

# Agroecology: Foundations for a new agriculture to feed the world

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# Challenges facing the agriculture of the XXI Century

- De-coupling agriculture from dependence on petroleum
- Developing climate change resilient agroecosystems
- Nurturing a biodiverse and self-sustaining agriculture: breaking high input monocultures
- Farming for food sovereignty
- Taking back the food system from corporate control

# The emergence of agroecology

- Agroecology emerged as an approach to **apply ecological concepts and principles for the design of sustainable agricultural systems as an alternative to input intensive conventional agriculture**, especially the **Green Revolution** which did not benefit resource-poor farmers.
- Agroecology lends itself to a more participatory approach to combat rural poverty and to conserve and regenerate the deteriorated resource base of small farms.



**FINAL REPORT** *for the*  
**International Symposium on Agroecology**  
**for Food Security and Nutrition**

18 and 19 September 2014, Rome, Italy



"Is it Possible to Reduce World Hunger and Protect the Environment?"



# The evidence in favor of agroecology

- A growing number of reports suggest **significant potential social and environmental gains** from transitioning toward agroecological agriculture as a way to nourishing current and future populations sustainably.
- (Pretty, Altieri, DeSchutter, IASTAD, IPES, FAO, etc.)

# Evidence.....

- Millions of farmers **have adopted and spread agroecology** through **horizontal exchanges** of information and practices, significantly improving their livelihoods and global food security
- Such initiatives **were implemented with less than 10% of the funding devoted** to the 15 international research centers of the **CGIAR**, with **more tangible positive impacts on crop yields, resource conservation and food security.**

# Peasants and world food

**Produce 50-75% of food consumed by world population, but use :**

- **25- 30% of the agricultural land**
- **30% water used in agriculture**
- **20 % fossil fuels used in agriculture.**

**WITHOUT USE OF AGROCHEMICALS,  
MECANZIZATION OR TRANSGENIC CROPS**

# Why agroecology does not widely spread?

A common criticism of agroecology is that **if it has such great potential** to address the multiple challenges facing agriculture, **why it is not adopted more widely by farmers ?**

# *Myths about agroecology*

- **Myth 1:** agroecology is opposed to science and innovation
- **Myth 2:** agroecology cannot be scaled up
- **Myth 3:** agroecology is subsistence oriented and incompatible with markets
- **Myth 4:** agroecology is low yielding and cannot feed the world
- **Myth 5:** agroecology is only for small scale poor famers



# Barriers to the spread of agroecology

- Lack of an **enabling policy environment**
- Lack of **right incentives** for farmers
- Absence of **special markets**
- Little **funding available for research and extension**
- Low number of **trained professionals and farmers**, etc.

# The real barrier

- The real lock-in' preventing a transition to agroecology lies in **the control of food systems, seeds, technologies, information outlets**
- as well as **research agendas** in public national and international research systems by what has been termed the corporate food regime.

# Market concentration in multiple sectors

- 3 companies control 60% of commercial seed market.
- 7 companies control majority of fertilizer sales.
- 3 companies share 71% of agrochemical market.
- 4 firms account for 97% of private R&D in poultry.
- 4 firms control up to 90% of the global grain trade.

# The agricultural challenge for the next decades

Food production needs to increase sustainably but using the same arable land base, with less petroleum, less water and nitrogen, within a scenario of climate change, social unrest and financial crisis.

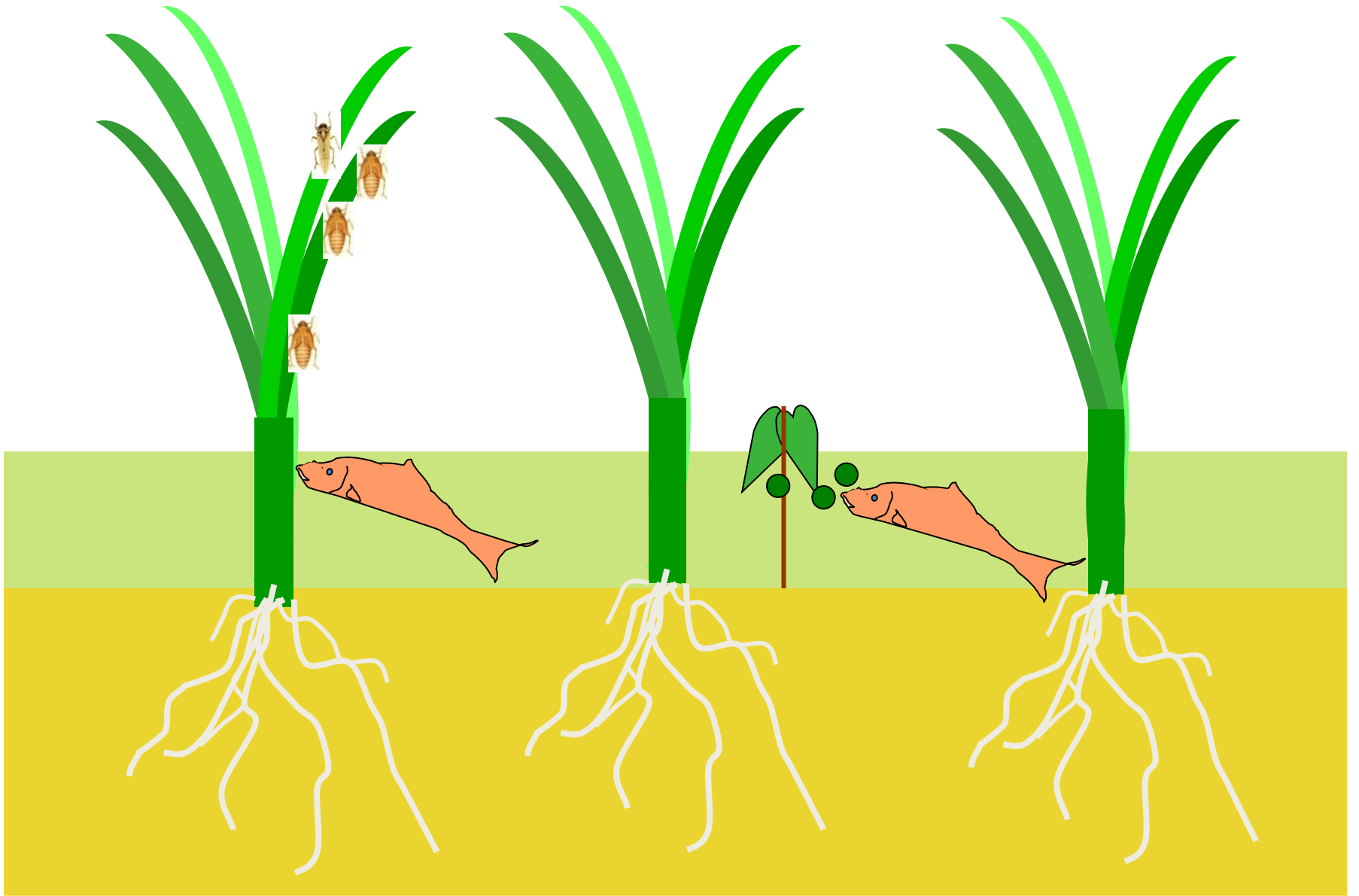
**This challenge cannot be met with the existing industrial agricultural model and its biotechnological derivations**







