

The Impact of agro-biodiversity and ecosystem services in development or A New Vision for a Just, Sustainable and Productive Agriculture



Outline

- Challenge the assumption that increasing yields should be a priority under all circumstances
- Biodiversity is working for us
- The debate of separation and integration (lands sparing vs land sharing)
- What is needed: small scale agroecological farms with strong local markers and strong communities



GLOBAL
FOOD
CRISIS



**Organic farmers
in Michigan**

**Traditional farmers
in Perú**









Coccusviridis, a
pest of coffee

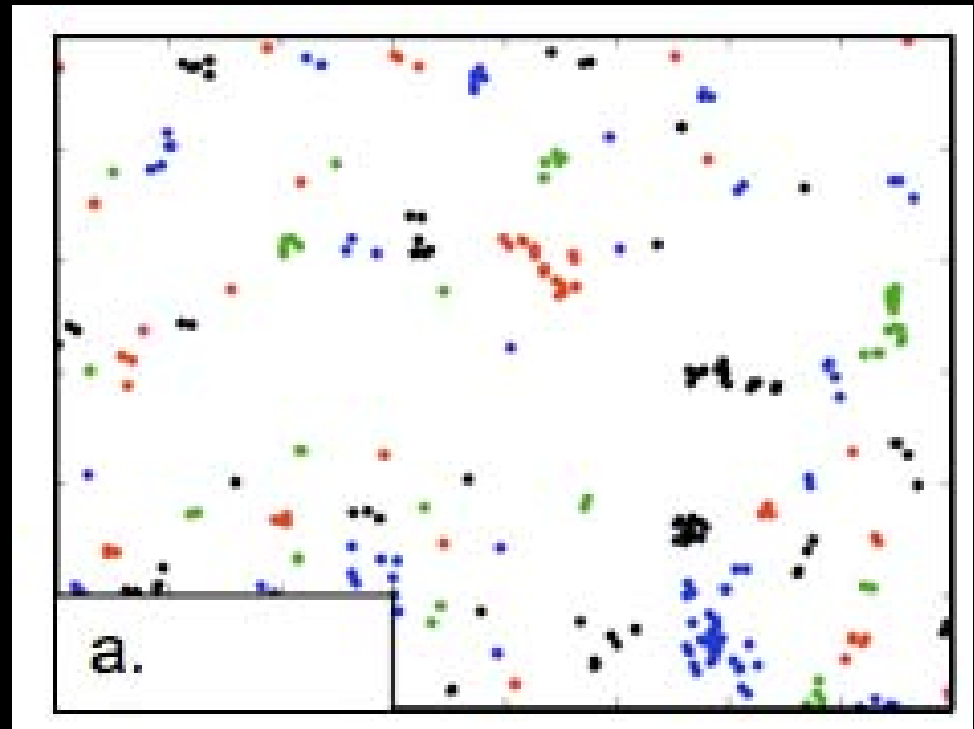


Azteca instabilis forms a mutualistic association with *Coccus viridis*





Densities of scales are
higher within the
Azteca clusters



Azya orbiger is a predator of *C. viridis*.





Waxy filaments protect
Azya from the ants







Azya larvae
parasitized

(Liere and Perfecto, 2008)

