

Agro-ecological research for sustainable development in a global perspective

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Agriculture and Sustainable Development?

- An agriculture that meets Sustainable Development challenges:
 - Economical **viability**
 - Ecological **sustainability**
 - Social **equity**
- A development which is not only based on **determinism** and **potential** but also on political and moral **intentions** to change the state of the society

Fostering a "sustainable" form of development

- Development can no longer be equated solely with the expression of a potential

i.e. the result of a **universal internal determinism**, that will express itself when adequately encouraged.

- It also includes the moral and political obligation to extract society from its condition,

i.e. through **voluntary choices and projects** whose emergence needs to be promoted through collective action.

and as a result of **trajectories** whose ecological, technological, economic and social dimensions will need to be backed (hesitations, bifurcations...)

Towards a sustainable development?

The central idea of SD is **integration** to overcome the danger that division and separation may tear human society apart

- It addresses to link **local** and **global** levels
- and **short-term** (context of action) with the **long** inter-generational **time span** (framework of most biophysical and social processes)
- It applies to the relation between economics and transformations in the global environment and resources through **technology**
- and reflecting a concern for **social equity**
- It lies midway between determinism and voluntarism (**political determination**): it depends on the capacity of stakeholders to design and implement their **projects** through a process of adaptation, drawing lessons from experience

It impacts **issues** as well as **research**

Agroecology?

- or Ecoagriculture, Ecologically intensive production systems, Conservation farming, Ecoculture ...
 - a new scientific framework **ecologically** oriented?
 - a **social** vision of Development?
 - a **value** oriented research?
- **New paradigms?**
 - 'ecological modernization' into agriculture
 - systems approach
 - agroecosystems management : agronomy / ecological engineering
 - alternative to conventional agriculture
 - social movement

Agroecology

- To manage the 'agricultural frontier'
by landscape **zoning**, new **institutions**, economies of **scale**, ecosystem services **payment**, cross sectoral **knowledge** exchanges ...
- Either to change agriculture and not only replace it
by working as well at the **territorial** level as at sectoral
one (specific commodities) in order to
 - create landscape **mosaics** (dynamic connectivity, heterogeneity),
 - generate economies of **diversity** (farmers, products and outputs, knowledge),
 - take in account the **bundle of rights** related to resources (access, use, transmission, land tenure ...)

Stratification vs Integration

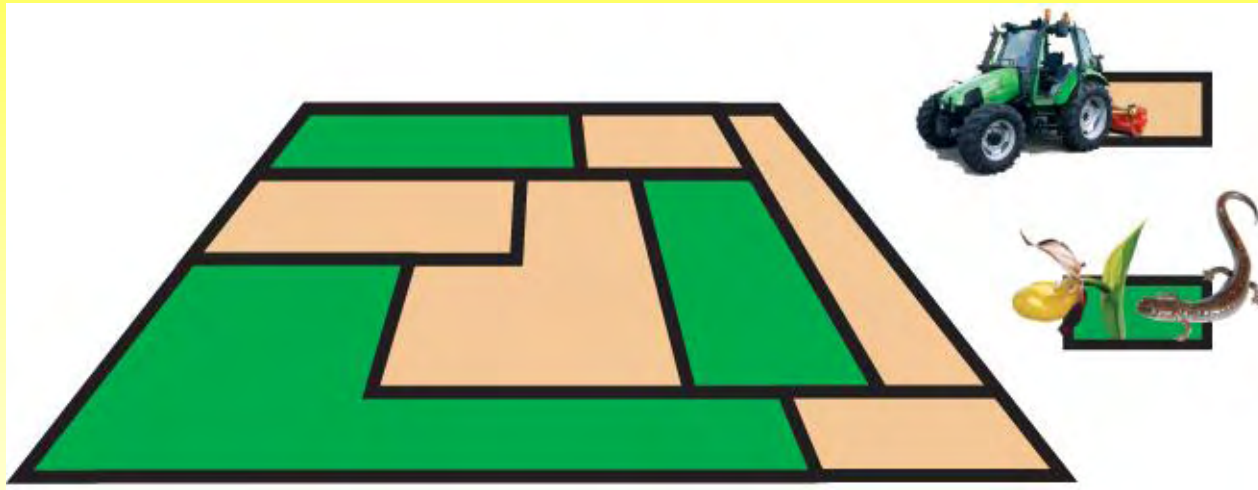
- Stratification within rural communities could lead to **increase inequalities** in regard of: land distribution, indigenous people and farmers rights, food security, eco-imperialism/local values for species and habitats ('environmental justice')
- Integration could favor a **diversity** at multiple levels from a **set of farming systems** (different farm sizes, households, products, labor effort, etc.) and a better productivity of the whole (heterogeneity and complementarities)