**China Rice Fish**

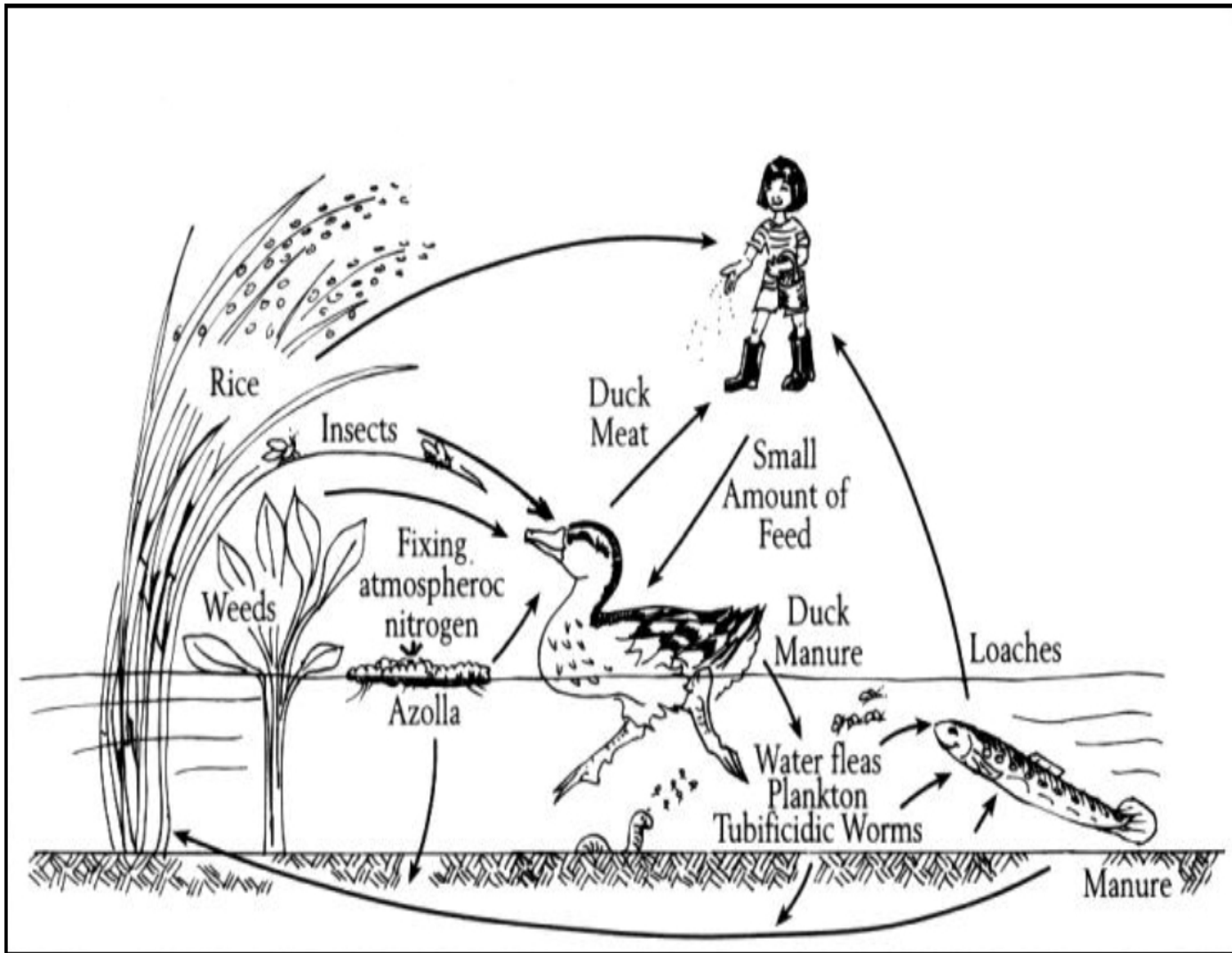






## 4. Rice-duck Co-culture System



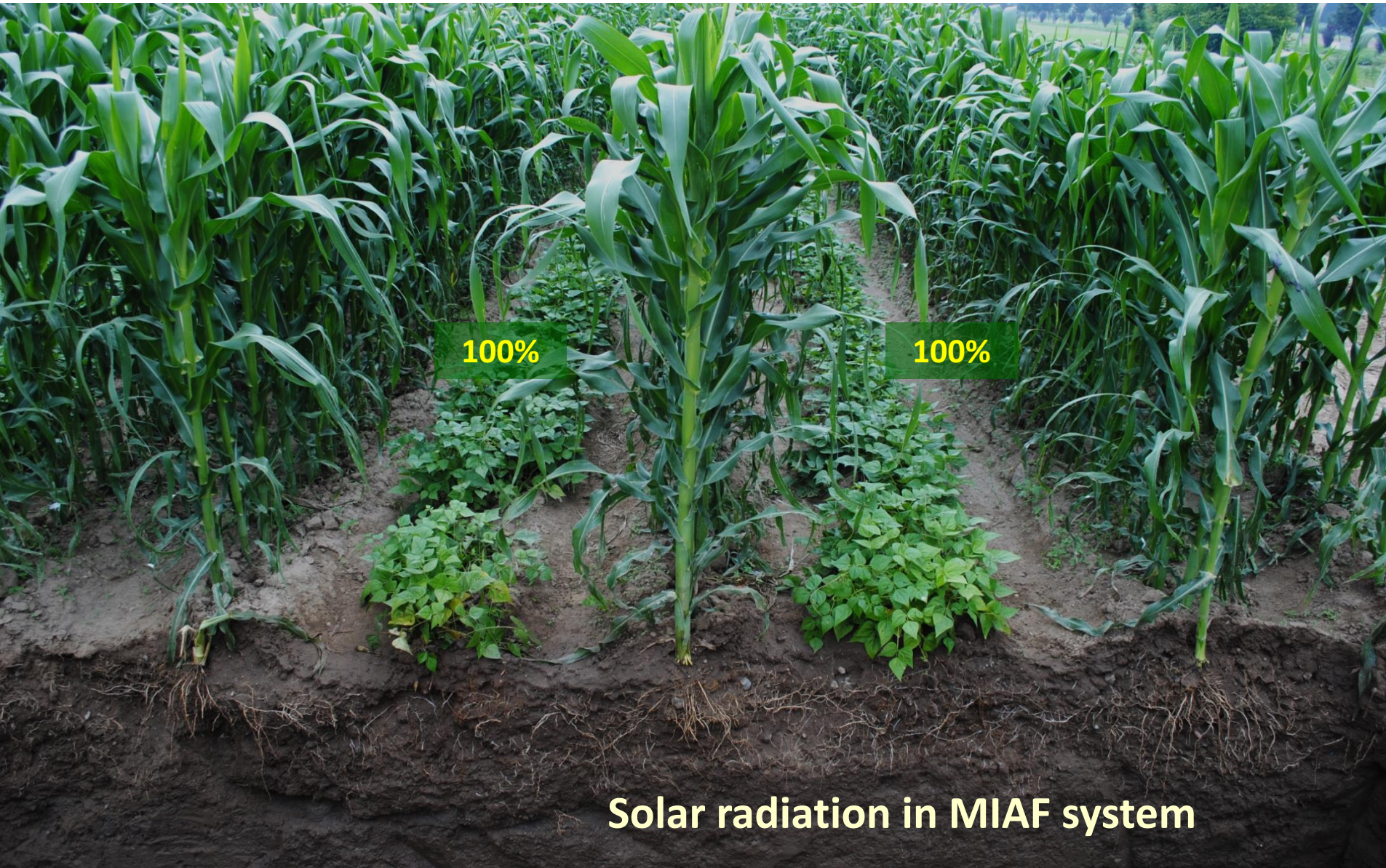


# LA MILPA: corn, beans, squash and chiles





Policultivos desarrollados por pequeños