*Azteca
instabilis*
acking an
adult
*Azyaorbiger
a*



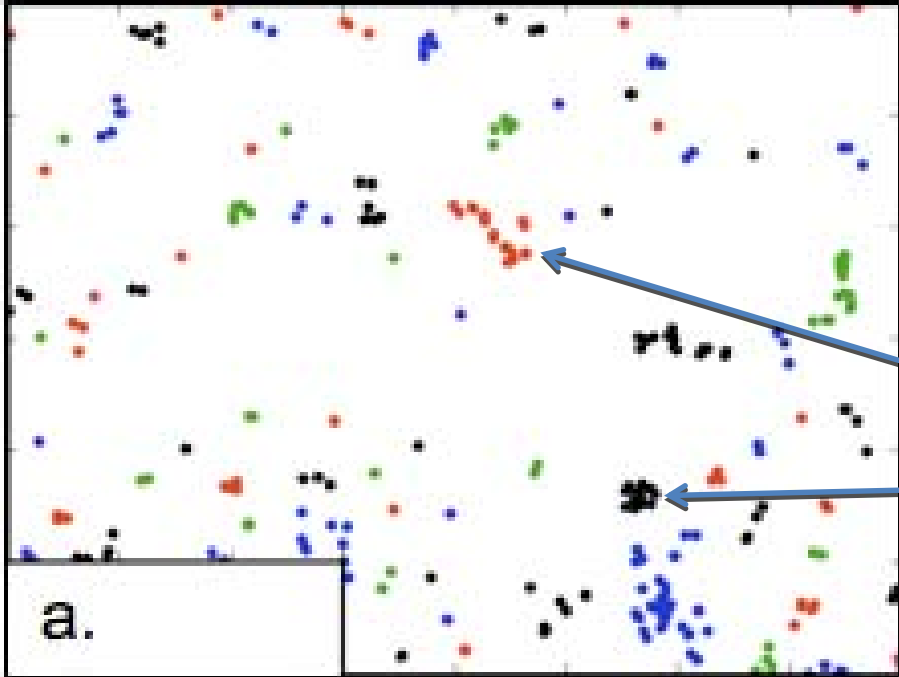
With
Azteca



Without
Azteca

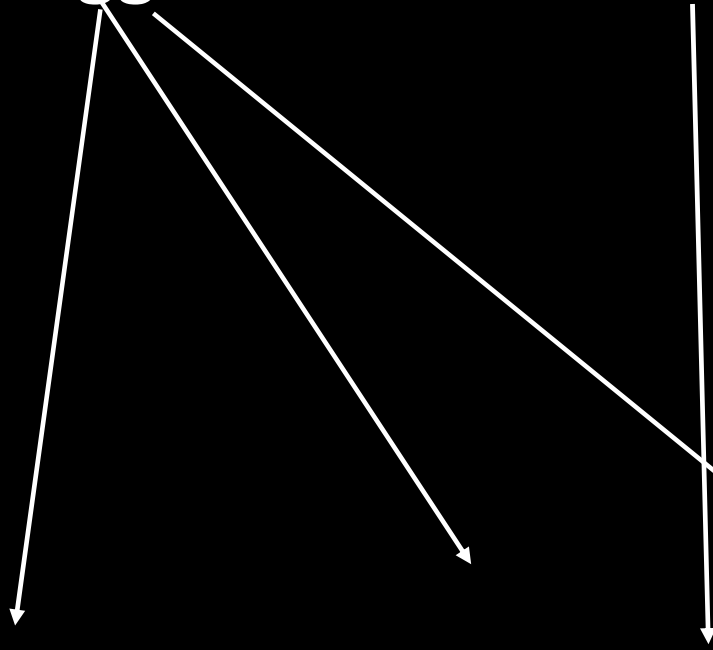


How is *Azya* able to locate *Azteca* clusters, and prevent their eggs from being detected by the ants?



