



FOOD QUALITY AND SAFETY



# Introduction to agroecology

**Marco Barzman, ENDURE &  
Alain Ratnadass, CIRAD  
IV ENDURE Summer School  
Agroecological engineering for  
crop protection  
Volterra, 8 oct. 2012**



# Origins

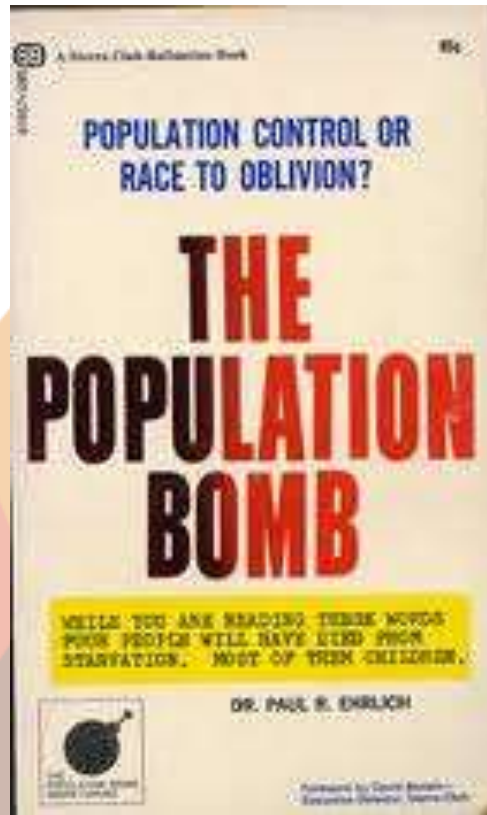


- 🌻 **Latin America: 1970s – 1980s – difficult political situations**
- 🌻 **Nth America: environmental protection, think globally act locally**
- 🌻 **United Nations Conference on Environment and Development, Rio Summit 1992**
- 🌻 **Reaction to green revolution**

# Assumptions...



## 🌻 Population bomb, Paul Erlich, 1968

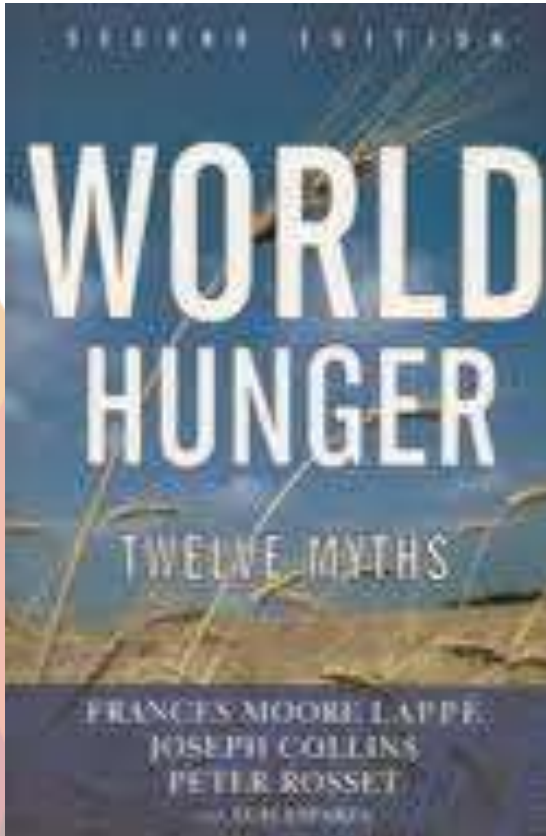


- Increase yields
- (control pop. growth)