agricultores, la productividad en términos de productos cosechables por unidad de superficie es mayor que en el monocultivo



# Land Equivalent Ratio

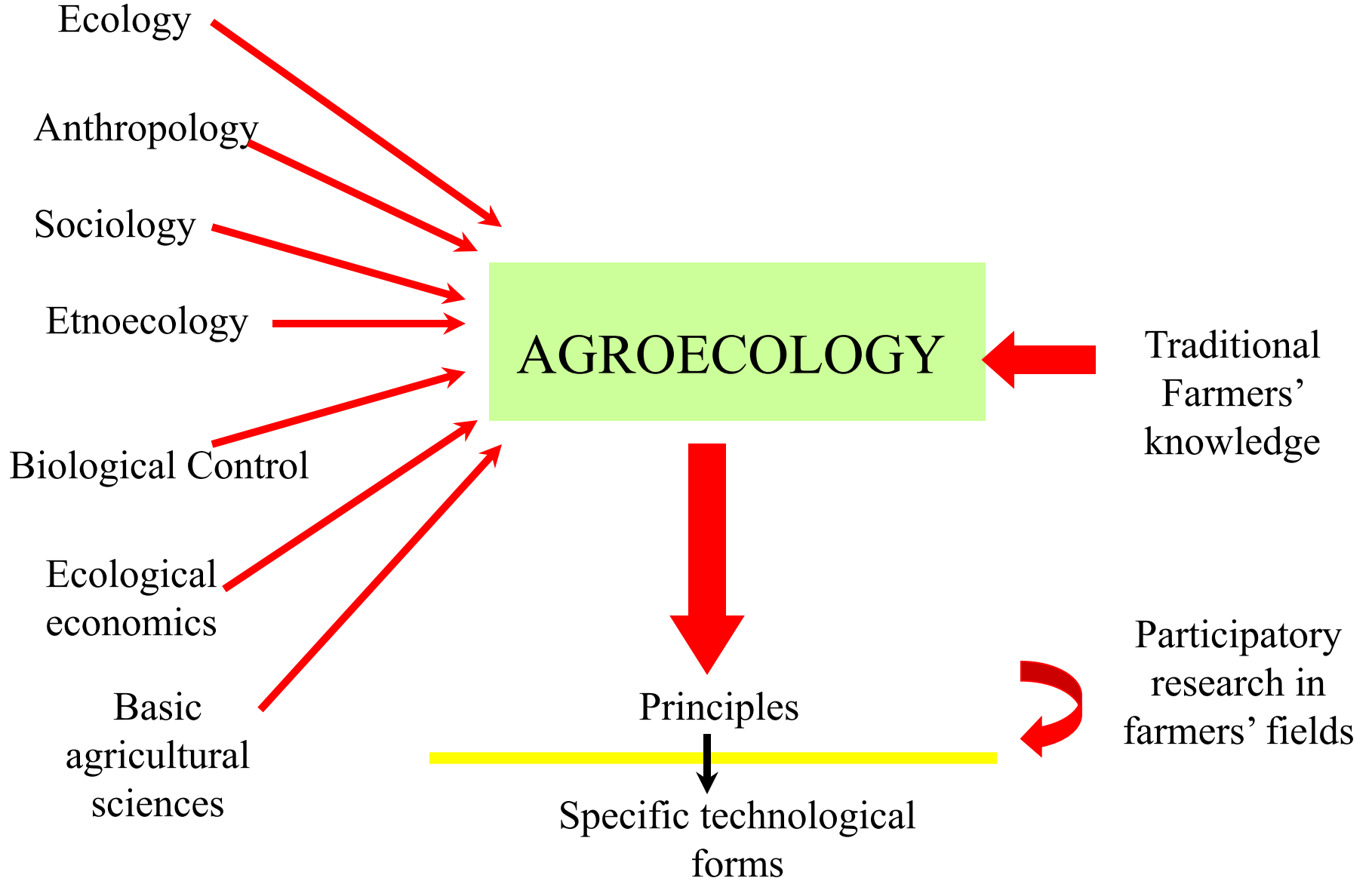
**0.5 + 0.5 is  
expected just  
based on land  
area**