A new dilemma

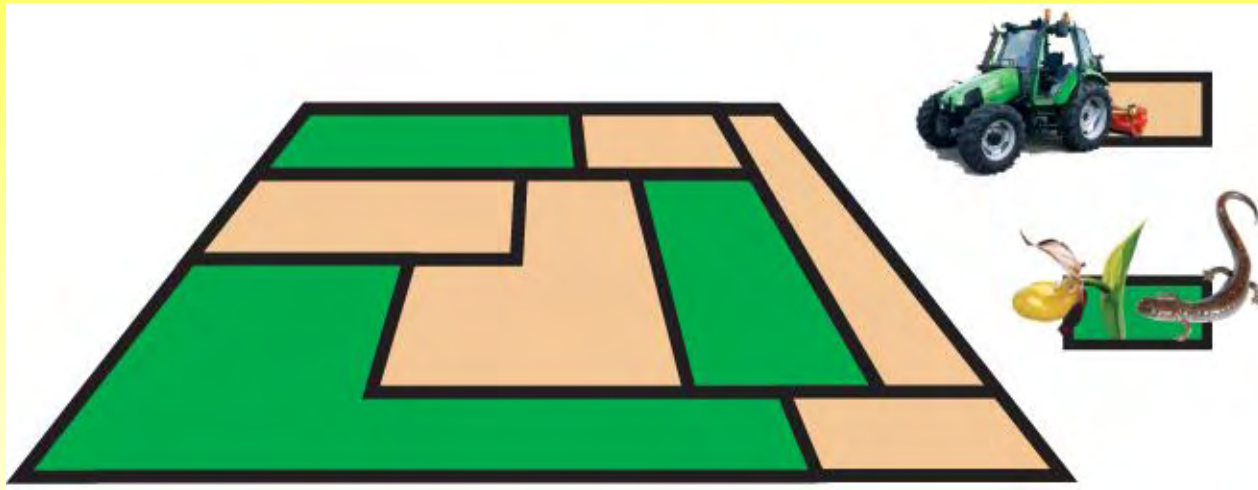
- To rethink the current way of segregating productive vs conservation areas (as **sanctuaries**)
- By (re)designing **mosaics of ecosystems** that provide multiple functions and services