# ...and reaction



## 🌻 12 Myths, Frances Moore-Lappé, 1986



➔ Improve access to production

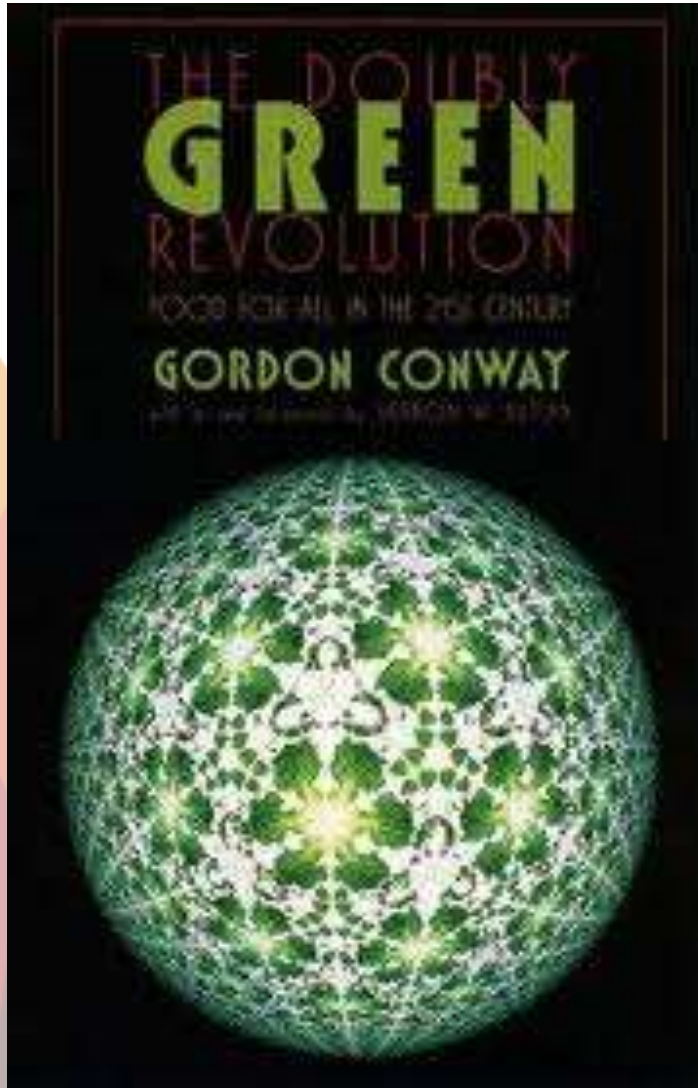


# Green revolution



- 🌿 **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



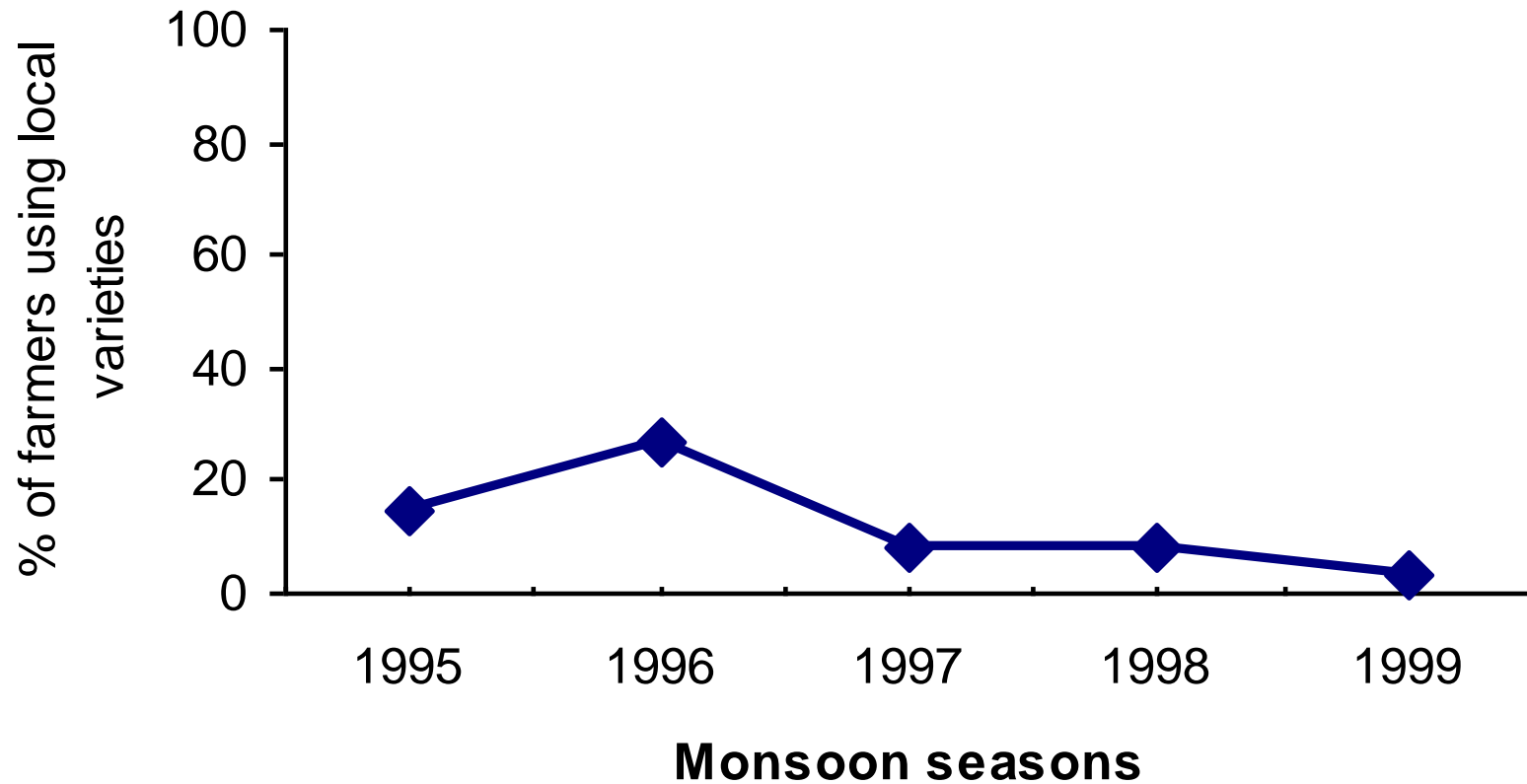
**Complex systems**



# Critique



## Local rice variety use among project farmers



from Barzman, 2000