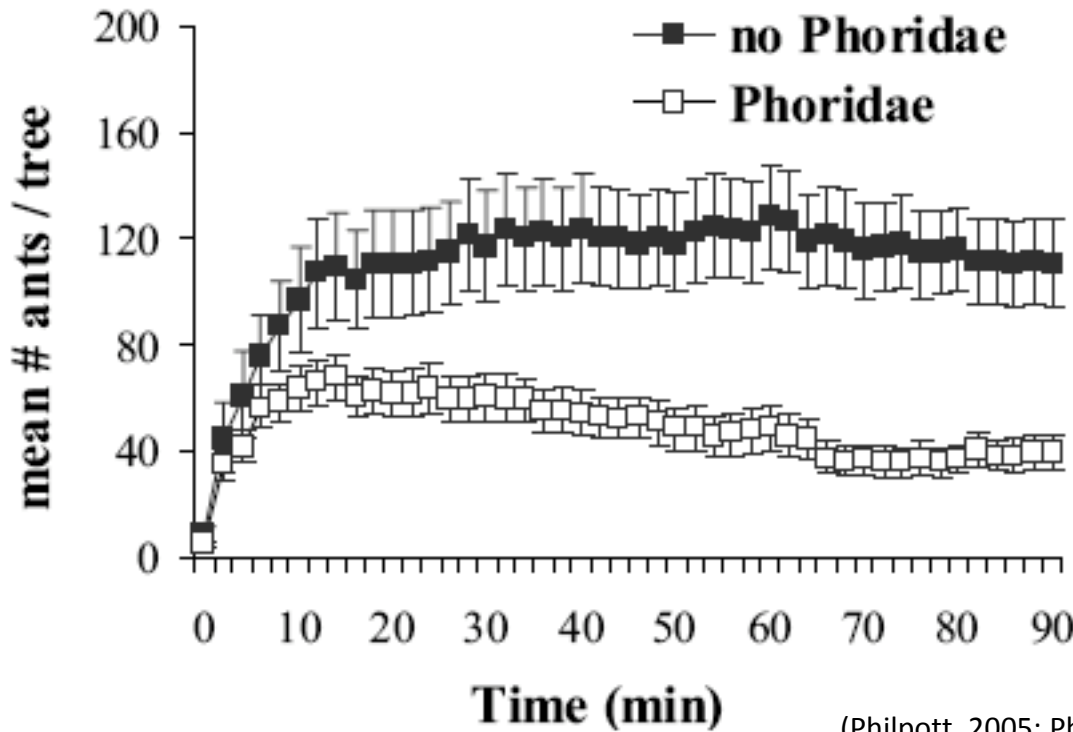
Clusters represent 5% of the farm

Eggs and first instar larvae of *Azya orbigera*





Phorid flies reduce foraging activity of *Azteca* and show a density dependence effect on ant cluster size.