Dilemma production/conservation

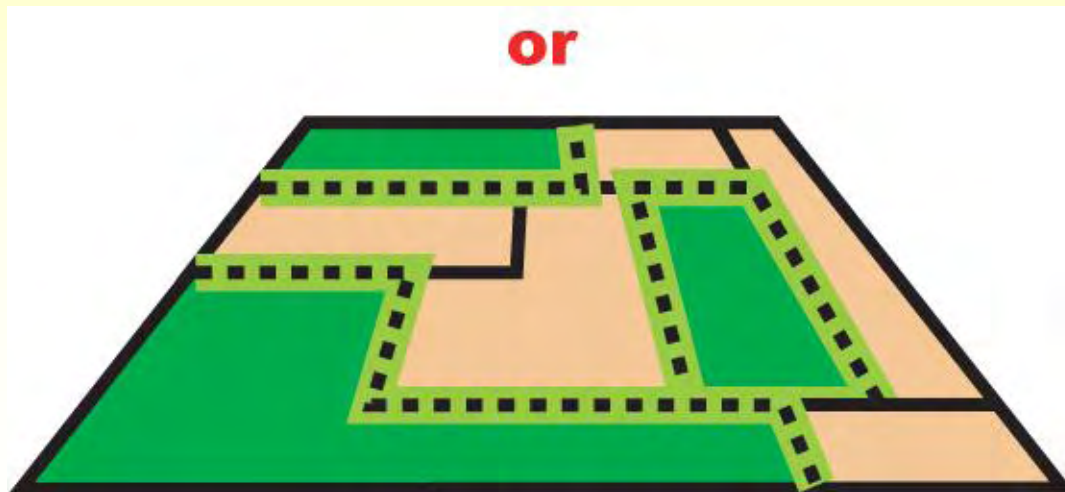
Segregation vs Integration



Dilemma production/conservation Segregation vs Integration



or



An integrative perspective

- Traits important to **farmers**
 - Resistance to drought and climate uncertainties
 - Food and fodder quality
 - Competitive ability (technical skills, prices regulation, energy costs ...)
 - Performance on intercroops
 - Storage quality
 - Taste and cooking properties
 - Compatibility with household labor conditions
- In order to build a functioning territory funded on a **mosaic of connected (agro)ecosystems**, including wet areas, forests, hedges, etc. and people!

Agroecosystems

Should mimic

- The **biodiversity levels** : genes (varieties, landraces ...), species, ecosystems, landscape
- The **functioning** of local ecosystems: soil fertility, water cycle, plant & animal health, sustained yields...

Then **conservation** is then the product of the **assemblage** of productive agroecosystems rich in functional biodiversity,

enabling the **collection of organisms** that play **key ecological** roles

Functional groups of biodiversity (‘MPPDC’)

- Ecologically functional groups that **mediate processes** such as biological control, pollination or organic matter decomposition
- Conservation functional groups that **protect** soil and water
- Livelihood functional groups that **produce** timber, fruit, cash, etc.
- **Destructive biota** that reduces production and other processes
- Functional groups that **connect** the landscape elements

An issue of institutional understanding

- Many agricultural practices are today **unsustainable** and counter-productive, because they focus purely on how much resource can be produced and harvested, rather than thinking of **resources as ever-changing** and deeply connected within **complex ecosystems**
- Needs to think **sustainability** as an **emergent property** of stakeholder interaction, and not a technical property of the ecosystem

Needs some changes

- In **policy making** and **institutions**: land reforms, respect of local bundle of rights, IPR, regulation of prices for food crops, insurance, rural finance, appropriate and equitable market opportunities, equitable partnerships between local governments, NGOs and farmers
- In **R&D**: from **top-down transfer** of technology to **partnership** technology development and **farmer to farmer** research and extension

A shift in R&D

In regard of

- **Integrating** farming systems **levels** (from field to farm and landscape)
- Reshaping **fundamentals** in agronomy
- **Modeling** of complex systems
- Involving **end users** in program priorities setting
- Enhancing Agricultural **Innovation** : values, knowledge (different forms and status), learning processes, collective action, communities of practice, organizations ...

A challenge for R&D

To design integrated management of natural resources as a process based on **cross-fertilisation** between methods and concepts from agronomy, ecology and social sciences while largely making use of local knowledge in order to overcome the **production vs. conservation** dilemma

New paradigm

Production

- Facing
- Breaking off with natural dynamics and processes
- Unbalanced
- Artificialisation of species and biological structures
- Substitution of biophysical mechanisms by technology

Conservation

- Effacement
- Whole respect of natural dynamics and processes
- Seek for an equilibrium
- ‘ Natural ’ species & structures
- No human activities

- Continuity, connections, interdependances
- Integration into biophysical processes
- Management of dynamics
- Co-adaptation, co-evolution, permanent adjustments
- Stewardship of ‘ natural ’ processes in order to meet a relevant level of production

To go further...

Institutionalizing understandings on NRM:

- **Resource sufficiency**

- resources as a given capital (stock)
 - in abundance /renewable /critical
 - substitutability between resources
 - technical improvement of yield efficacy

- **Functional integrity**

- resources emerging from interactions within the socio-ecosystem

- critical points for functioning

- technical and social improvement of the management processes regarding a set of activities

- and altering roles and interactions of their actors

A conceptual shift?

From a framework

- where agroecosystem is the sum of resource transformation and consumption
capital/technologies/resources
in a stable (or foreseeable) environment
- to managing (stewarding) ecosystems **functionalities** in order to facilitate 'ecosystem services' (cf. MEA), building 'capacities', adapting to changes in environment (climate, policies, values, norms ...)

With **new concepts**: dynamics, thresholds, resilience, viability kernels, learning processes and collective action, etc.

based on **co-evolution** of a system-environment relationship facing uncertainties!

A long term '**food securization**' approach in a globalized world? A global public good?

Thanks for your attention!

Lets go ahead to the follow up ...