**Genetic erosion**

# Responses for Sth



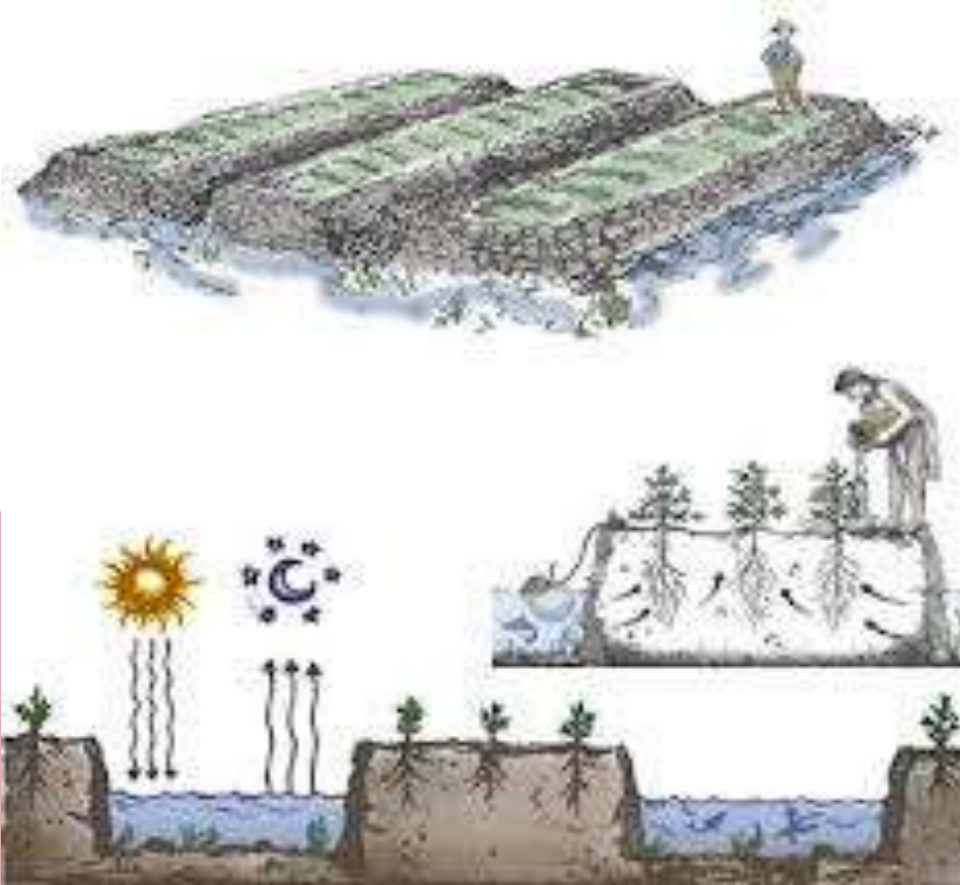
- 🌻 **Genetic erosion – in-situ conservation**
- 🌻 **Biopiracy – address rights of traditional communities**
- 🌻 **Social justice – land reform**
- 🌻 **Indigenous Knowledge Systems / understanding traditional systems**
- 🌻 **Autonomy / food sovereignty**
- 🌻 **Appropriate technology**