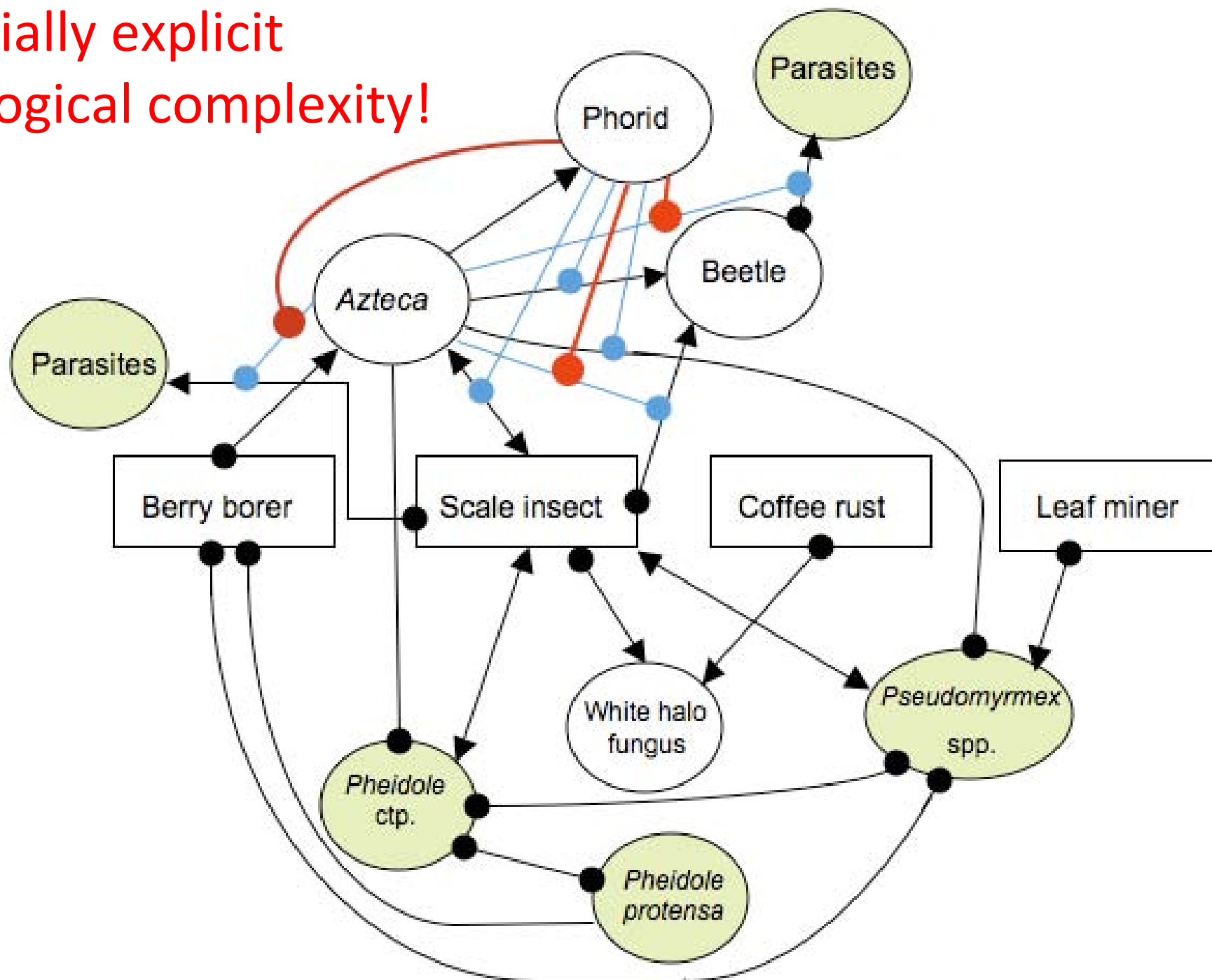


Pseudacteon sp.
(Phoridae)



(Philpott, 2005; Philpott)

Spatially explicit ecological complexity!





Separations *versus* Integrations

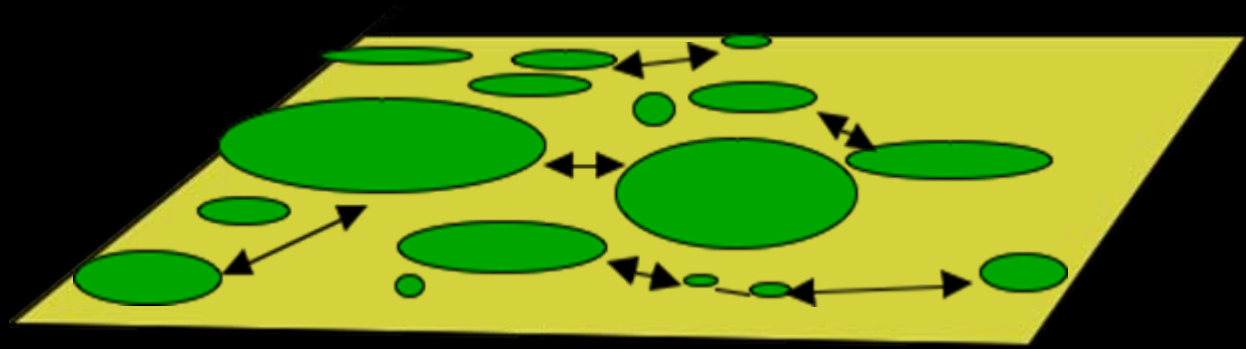
Industrial Monocultures

A Lose-Lose Situation

- Overproduction → low prices → rural exodus, suicides, etc.
- 1 billion hungry; 1 billion overweight
- Contamination due to pesticide and fertilizer use (freshwater contamination, dead zones, etc)
- Increases in GHG → global warming
- Loss of biodiversity

The ecological argument:

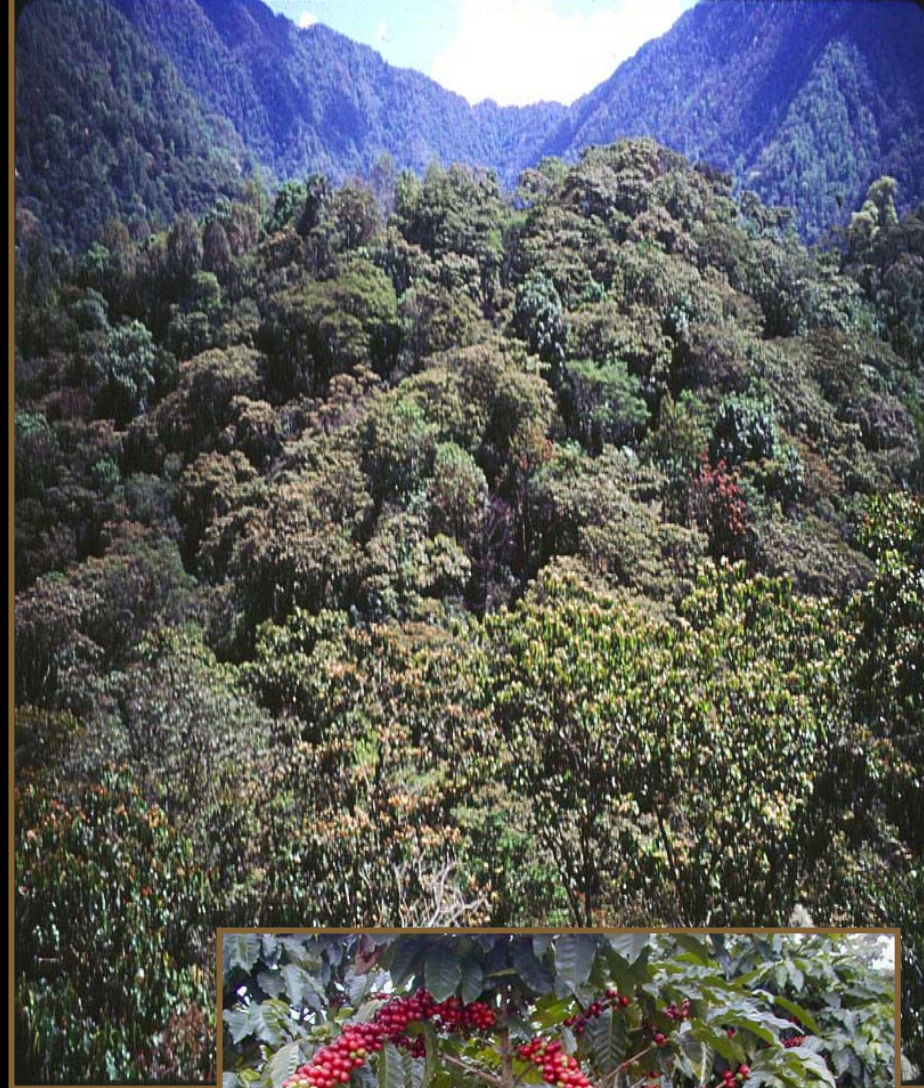
- Most natural habitats are fragmented
- Local extinctions occur even in continuous habitats
- Migration maintains populations as metapopulations