**1.5 ha of land needed  
to produce same  
amount through  
monoculture**

$$\text{LER} = \frac{3000}{4000} + \frac{750}{1000} = 0.75 + 0.75 = 1.50$$

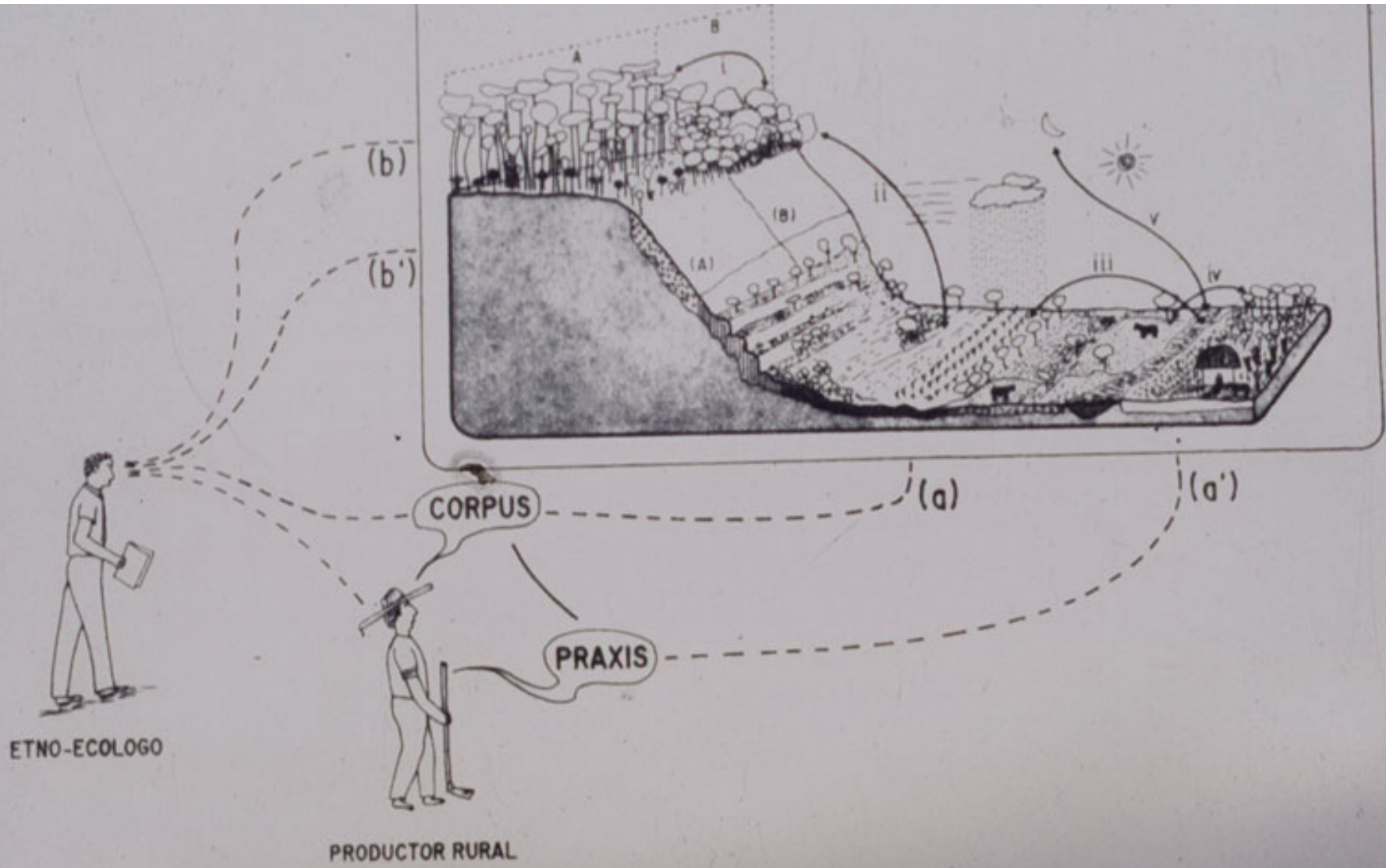
Corn

Soybean





# Restoring traditional systems





Water in the canals absorbs the sun's heat by day and radiates it back by night, helping protect crops against frost. The more fields cultivated this way, the bigger the effect on the microenvironment.

The platforms are generally 13 to 33 feet wide, 33 to 330 feet long, and about 3 feet high, built with soil dug from canals of similar size and depth.

Sediment in the canals, nitrogen-rich algae, and plant and animal remains provide fertilizer for crops. In an experiment, potato yields outstripped those from chemically fertilized fields.



# WARU-WARUS Cuzco-Puno, Peru



# Yield impacts of Waru Warus

- In Huatta reconstructed raised fields produced impressive harvests, exhibiting a **sustained potato yield of 8–14 t/ha a year**. These figures contrast favorably with the average potato yields in Puno of 1–4 t/ha a year.
- In Camjata the potato fields reached 13 t/ha a year and quinoa yields reached an acceptable level of 2 t/ha a year



# Impacts in Cajamarca

- ◆ An effort led by NGOs and peasant communities over ten years more than 550,000 trees were planted and about 850 hectares of terraces and 173 hectares of drainage and infiltration canals were reconstructed.
- ◆ The end result were about **1124 hectares of restored terraces, benefiting 1247 families.** Potato yields went from 5 t/ha to 8 t/ha and oca yields jumped from 3 t/ha to 8 t/ha.