# 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

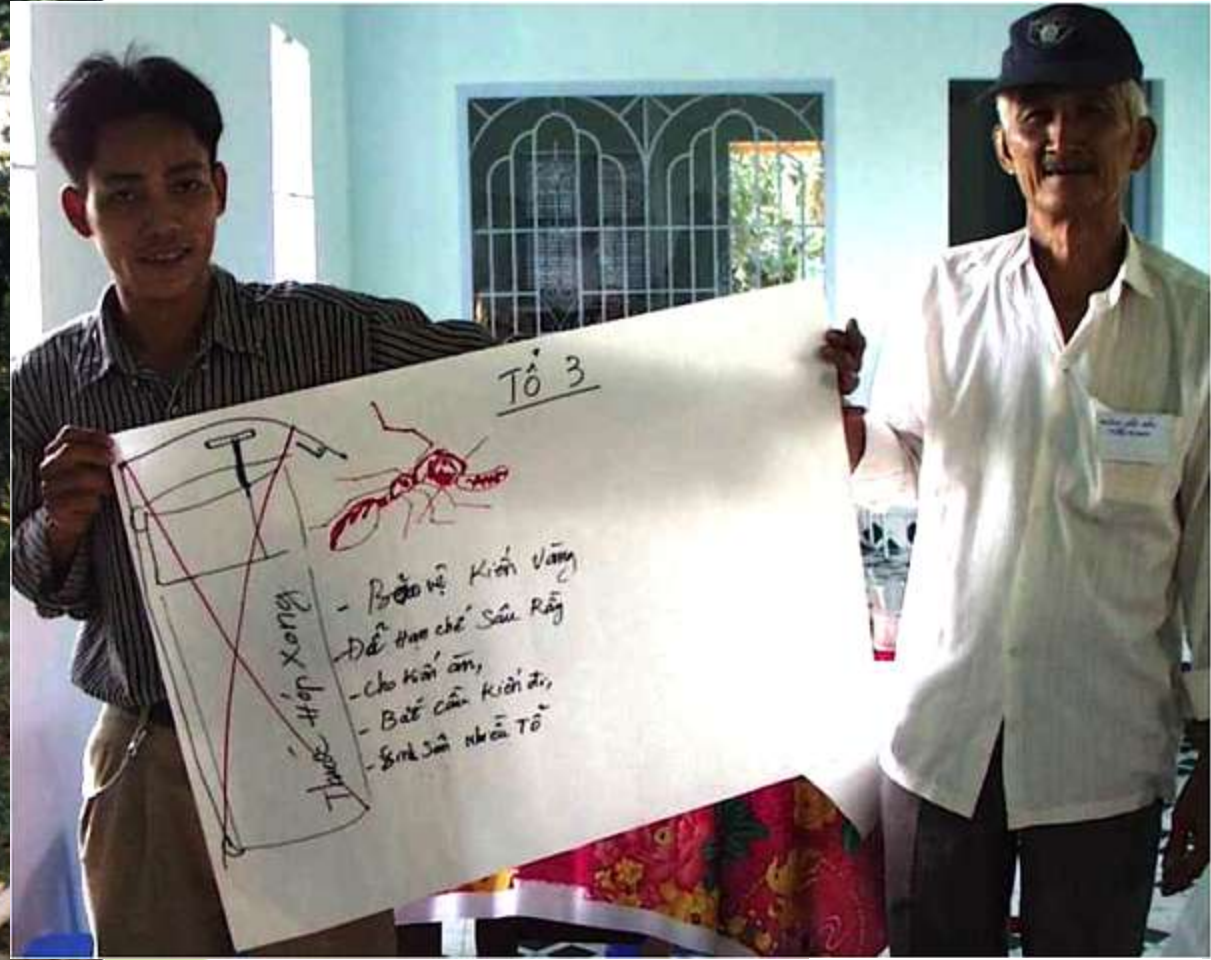


Photo by P. van Mele

Photo by M. Barzman

# Some of the people...



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



🌱 **Ivette Perfecto, biodiversity in ag**



🌱 **Fernando Funes, Cuba**



🌱 **Peter Rosset - Small Is Bountiful, 1999**

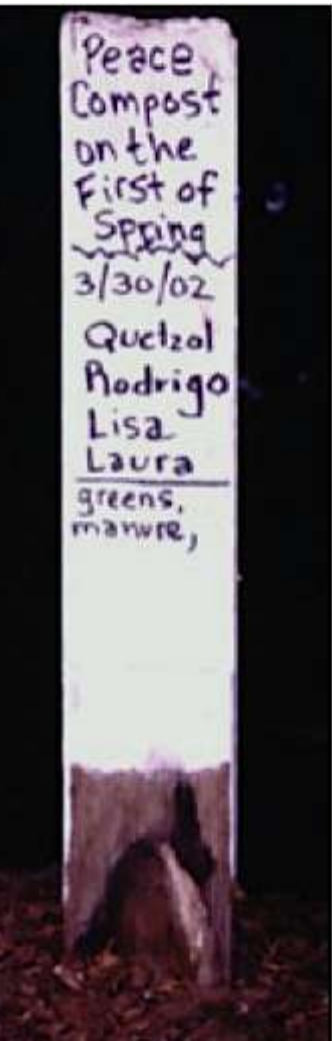