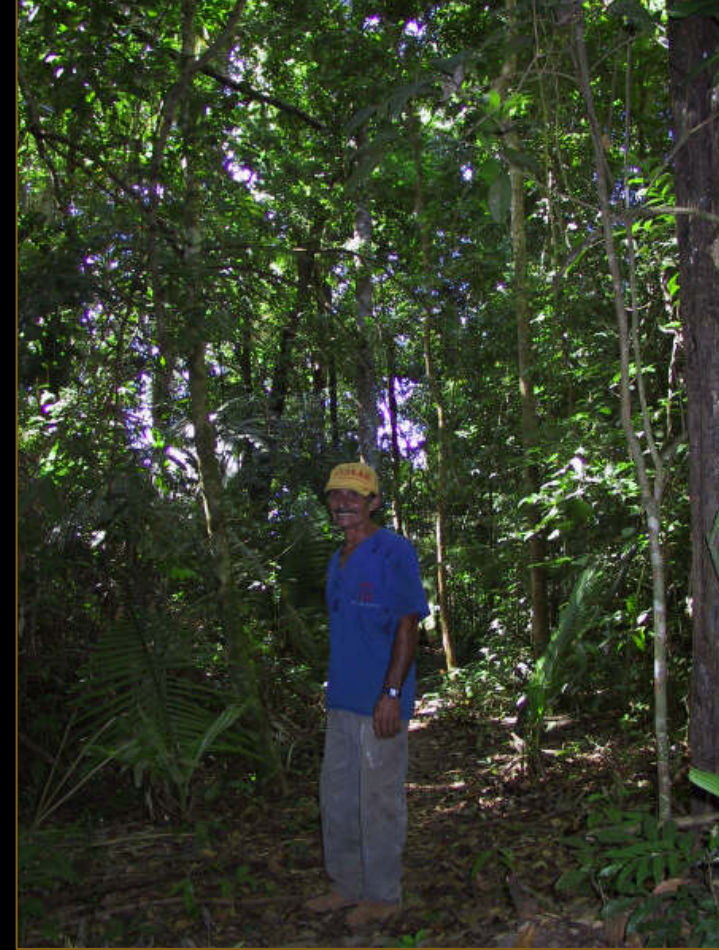


- The quality of the matrix determines migration

The matrix
matter!







- Sustainable, diverse, non-toxic agriculture represents a higher quality matrix that maintain ecosystem services at local, landscape and global levels.
- The more agriculture resembles the natural habitat the better for biodiversity and ecosystem services.



Nature's Matrix

LINKING AGRICULTURE, CONSERVATION
AND FOOD SOVEREIGNTY




IVETTE PERFECTO, JOHN VANDERMEER
AND ANGUS WRIGHT

The productivity argument:

- Sustainable (knowledge intensive) agriculture can be as productive as chemical/capital intensive agriculture (Badgley et al., 2008; and others).
- Large scale farms are inefficient (Sen, 1962).
- Agroecological systems are more resilient:
 - Hurricane Mitch in Central America (Holt-Giménez, 2002)
 - Agroforestry systems buffer climate extremes (Lin et al., 2008; Philpott et al., 2008)

Can agroecological farms feed the world?

-  Actual food production
-  Predictions based on yield ratios from developed countries
-  Predictions based on yield ratios from developing countries

The socio-economic argument

- Well supported small/medium scale farmers with land tenure, water rights, intellectual property rights, can create vibrant and stable rural communities.
- Stabilization of the agricultural frontier.