**Seizing  
opportunities from  
crisis**



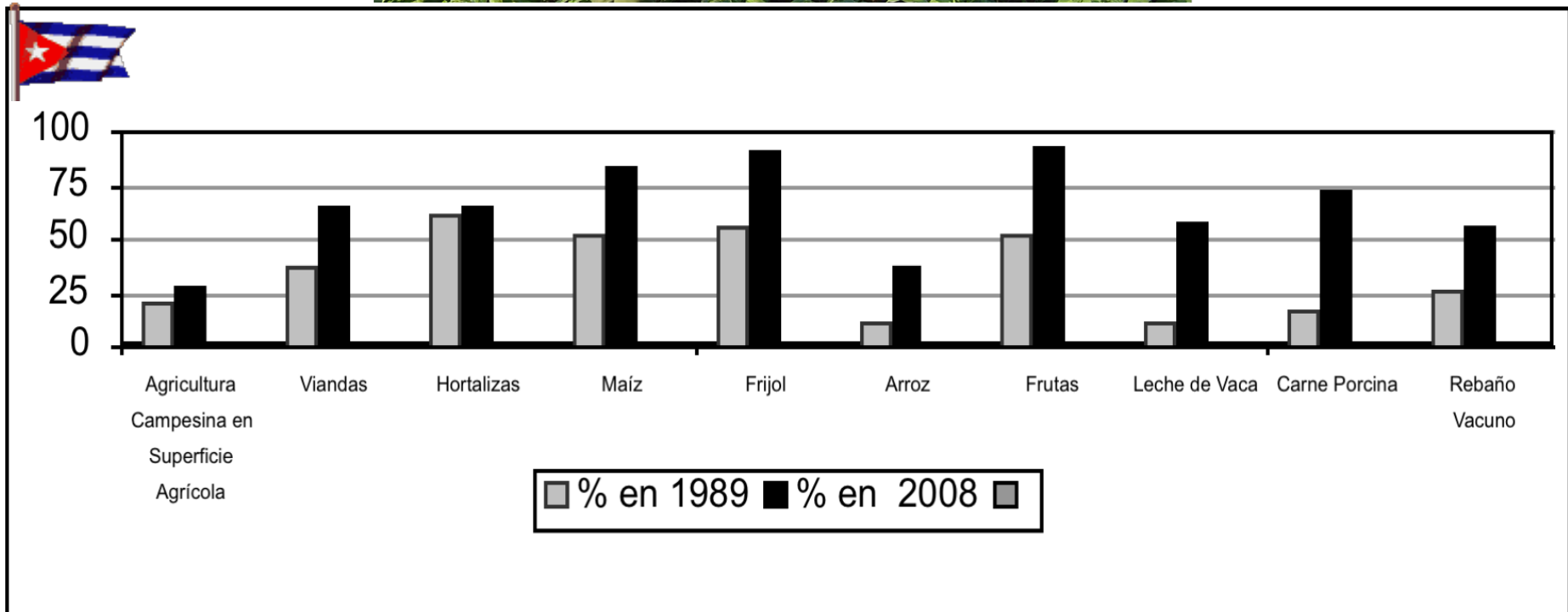
# Cuba: losses of major agricultural inputs after the dissolution of the Soviet Union

Input	1989 imports	1992 imports	Reduction %
Petroleum (Mt)	13.0	6.1	53
Fertilisers (Mt)	1.3	0.3	77
Pesticides (US\$)	80.0	30.0	63
Animal feeds (Mt)	1.6	0.5	72

Source: Rosset & Benjamin, 1993



# Percentage contribution of peasant agriculture to total national production in various crops before and after crisis



# Agroecological strategies

```
graph TD; A[Agroecological strategies] <--> B[Polycultures]; A <--> C[Animal integration]; A <--> D[Rotations]; A <--> E[Green manures]; A <--> F[Organic amendments];
```

**Polycultures**

**Animal integration**

**Rotations**

**Green manures**

**Organic amendments**

# Agroecological strategies



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**Polycultures**

**Animal integration**

**Rotations**

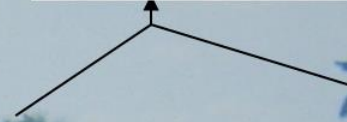
**Green manures**

**Organic amendments**

ANTES



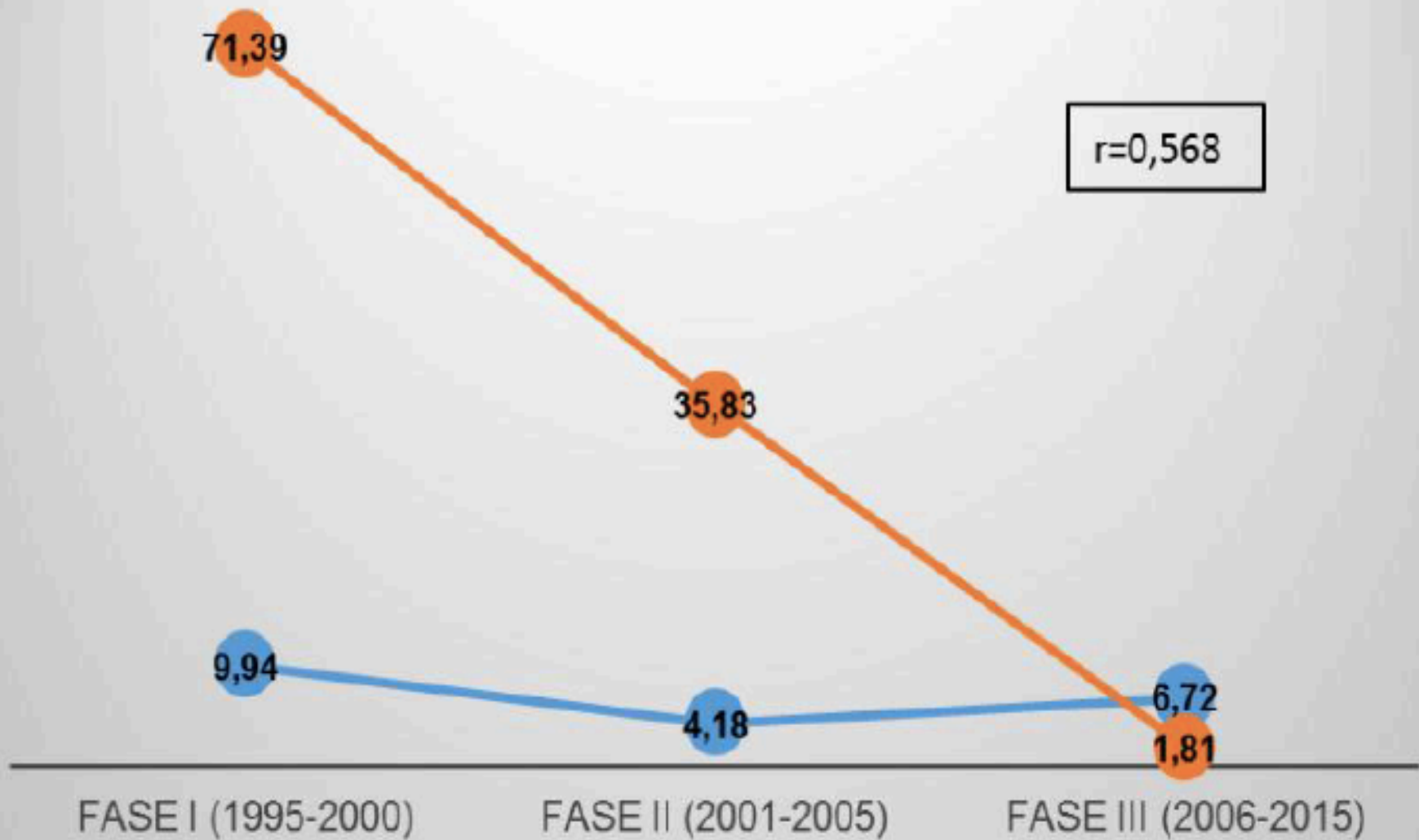
Reference



**DESPUES**

Reference





● Rendimiento de la producción, t/ha/año.  
● Índice de dependencia externa, %.

