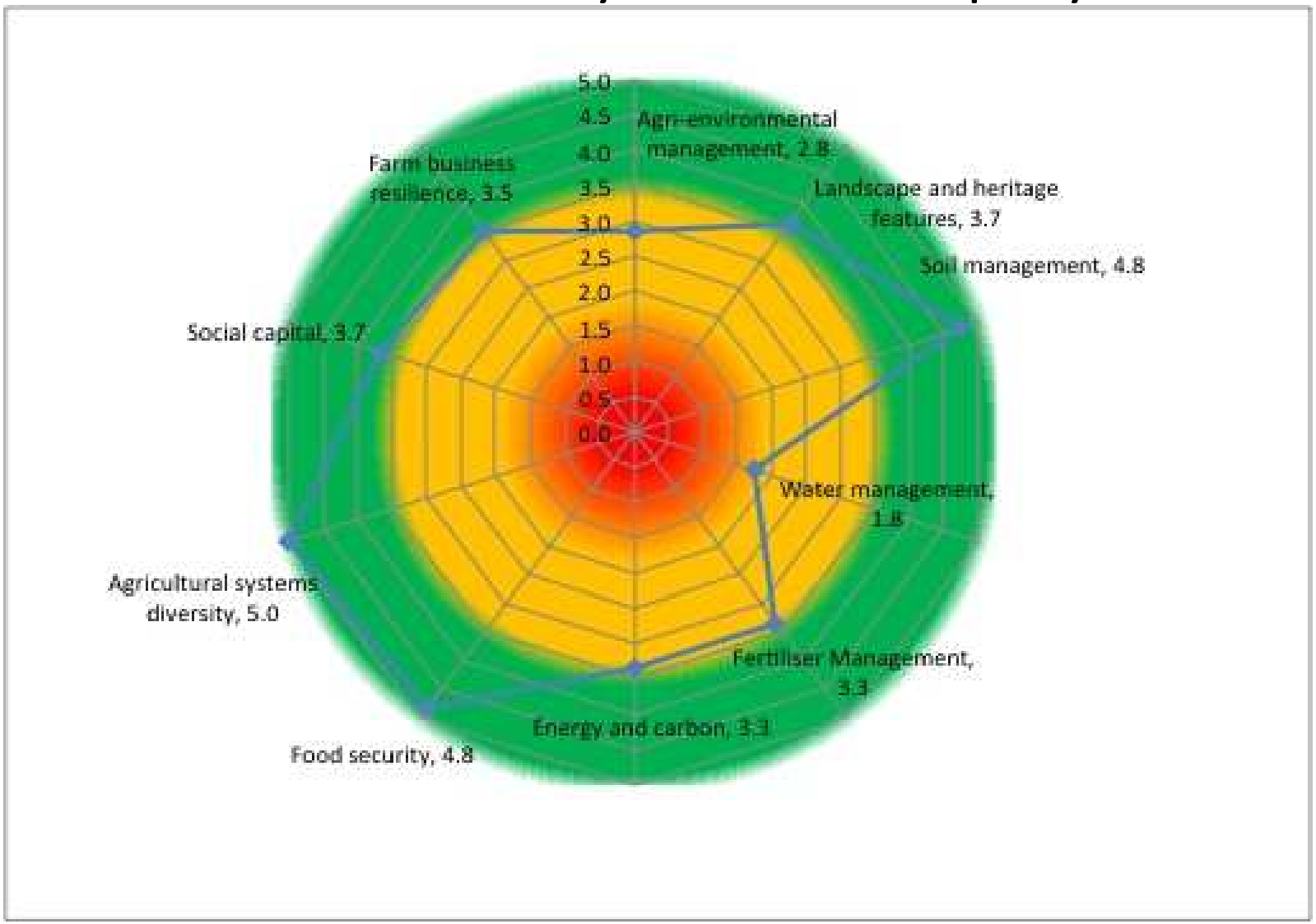
A leading example of private standard:
Vegan Organic Network (2007) in the United Kingdom

other standards in Germany and the USA refer to those

Case Study

- Tolhurst Organic Partnership Community Interest Company
- 7 ha outdoor field vegetables
- 1 ha walled garden, greenhouses and polytunnels
- 0.17 ha for tomatoes, cucumbers, lettuces and propagation
- farm grows 300 different crops, considering both species and varieties of vegetables, all-year round (50 families per ha)
- 20 different crops as green manure, most of them legumes
- self-production of organic matter, which amounts to roughly 250m^3 per year (125 tonnes)
- all the organic waste produced on-site is then recycled as compost