# Responses for Nth



## 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







FOOD QUALITY AND SAFETY

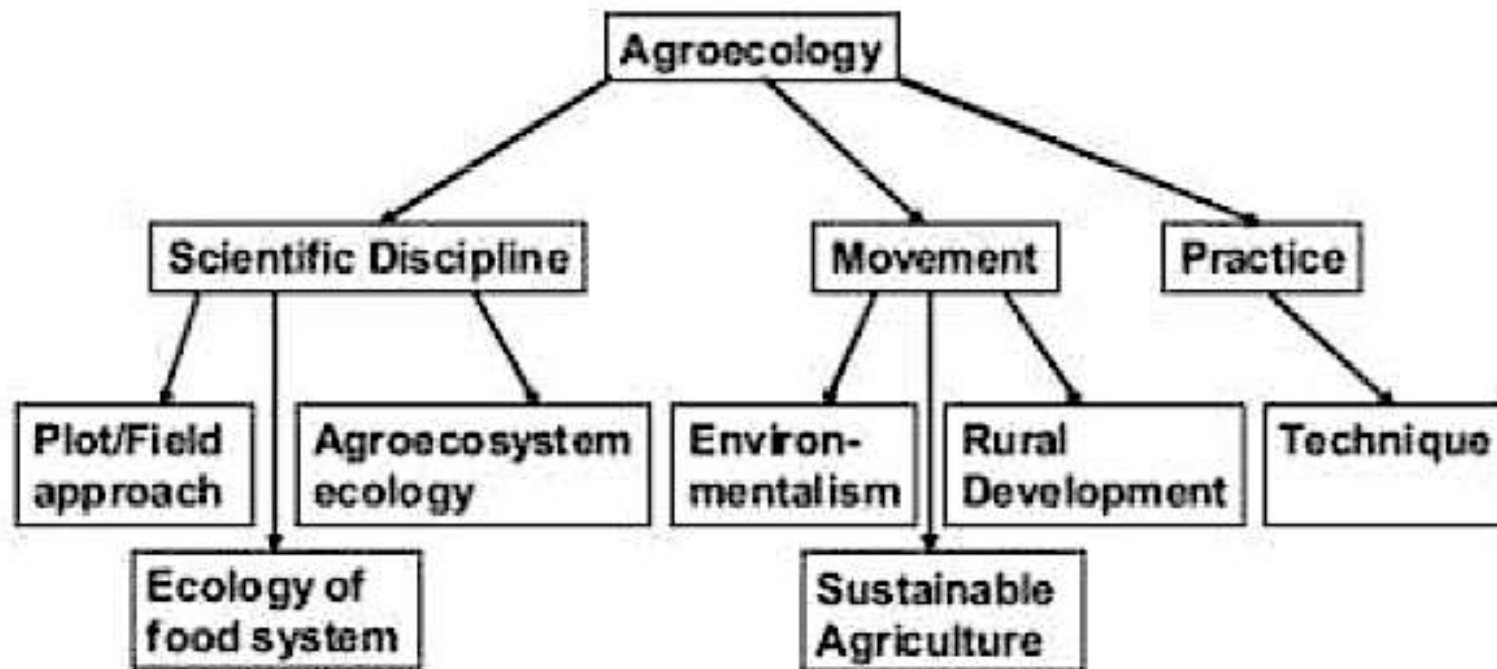
# OCCIDENTAL ARTS & ECOLOGY CENTER

MOTHER GARDEN BIODIVERSITY   WILDLANDS BIODIVERSITY   PERMACULTURE AND ECOLOGICAL DESIGN   INTENTIONAL COMMUNITIES   SCHOOL GARDENS   ARTS   CHAUTAUQUA SERIES   ECOLOGICAL AGRICULTURE   WATER INSTITUTE