Area (ha)	10
Energy (GJ/ha/año)	50.6
Proteín (kg/ha)/año	867
People fed by produced energy (Pers/ha/año)	11
People fed by produced protein (Pers/ha/año)	34
Energy efficiency	30



**Campefino a**

**Campefino:**

**spreading**

**knoweldege at the**

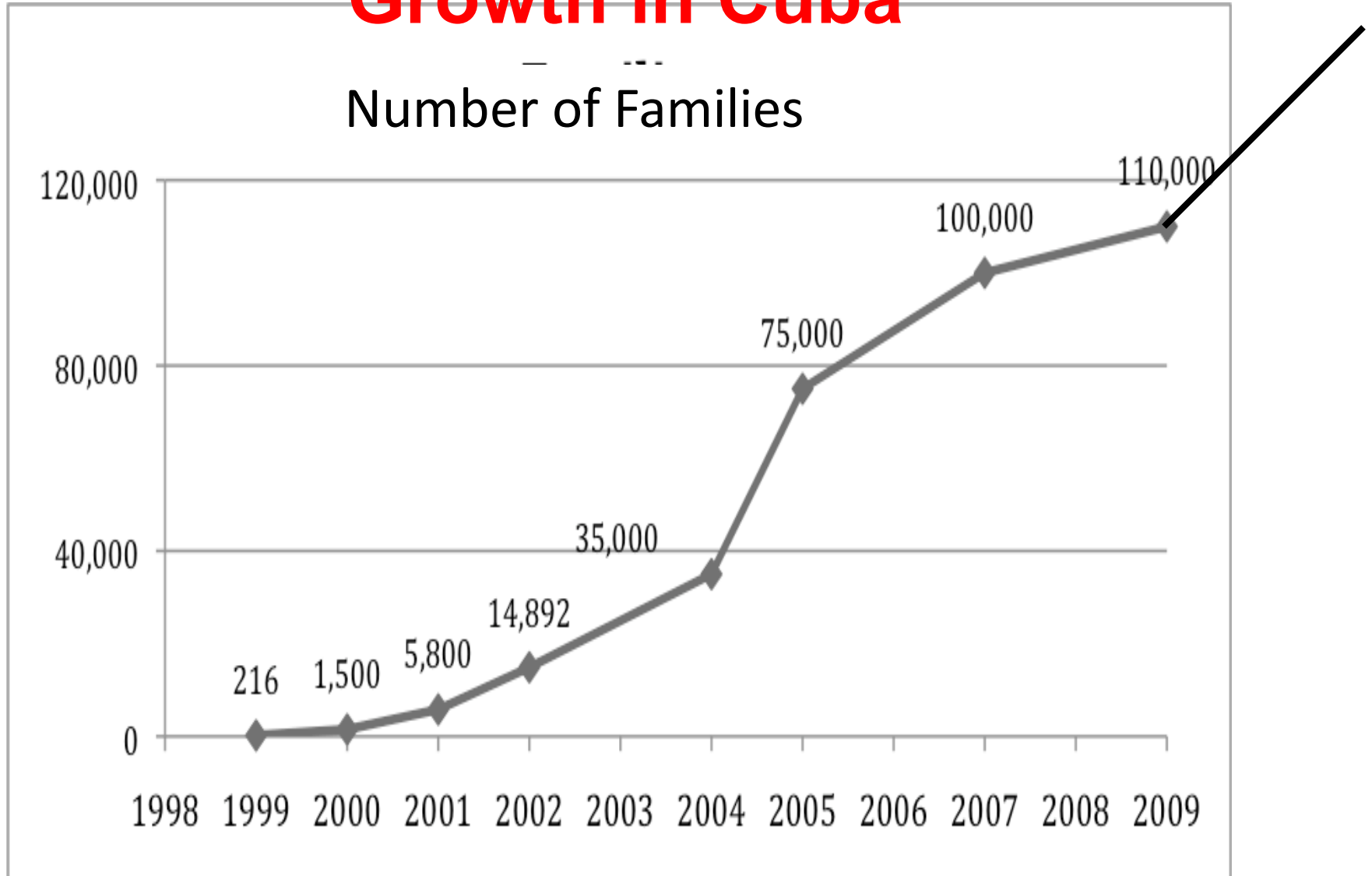
**grasroots**

# The Campesino a Campesino Movement

- The Campesino a Campesino movement is an **extensive grassroots movement** in Central America and Mexico.
- It is a cultural phenomenon, a broad-based movement with **campesinos as the main actors**"
- The Campesino a Campesino movement is an excellent **example of how alternative technologies and practices can be disseminated** bypassing "official channels".



# Campesino a Campesino movement Growth in Cuba



**Campesino a Campesino** Es un fenómeno cultural , un movimiento de amplia base con los campesinos como los principales actores "





# Velvetbean in Central America

- Mucuna fixes 150 Kg N/ha/year, produces 30-50 tonnes of biomass/ha/yr
- 45,000 families growing Mucuna
- crop yields up from 400-600 Kg/ha to 2000-2500 kg/ha while conserving/regenerating soil in hillsides

# Campesino a Campesino

- In response to **hierarchical information systems**, peasant innovation networks, such as campesino a campesino movements (M CaC), have developed and **spread farming knowledge** for over 30 years by empowering farmers through equal exchanges.
- MCaC- allowed producers to **exchange information and share research** within their ecosystems and often beyond.
- **Small farmers have improved and adapted their practices in response to a changing environment**, drawing from local knowledge and biodiversity to generate innovation without the use of Big Data.

