The Future of Food.
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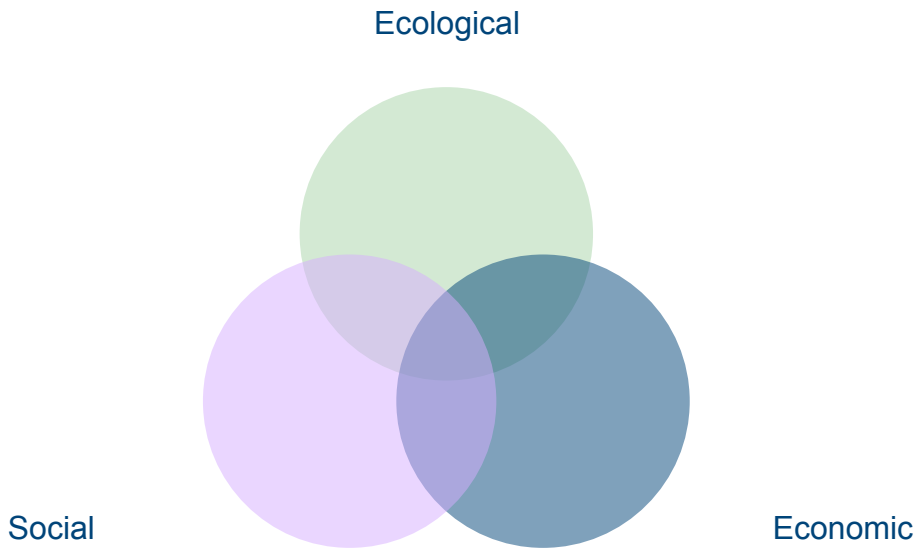
Sustainability emerging from alternative farming systems.

Three dimensions of Sustainability.



(Yunlong & Smit, 1994; Goodland, 1995, Lewandowski et al., 1999)

The ‘math’ behind production increase.

- 1960 – population = 3 billion.
  Average calorie intake 2,360 c/day
  = 7,080 billion c/day

- 2008 – population = 6.7 billion
  Average calorie intake 2,800 c/day
  = 18,760 billion c/day (%165 increase)

- 2050 – population = 10.5 billion
  Average calorie intake = 3,300 c/day
  =34,650 billion c/day (%85 increase)

  Figures taken from: Smeets et al, 2007; Sachs, 2008; F.A.O., 2002/2009.

Absolute versus Percentage.

- While the percentage increase is less than was achieved in the prior production jump (the Green Revolution) – the absolute increase required over the next 40 years is greater.
- 1965-2008 = 11,680 billion c/day
- 2008-2050 = 15,890 billion c/day

Income convergence and food intake.

- More than 70% of the *global* agricultural land use in 2002 was allocated to the production of animal products, while animal products accounted for less than 17% of the total calorie intake.
- To meet the 'meat' demands of 2050 we will need to put 10(9) more hectares into agricultural production.
- Predicted that 20% of calories will come from animal products. Currently consumption is ~10%.
  (Smeets et al., 2007)

Balancing needs.

- As population increases, per capita resource allocation (inputs) and waste capacity (outputs) decreases.

Efficiency factor increase.

“Double production” with:

- Less water.
- Less energy.
- Less arable land.
- Less predictability (climate).

= Efficiency factor >2

Food producers of the future:

Will be:

- Resilient.
- Adaptive.
- Innovative.
- **Sustainable.**

Conventional Versus Alternative.

(Bird & Ikerd, 1993; Waltner-Toews & Lang; 2000)

Conventional

- Centralised management
- Emphasis on specialisation
- High ration of hired (outside) workers.
- Separation of management and labour
- Emphasis on standardisation of farming practices.
- High reliance on technology use to minimise real-time, in-field decision making.
- Command & Control view of nature – open loop model Input-production-output-waste

Alternative

- Farm is owner operated.
- High ratio of farm-family workers.
- Farm is a partnership (between families).
- Structured as a joint management-labour relationship.
- The farm is diversified.
- Emphasis on use of on-farm resources.
- Common use of site-specific and real-time decision making.
- Diverse set of enterprise statements.
- Adaptive ecosystem view of nature – nature is harnessed not controlled.

Sustainable food system:
(Kloppenburg et al., 2000)

- Ecologically sustainable.
- Knowledgeable/communicative.
- Proximate (supply-chain).
- Economically sustainable.
- Participatory.
- Sustainability regulated.
- Sacred.
- Healthful.
- Diverse.
- Culturally nourishing.
- Seasonal/temporal.
- Value-oriented (associative) economics.
- Relational.

Feedback loops.

- Stage one of the decision making process is dependent on feedback sensitivity.

- “Feedback can be described as an influence or message that conveys information about the outcome of a process or activity back to it’s source.”

  (Capra, 1996, cited in Sundkvist et al., 2005)

- “The ability to identify, implement and evaluate sustainable development strategies at all levels is inextricably linked to the effective identification, collection, use, and dissemination of information.”

  (Kelly, 1998, p43)

Industrial models and feedback sensitivity for sustainability.

(Sundkvist et al., 2005)

- Intensification.
- Specialisation.
- Distancing.
- Concentration & Homogenisation.

Food producers of the future:

- Will need to meet the growing nutritional needs of the population without falling into the traps seen in industrialised models.
- Will need to be highly sensitive and reactive to the feedback driving towards sustainability.
- Have a strong focus on balancing the often contradicting demands from stakeholders.
- It is predicted that those producers with a strong worldview and cultural affiliate will be more sensitive to sustainability driven feedback, and thus more able to balance demands.