# What is agroecology?



From Wezel et al, 2009



## **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)

# A definition within scope of ag production



**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

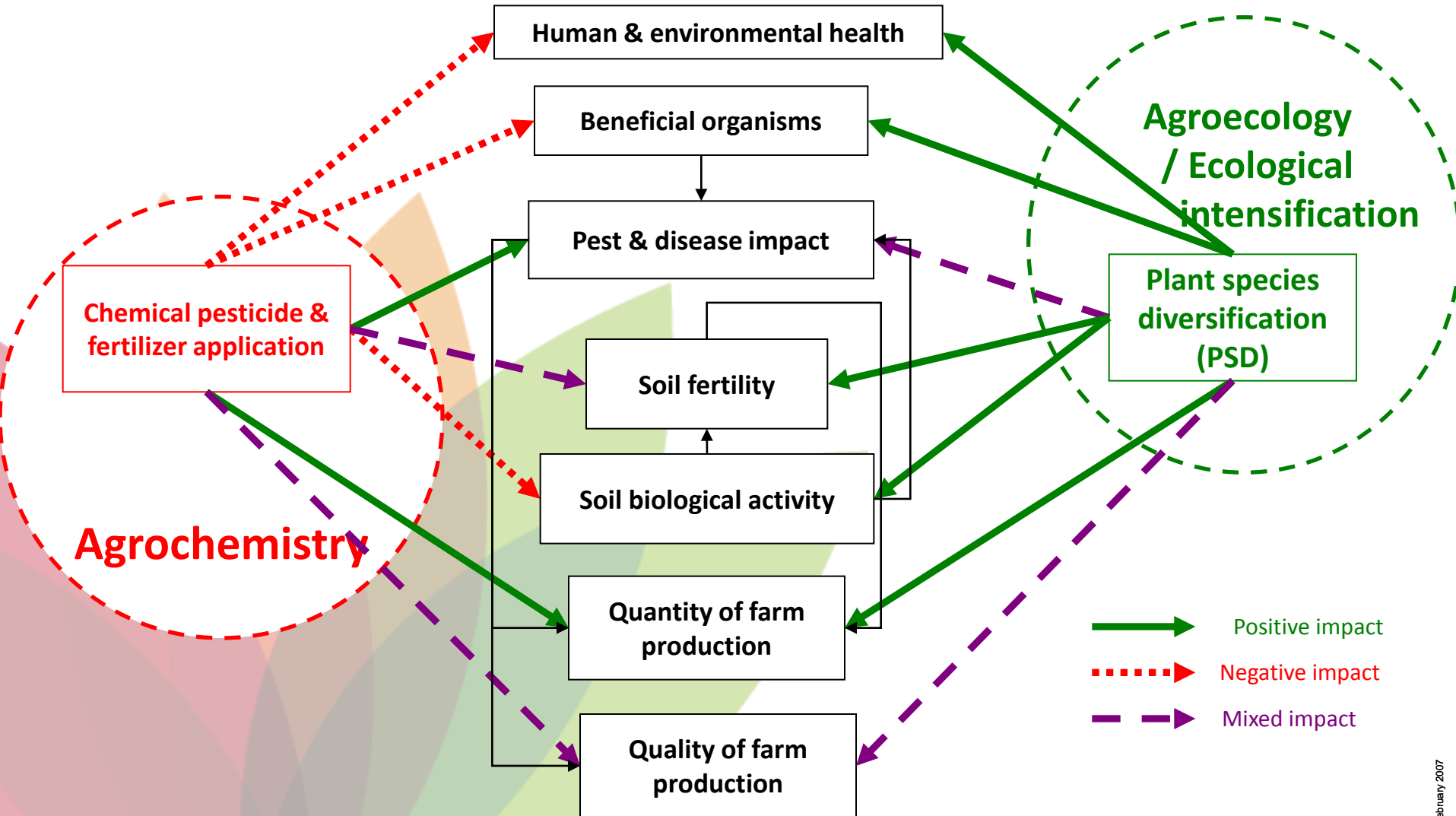
# Relying on ecosystem processes

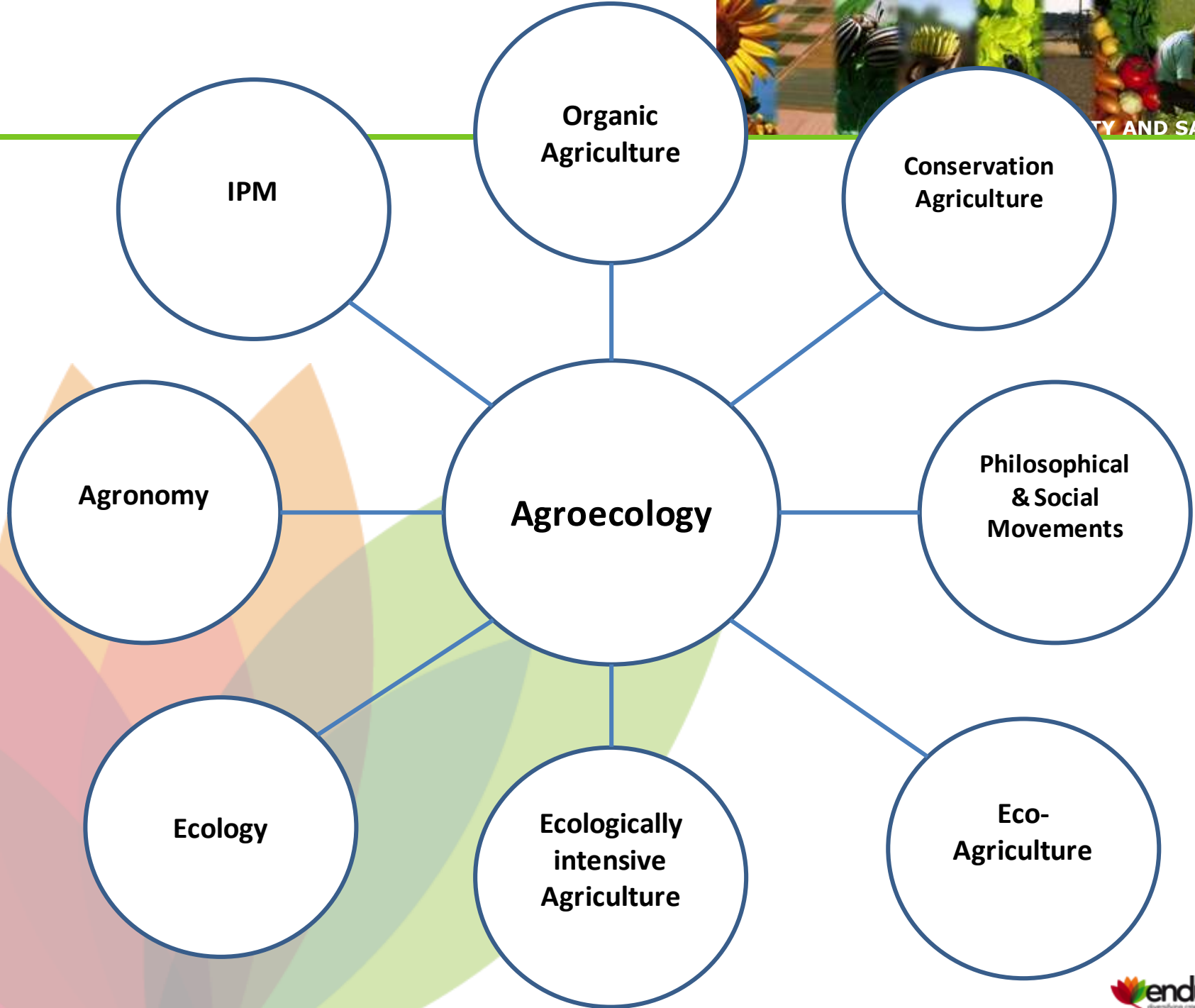


- 🌱 **Energy flow**
- 🌱 **Nutrient cycling**
- 🌱 **Soil building**
- 🌱 **Succession**
- 🌱 **Disturbance**
- 🌱 **Interactions between species**
- 🌱 **Abiotic/biotic interactions**