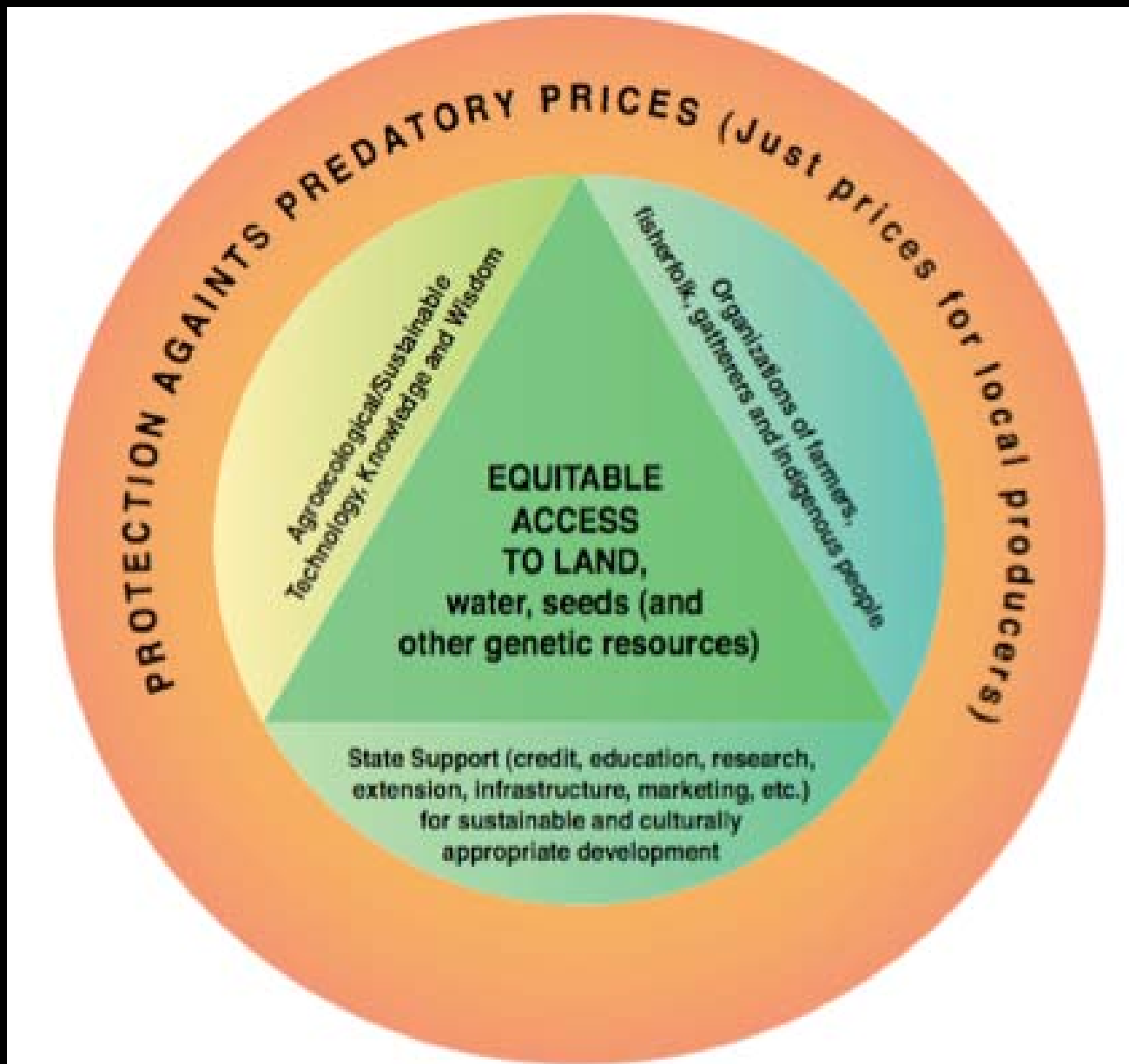
The socio-economic argument

- UNEP-UNCTAD Capacity Building Force (2008):
 - Improvements in social capital including stronger social organizations
 - Increased education skills and health
 - Improvements in infrastructures and markets
 - Increase household income



