Measurable Sustainability Indicators for Organic Farms

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How can we measure farm sustainability?

- The “Blume” model has twenty categories.
- The FAO model is very data intensive.
- FiBL has developed “SMART” indicators.
- Our comparative research will try to measure whether organic and conventional farming systems are becoming more or less sustainable.
  - We propose four groupings, each with three measures;
  - There are two or three measurables per indicator.
Proposed indicators for farm use

Twelve measurable sustainability indicators grouped in four themes:

- **Ecology**
  - 1. Biodiversity
  - 2. Soil organic matter
  - 3. Soil fertility

- **Economy**
  - 4. Water use efficiency
  - 5. Animal welfare
  - 6. Product standards

- **Society**
  - 7. Fairtrade practices

- **Culture**
  - 8. Transparency
  - 9. Personal development goals
  - 10. Profitability
  - 11. Resource economics
  - 12. Eco-system services
Let’s look carefully at each of these 12:

- Three Ecological Indicators;
- Three Societal Indicators;
- Three Cultural Indicators;
- Three Economic Indicators.

The indicators focus on continual improvement compared with a base.
1. **Biodiversity** is measured by:
   - variety [number of plant species];
   - diversity [number of plant families];
   - rarity [number of endangered plant species].
2 **Soil organic matter** is measured by:

- soil carbon %;
- fraction of soil carbon which is active biomass;
- an index of soil macro-fauna actually present in soil.
3 Soil fertility measured as:

- change in N, P, K, pH,

  - as an index of:
    
    current soil status - original soil status
    desirable status      desirable status
4 Water use efficiency measured as:

- the change in the ratio of crop production per unit of water used (current ratio less original ratio).
Societal Indicator Two:

5. Animal Welfare expressed as:

- The difference between:
  - current animal welfare index - desirable welfare index
  - original animal welfare index - desirable welfare index

This index is calculated for each type of animal. The proportion for each animal will be converted into numbers of large stock units and then expressed as fractions of the farm total.
Societal Indicator Three:

- **6. Product standards** measured either as:
  - non-conformities with the local organic certification standards,
  - or, when possible,
  - as a combination of nutrient density and toxic residue indices for each crop or animal produced.
Cultural Indicator One:

7 Fair trade indicators measured as:

- worker satisfaction index comprising
  - Education
  - Housing
  - Safety
  - Satisfaction
  - Wages, and
  - Dignity indices,
    together with a
    - “drudgery of work” index,
      - as developed by Chan et al. (2015).
Cultural Indicator Two:

8  Transparency index measured by:

- number of organisations with access to information about items one to seven above;

- maximum score for this index is attained when all of these factors are published on the internet (open access).
9 Personal development goals measured qualitatively:

- the extent to which the farmer feels that life is unfolding in a direction that is in line with what is desired.

- The Savory Institute Holistic Resource Management planning tool is one possible measuring instrument.
10 Profitability is measured by:

- expressing the farm gross margin as a proportion of the farmer’s desired gross margin:

- direct income - directly allocated variable costs
  farmers’ desired return on investment

(what the farmer would consider a satisfactory gross margin, bearing in mind all the investments of earlier generations, of the current generation, and the level of financial return which the farmer considers acceptable as a reward for all the effort of farming).
11 Resource economics measured as:

- society’s evaluation of whether the farm resources are being stewarded sustainably,
- and whether the farm is a useful resource for local people (such as a local participatory guarantee system [PGS] or local groups who have access to the farm for hiking, tree-planting or educational activities).
Economic Indicator Three:

- **12 Ecosystem services index** measured as:
  - contributions of the farm to local water, biodiversity, amenity, and whether the farm impacts positively or negatively on local ecosystems.
Africa needs Food sovereignty:
“Food sovereignty is the right of peoples to healthy and culturally appropriate food produced through ecologically sound and sustainable methods, and their right to define their own food and agriculture systems. It puts the aspirations and needs of those who produce, distribute and consume food at the heart of food systems and policies rather than the demands of markets and corporations. It ensures that the rights to use and manage lands, territories, waters, seeds, livestock and biodiversity are in the hands of those of us who produce food.”

—Declaration of the Forum for Food Sovereignty, Nyeleni, February 2007
Comparison of Alliance for a Green Revolution in Agriculture Millennium Villages Project (AGRA-MVP) with the Export Programme for Organic Products from Africa (EPOPA).

Extracted from Organic Agriculture: African experiences in resilience and sustainability.
African Organic Research

- NOARA
- FiBL/icipe/KIOF/KALRO/TSBF/Univ
- West Africa/Ghana/Nigeria/Mali
- South African Centre of Excellence (FS)
- NMMU Comparative Trials
- African Organic Farming Systems project (Zambia, Uganda, South Africa)
Collaborative Centre for Regenerative Agriculture

Teaching:
- Dip. AgMan.
- B Tech & Hons
- Post-graduates
- PGCE Agriculture Teachers

Commercial AgriPark
- Produce & process vegetables near sewage plant; use sewage for energy & compost; buy vegetables from local farmers; distribute to schools

Basic Research:
- Long-term Comparative Organic trials

Farmer Outreach and Training for Food Security
- Gardens: Kos en Fynbos movement
- Commercial Farmers
- Sustainable Agriculture Study Group

Applied Research:
- Uganda/Tanzania success
- Zambia progress
- South Africa

Centre of Excellence in Food Security (NRF through UWC & UP) & NRF-RTF support & NMMU & AEON & SHaddad Agricultural Services

NRF-RTF through DAFF

George & Eden Municipalities Centre of Excellence in Food Security (NRF); CSIR? DAFF? W Cape Dept Agric?

Rainman Landcare Foundation
African Organic Farming Systems Research project (Dept Agric-NRF-RTF)

- How did Uganda get 1.2 million farmers going with organic production and markets?
- How did Zambia support 100,000 small scale organic farmers, and how do they farm?
- What are the barriers to market access in SA?
- How are soil organic matter and water use efficiency connected, and how do we improve?
- How do we improve food quality/ availability?
- What can schools do to improve food security?
- Does organic farming work economically?
Saasveld Long-term Comparative Farming Systems Trials: organic & conventional

First season ready for harvest, December 2014

Second season now harvesting, will replant third season September 2015
N’wa-Jama Mashele harvesting the first cow-pea crop at the Long-term Comparative Organic Farming Systems Research Trials on the Saasveld Campus of NMMU at George, W Cape. Water use efficiency study and biological pest control starting