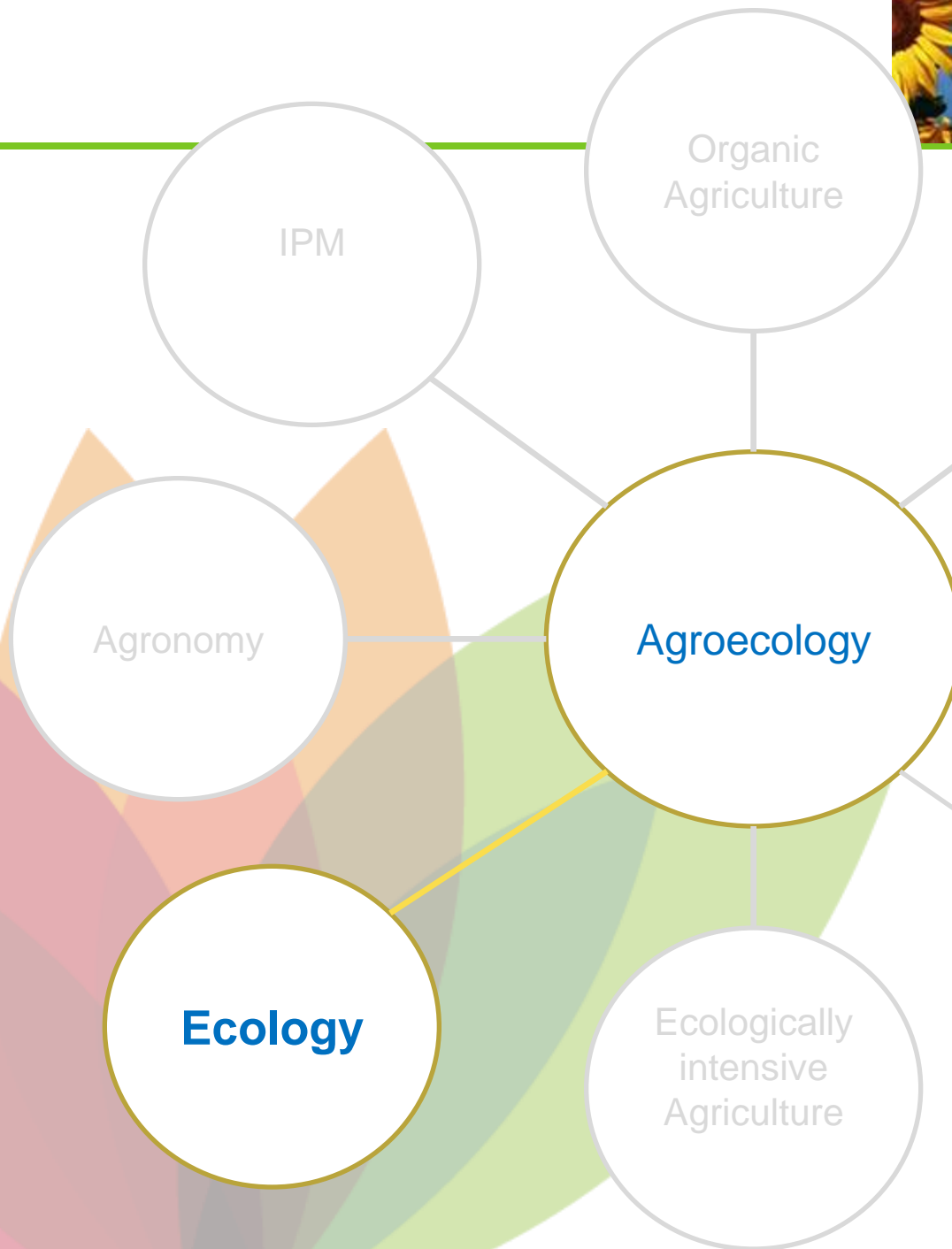


# Need for a shift from Agrochemistry to Agroecology











Assemblée générale  
Vendredi 23 mars 2012  
AgroParisTech







**IPM**

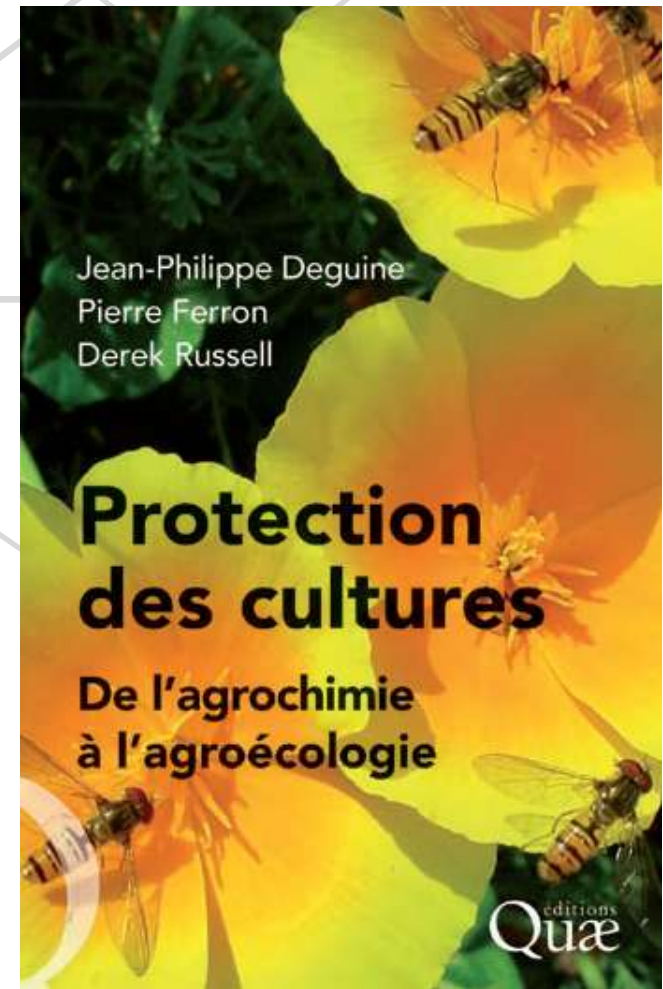
Organic  
Agriculture

Conservation  
Agriculture

Agronomy

**Agroecology**

Ecologically  
intensive  
Agriculture





**Organic  
Agriculture**

Conservation  
Agriculture

Philosophic  
al & Social  
Movements

Eco-  
Agriculture

Ecologically  
intensive  
Agriculture

Ecology

Agronomy

**Agroecology**





PIERRE RABHI

MANIFESTE  
POUR  
LA TERRE ET  
L'HUMANISME

préface de Nicolas Hulot



*The Journal of Peasant Studies*  
Vol. 38, No. 3, July 2011, 587–612

Routledge  
Taylor & Francis Group

IPM

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

Miguel A. Altieri and Victor Manuel Toledo

Agroecology

Philosophical  
& Social  
Movements

Agron. Sustain. Dev.  
DOI 10.1007/s13593-011-0065-6

REVIEW ARTICLE

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

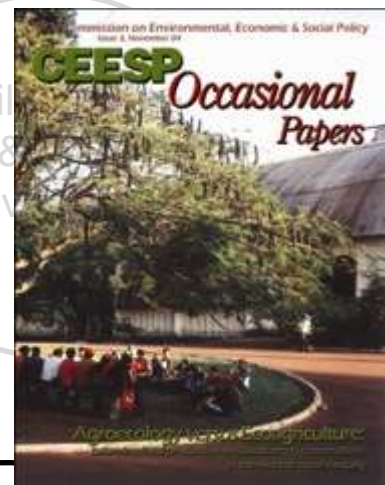
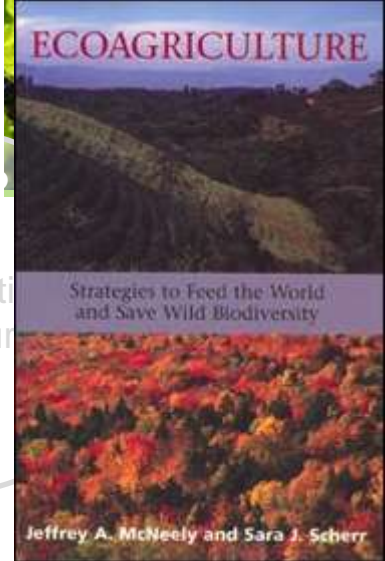
Miguel A. Altieri • Fernando R. Funes-Monzote •  
Paulo Petersen

PERMA-  
CULTURE  
2.

Aménagements pratiques  
à la campagne et en ville  
Bill Mollison







RESPONSE TO ALTIERI AND FARVAR ARTICLES

Agriculture

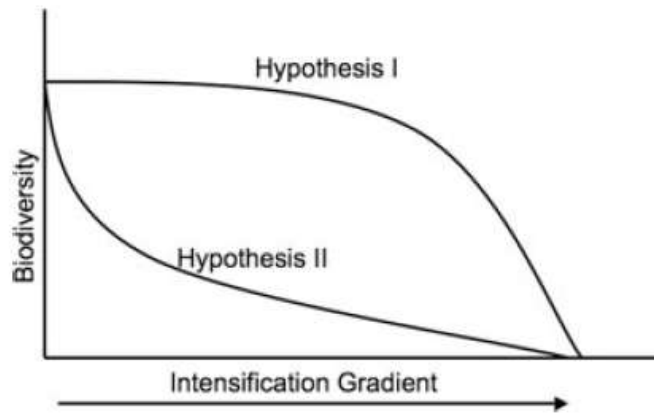