Public Goods Tool on Tolhurst Organic Partnership Community Interest Company



BioGreenhouse

Public Goods Tool on Tolhurst Organic Partnership Community Interest Company

Agricultural systems diversity. (5/5). The farm grows 300 different crops, between vegetable species and varieties, all-year round on approximately 9 ha of land, and it manages to supply fresh produce for an average of 50 families per ha.
Food security. (4.8/5). Growing local fresh produce, while reducing the aid of external inputs to a minimum, is a fundamental part of the farm's philosophy, and all the vegetables produced are sold to local families and communities.
Soil management. (4.8/5). Soil is analysed annually and is never left uncovered due to the use of green manures and undersowing. Compost produced on farm is used as growing media for plant propagation and is added to the soil.

Farm business resilience (3.5/5). Even though the sources of income for the farm are multiple, net assets tend to stay the same through the years, giving the farm not many chances to make investments, so the business is generally surviving.
Fertiliser management (3.3/5). In terms of nutrients, their levels are periodically monitored through a budget-like software; according to the assessment, there is a general K deficit, which could be solved by applying wood ash as a natural fertiliser. The only wastes the farm produces are all organic, amounting thoroughly 250 m^3 per year, and they are recycled as compost, whose major nutrients are measured.

Water management. (1.8/5): irrigation is used for a period of 20 weeks every year (spring-summer) and water is directly abstracted from the aquifer; currently, no rainwater is harvested, no localised irrigation system is in use and there is no management plan in action (i.e. protection against floods and runoff, water pollution).

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Results

Data taken from the assessment via Public Goods tool, recalculated to be proportioned to the total on-farm protected area (1700 m^2) then used for LCA. Both sets of data refer to an average year of consumption.

Data Input	**Total Quantity (from PGT)**	**Proportioned Quantity (in LCA)**
Fuel usage (diesel)	850 l	0,014 l/m^2
Water for irrigation	2240 m^3	37 liters/m^2
Electricity consumption	3400 kWh	0,0425 kWh/m^2
Compost (fertilizer)	125 t	2,08 kg/m^2
Wood chip (fertilizer)	125 t	2,08 kg/m^2
Wood ash (fertilizer)	1,5 t	0,025 kg/m^2

Results

Total results of the case study via Life Cycle Assessment. Red and green cells respectively represent higher and lower values in comparison to the references used during the analysis.

Impact Category	**Unit (per kg of tomatoes)**	**Own Results**
Climate Change (CC)	kg CO_2 eq	147,31
Resource Depletion (RD)	k Sb eq	0,946
Acidification (AC)	molc H^+ eq	4,241
Terrestrial Eutrophication (TE)	molc N eq	16,85
Marine Eutrophication (ME)	kg N eq	0,231
Freshwater Eutrophication (FE)	kg P eq	-1,309
Particulate Matter (PM)	kg PM2.5	0,298
Water Use (WU)	m^3	0,04

Results (1)

- The main difference between the tools is the type of data they employ (i.e. exclusively quantitative for LCA, mix of quantitative and qualitative for PGT)
- Initial data collection is a long and complex phase in both cases
- The tools are both applicable to larger farming systems
- LCA showed some difficulties for application to local situations/small farms
- Neither tool is dedicated to organic greenhouse horticulture, but could be “modifiable” according to the needs of the analysis

Results (2)

- LCA gives "general" quantitative results on impacts on key environmental categories
- PG tool shows farm specific where to improve farming practices regarding a set of social, economic and environmental aspects through a scoring system
- trying to combine results from different assessment tools is difficult because of the overall complementarity between them

Further Research

- Addition of social and economic aspects to LCA
- PG tool with more specific data on organic greenhouse horticulture, through an extra worksheet
- Implementation of local and/or regional databases for LCA, potentially through representative case studies in organic farming and greenhouses

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