Introduction to agroecology

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IV ENDURE Summer School
Agroecological engineering for crop protection
Volterra, 8 oct. 2012
Origins

- Latin America: 1970s – 1980s – difficult political situations
- Nth America: environmental protection, think globally act locally
- Reaction to green revolution
Assumptions...

- Population bomb, Paul Erlich, 1968

- Increase yields
- (control pop. growth)
…and reaction

12 Myths, Frances Moore-Lappé, 1986

- Improve access to production
Green revolution

- Norman Borlaug – high yielding varieties + high input
- CGIAR – IRRI – CIMMYT – FAO
- World Bank – UNDP
Doubly green revolution

and now → “evergreen revolution”
Critique

- Social justice – unequal distribution of benefits
- Technology & dependence (machinery, seed, NPK, loans, markets, …)
- Knowledge – expert K vs. IKS
- Appropriateness of Northern model applied to unknown system
- Unexpected consequences
  - Diet (e.g. rice in Bangladesh)
  - Public health (e.g. water buffalo)
  - Biodiversity
- Local resources, local systems
Critique

Complex systems
Critique

Local rice variety use among project farmers

Genetic erosion

from Barzman, 2000
Responses for Sth

- Genetic erosion – in-situ conservation
- Biopiracy – address rights of traditional communities
- Social justice – land reform
- Indigenous Knowledge Systems / understanding traditional systems
- Autonomy / food sovereignty
- Appropriate technology
IKS ex.: Chinampa
IKS ex.: waru waru
Ex.: rice terraces
IKS: weaver ant in VN

Photos by P. van Mele
IKS: weaver ant in VN

Photo by M. Barzman
IKS: weaver ant in VN

Photo by M. Barzman

Photo by P. van Mele
Some of the people...

Miguel Altieri - Agroecology: the science of sustainable agriculture, 1986

Ivette Perfecto, biodiversity in ag

Peter Rosset - Small Is Bountiful, 1999

Fernando Funes, Cuba
Strategies

- Anti-GMO movement
- Locavore: Food-shed, CSAs, Farmers’ markets, U pick, agroecotourism
- School programmes – school gardens, organic lunch, salad bar
- Intentional communities
- Farm worker rights
- Urban ag
- Organic ag
New directions for ag

- Wildlife-friendly agriculture
- Native spp.
- Low-input organic farming
- Permaculture
- Biodynamic
- French intensive horticulture
- Urban agriculture
- Crop-livestock integration
- Agroforestry
What is agroecology?

From Wezel et al, 2009
Contributions to science

Agroecology as a scientific approach?

- Holistic vs. reductionist approach
- Systems sciences
- Multi-disciplinary approaches
  ex. NMJ weed sci → farm management Q
- Multi-sector – who is the expert?
- Ecology – from “contemplative Ecology” of ‘natural’ systems to management of agroecosystems
- Ethnobotany / understanding traditional systems
- Descriptive agroecology on developed country agriculture?
- Ecosystem services (multi-functional agriculture)
The application of ecological concepts and principles to the design and management of sustainable agroecosystems
Sustainability in ag

- Minimal impact on environment
- Preserve & rebuild soil fertility
- Use water efficiently
- Rely on internal resources & nutrient cycling
- Conserve biological diversity
- Enable local control of agricultural resources & access to knowledge
Relying on ecosystem processes

- Energy flow
- Nutrient cycling
- Soil building
- Succession
- Disturbance
- Interactions between species
- Abiotic/biotic interactions
Need for a shift from Agrochemistry to Agroecology

- **Agrochemistry**
  - Chemical pesticide & fertilizer application

- **Agroecology**
  - Plant species diversification (PSD)

**Human & environmental health**

- **Beneficial organisms**
- **Pest & disease impact**
  - **Soil fertility**
  - **Soil biological activity**
  - **Quantity of farm production**
  - **Quality of farm production**

**Positive impact**

**Negative impact**

**Mixed impact**
Agroecology

- IPM
- Agronomy
- Conservation Agriculture
- Philosophical & Social Movements
- Ecology
- Ecologically intensive Agriculture
- Eco-Agriculture

- Organic Agriculture
Agroecology

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Agroecology

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- Ecology
- Agronomy
The agroecological revolution in Latin America: rescuing nature, ensuring food sovereignty and empowering peasants

Miguel A. Altieri and Victor Manuel Toledo

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REVIEW ARTICLE

Agroecologically efficient agricultural systems for smallholder farmers: contributions to food sovereignty

Miguel A. Altieri · Fernando R. Funes-Monzote · Paulo Petersen
Biodiversity Conservation in Tropical Agroecosystems
A New Conservation Paradigm

Ivette Perfecto\textsuperscript{a} and John Vandermeer\textsuperscript{a,b}


**Figure 1.** Two hypotheses about the relationship between management intensity and biodiversity.
Facing up to the paradigm of ecological intensification in agronomy: Revisiting methods, concepts and knowledge
Thierry Doré, David Makowski, Eric Malézieux, Nathalie Munier-Jolain, Marc Tchamitchian, Pablo Tittonell