# Recuperating and reconfiguring agroecological territories





# MIXTECA ALTA, MEXICO



# Ecological restoration by farmers Mixteca alta, Mexico



# Ecological restoration by farmers Mixteca alta, Mexico



1992



2001



2014



2016



Ecological restoration Comunidad campesina vereda Bellavista-Colombia

Source: CAMPAB



# Impacts of the restoration effort in Comunidad Bellavista-Colombia



- **75% recovery** of forest cover
- **Forest fragments connected**
- **Water conservation** and rational use (available for families- increase from **25 to 75** families)
- Improved **water quality** (no sedimentation)
- **Diversification of production systems** -**70% reduction** in use of external inputs)
- **Food security** (families produce 90% of what they consume)
- **Community cohesion, participation of women and young people**



# Farm: Pinzacuá, Alcalá, Valle del Cauca-Colombia

## Changes in land use 2003 – 2007 (source: Alicia Calle-2017)



2003

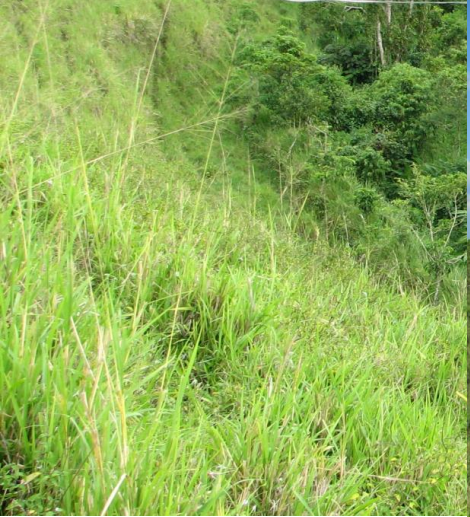


2007

Proyecto Regional Enfoques Silvopastoriles Integrados para el Manejo de Ecosistemas



# Ecological restoration Finca Pinzacua-Colombia (source: Alicia Calle-2017)



# Ecological restoration Finca Pinzacua-Colombia (source: Alicia Calle-2017)





# Agroecology and the re-peasantization

- By revitalizing small farms agroecology **moves peasants to autonomy from inputs and markets, and out of debt**
- By **recovering, reconfiguring and restoring territories away from agribusiness** via land reform, occupations and other mechanisms
- By adopting agroecology in wide areas by thousands of peasants

# Agroecology and social movements

- Today agroecology has been taken by rural social movements and is seen as a transformative science and movement explicitly committed to a more just and sustainable future by reshaping power relations from farm to table.

# Declaration of LVC Mali 2015

- We see agroecology as a key form of resistance to an economic system that puts profit before life.
- Agroecology within a food sovereignty framework offers us a collective path forward from the multiple crises of climate, food, environmental, public health promoted by the industrial food system

# The pillars of food sovereignty

Protección contra Dumping

Agroecological strategies

Land reform

Access to land, water  
seeds

Social  
movements

State support

Markets. Credit, extension  
Research, etc.

# **Legal initiatives fostering agroecology in Latin America**

- **Ecuador: Ley organica de Agrobiodiversidad, Semillas y Agroecologia**
- **Bolivia: Revolución Productiva Comunitaria Agropecuaria para la soberanía alimentaria**
- **Guatemala (2005)-Ley de Seguridad alimentaria y nutricion**
- **Brazil-Plan Nacional de Agroecologia y Agricultura Organica (2013)**
- **Venezuela (2008)-Articulo 8 soberania alimentaria**
- **Nicaragua : Ley de Fomento de la Produccion Agroecologica y Organica**

# Fome Zero (Zero Hunger + Agrarian Dev)

## *Agricultural Credit*

- New settlers, women, value-added and processing

## *Public Procurement: PAA*

- Guaranteed markets for small scale production
- Donated to schools, hospitals, food banks

## *School Lunch Program: PNAE*

- 30% must be produced from small-scale farmers
- ~2000 municipalities are participating
- 45 million students/day





# Alternative food systems

- Some of the most promising initiatives include **short food supply chains, direct marketing schemes, cooperative marketing and purchasing structures**
- local exchange schemes (e.g. **farmers' markets, sustainable local public procurement, community and school gardens, CSAs, and seed-saving and machinery cooperatives**).





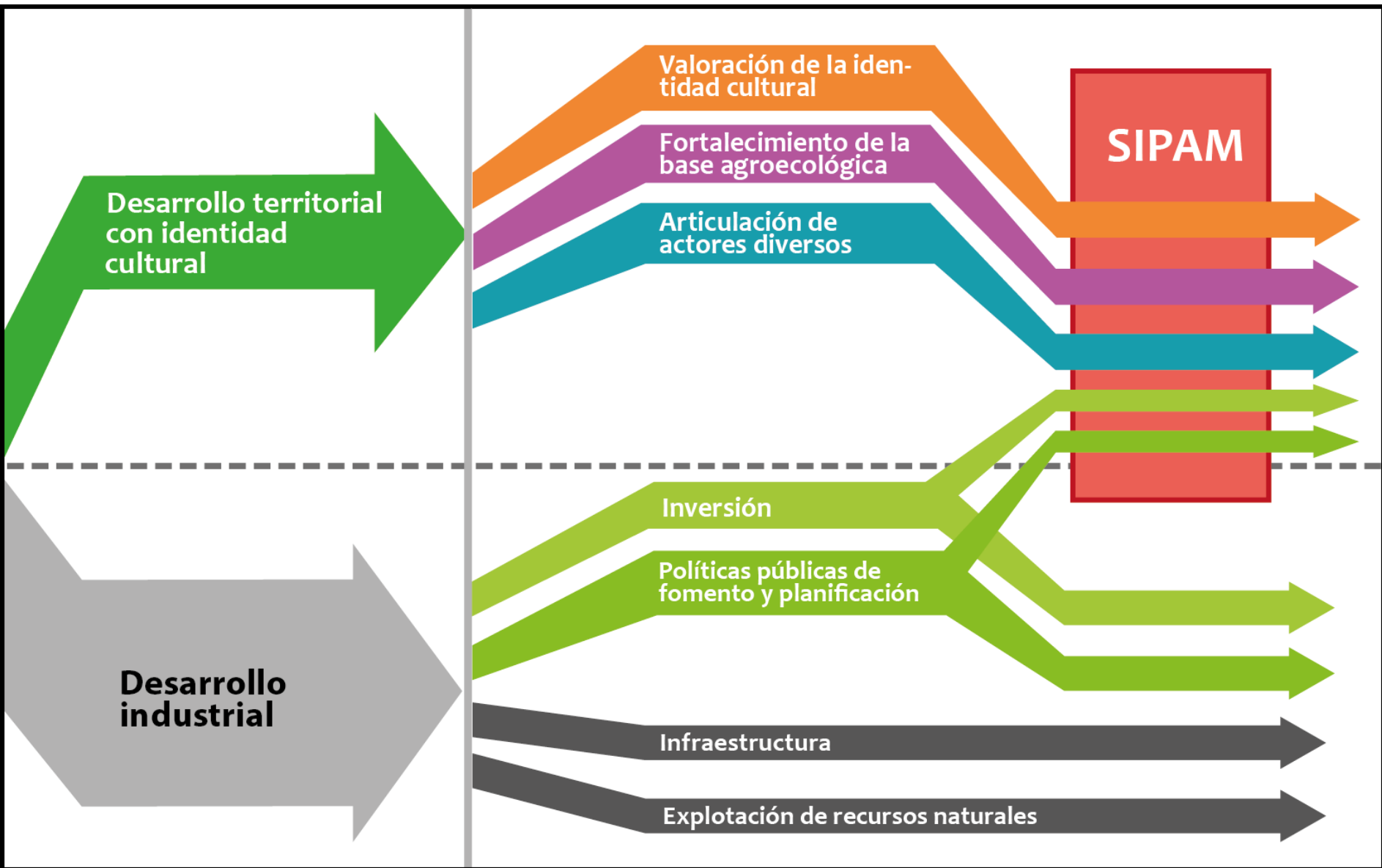
# Alternative food systems cont.