Conservation  
Agriculture

# Biodiversity Conservation in Tropical Agroecosystems

## A New Conservation Paradigm

Ivette Perfecto<sup>a</sup> and John Vandermeer<sup>a,b</sup>

Ann. N.Y. Acad. Sci. 1134: 173–200 (2008). © 2008 New York Academy of Sciences.



**Figure 1.** Two hypotheses about the relationship between management intensity and biodiversity.

Agroecology

Philosophical & Movement

Eco-Agriculture

Ecologically

Agronomy

Reconciling Food Production and Biodiversity Conservation: Land Sharing and Land Sparing Compared  
Ben Phalan *et al.*  
*Science* **333**, 1289 (2011);  
DOI: 10.1126/science.1208742

# L'agriculture écologiquement intensive : nature et défis

Sylvie Bonny Cah Agric, vol. 20, n° 6, novembre-décembre 2011



## Facing up to the paradigm of ecological intensification in agronomy: Revisiting methods, concepts and knowledge

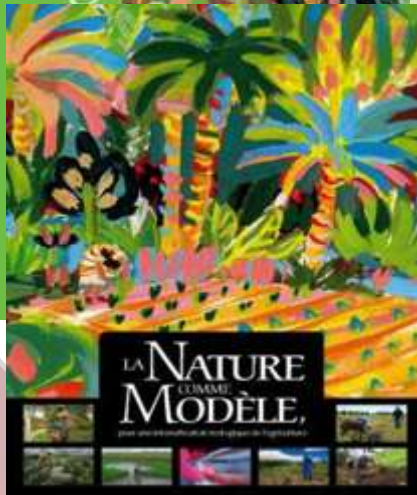
Thierry Doré, David Makowski, Eric Malézieux, Nathalie Munier-Jolain, Marc Tchamitchian, Pablo Titttonell



Agroecology

Ecologically  
intensive  
Agriculture

*Inventer  
une nouvelle  
agriculture*



**Michel Griffon**  
Pour des agricultures  
écologiquement intensives



« L'agriculture doit effectuer une véritable révolution technologique, et celle-ci doit être accompagnée de politiques agricoles nouvelles. »