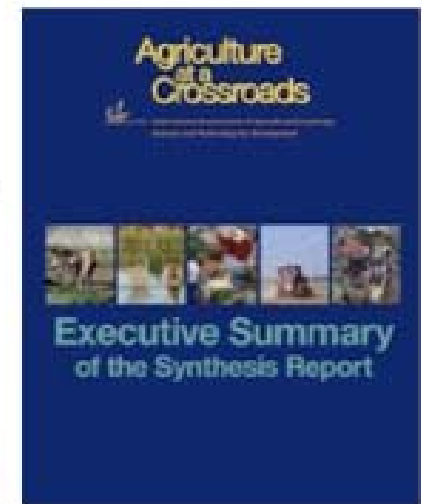
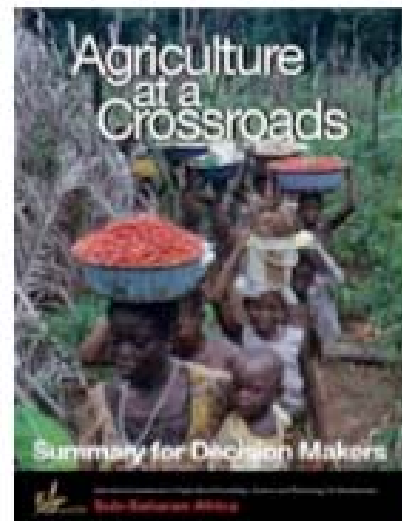
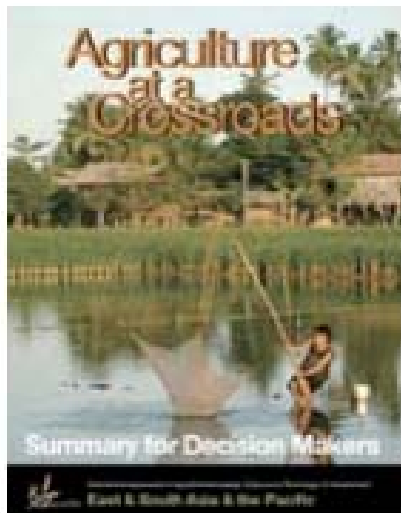
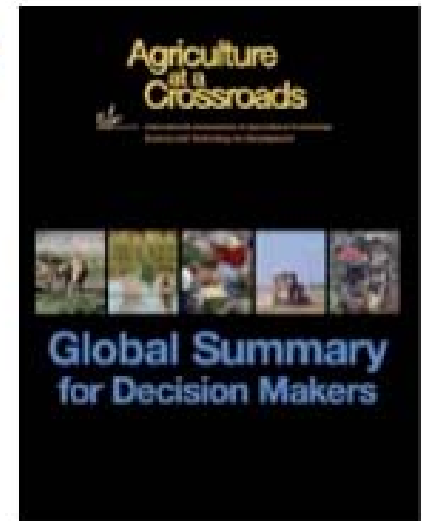
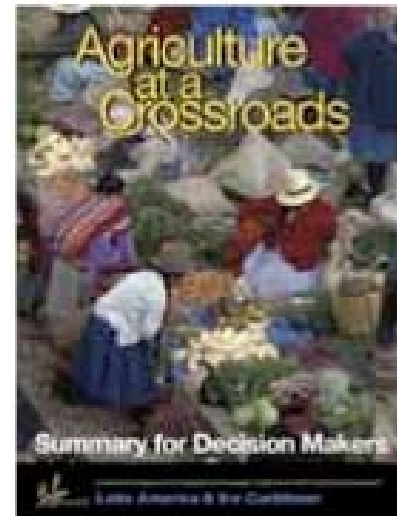
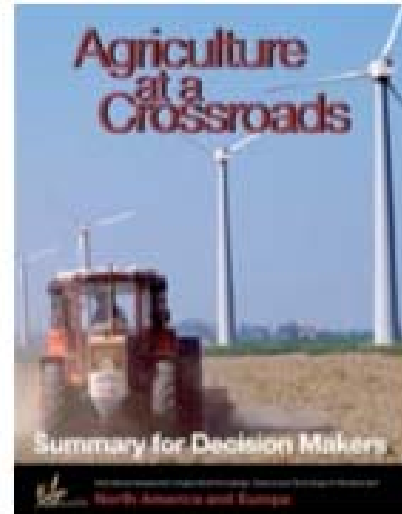
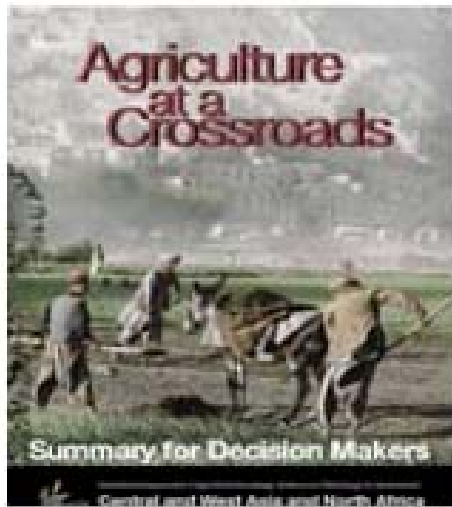
Social Movements for Food Sovereignty





IAASTD Reports

“Business as usual is not an option”



<http://www.agassessment.org/>

Multifunctional Agricultural Landscapes

- High Diversity (α , β , and γ diversity)
- No (or minimal use of) agrochemicals
- Knowledge intensive (instead of capital intensive) (use of local knowledge and materials)
- Soil and watershed protection
- Small/medium size farms
- Seeds adapted to local conditions (vigorous seed exchange)
- Focus on local markets and community based rural-urban networks
- Diverse market structures (CSA, farmers market, direct marketing, links to supermarkets, etc.)
- Link to local processing
- Secure land tenure, water rights, intellectual property right for farmers
- Protection from dumping