- local exchange systems, local markets, and on-farm direct consumption - often based around principles of food sovereignty and local community empowerment
- producer and consumer cooperatives, local credit associations, collective kitchens, organizations to support marginalized economic actors (e.g. landless workers), and **truly fair trade schemes**

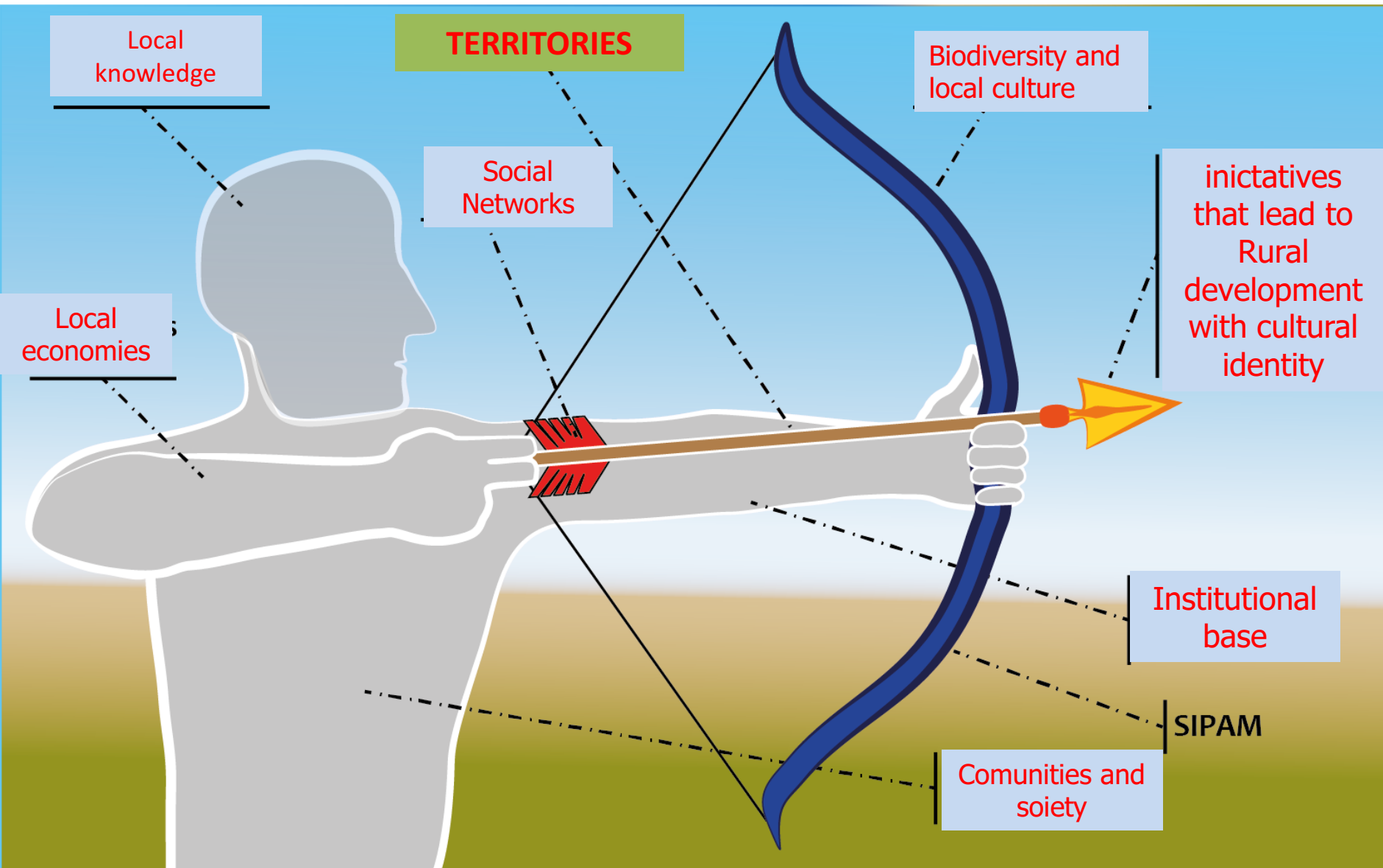


# Antioquia Colombia





# Sustainable Rural Development: crystallizes at the local level



# Scaling-up agroecology is possible but will require positive actions

- Agroecology has already reached millions of farmers and millions of ha (hectares) in Africa, Asia and the Americas.
- Scaling it up will require long-term efforts, essentially needed for:
  - supporting **farmer-to-farmer networks**;
  - funding **research and education at various levels**
  - providing an **enabling public policy environment**;
  - taking specific actions for **empowering women**;
  - making **strategic alliances with social movements**

**Consumers acting in solidarity**  
**(eating is a political and ecological act)**

# Drivers of agroecological massification

1. Existence of a **crisis** that drives the search for alternatives,
2. **Social organization**, organization and social fabric are the growth media on which agroecology advances
3. **Networks** for sharing experiences and knowledge
4. Effective **agroecological practices**,
5. Mobilizing discourses (**leaders**),
6. External **allies** (NGOs, researchers, consumers),
7. Favorable **markets** (alternative food networks),
8. Favorable **policies** (subject to political will)

A close-up photograph showing several hands holding multiple ears of corn. The corn cobs are in various stages of ripeness, with some showing yellow and others reddish-orange kernels. A vibrant, multi-colored striped fabric, likely a traditional textile, is draped across the scene. A semi-transparent yellow rectangular box is centered over the image, containing the text "Thank you!!" in a white, bold, sans-serif font.

**Thank you!!**