

Crop-livestock integration through no-tillage on cover-crop in Vietnam

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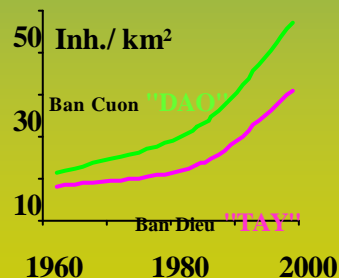
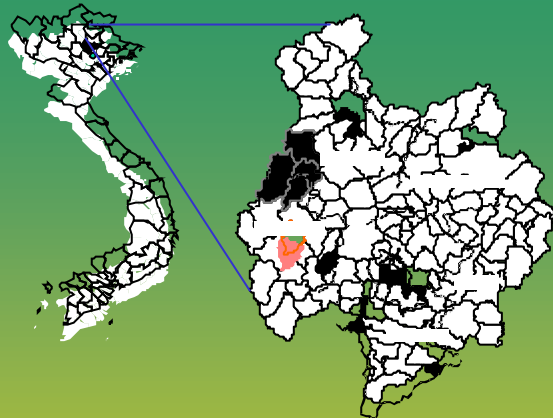
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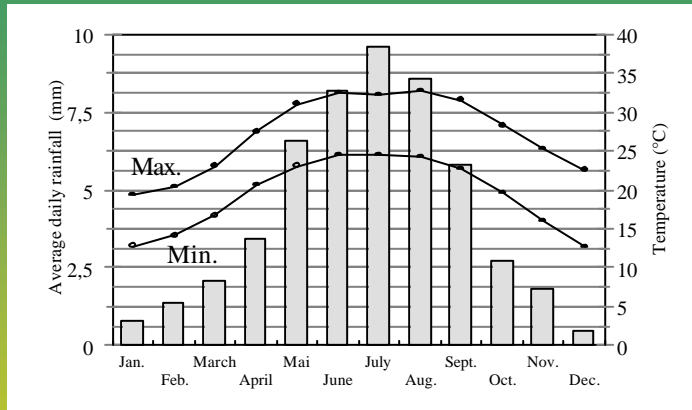


Context

- Northern Viet Nam
- 50 inh./km²: “empty”
- Farm size: 2-3 ha
- Increasing population
- Various ethnic groups



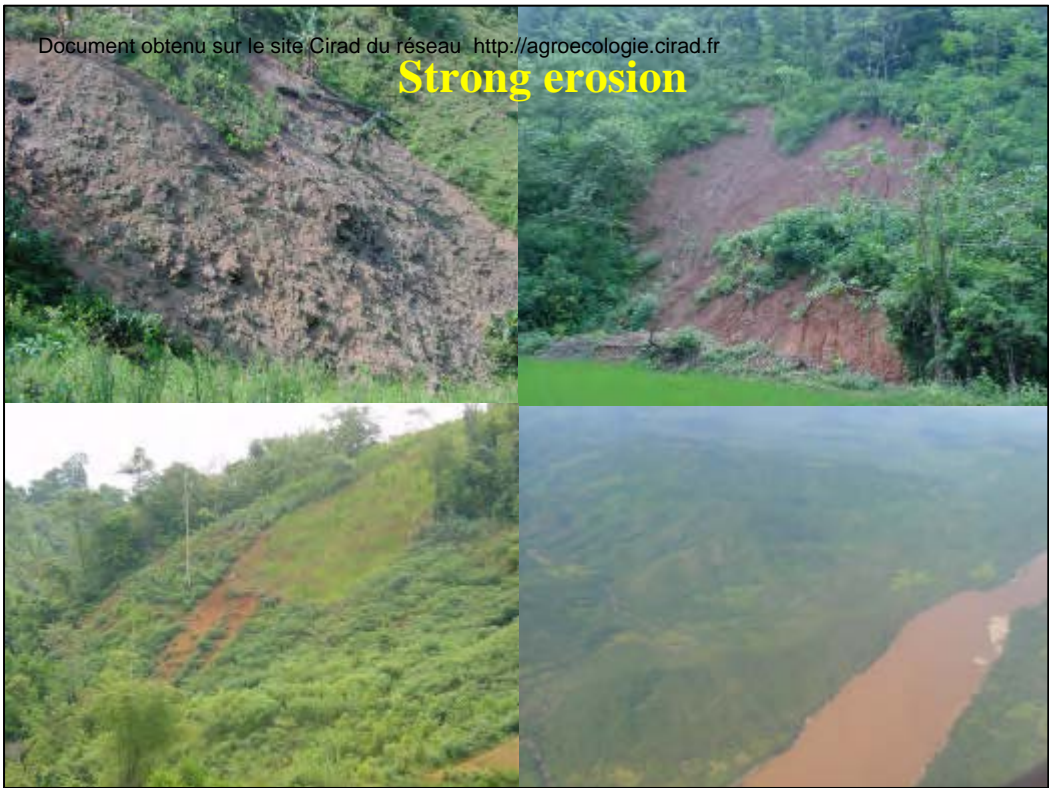
Sub-tropical climate



Average: 1 800 mm/year, high variability in space and time
Hot rainy season : April to September
Cold dry season: October to March



Strong erosion



Context

- **Mountainous area (remoteness, no access to market or information, low investment capacity, etc.)**
- **De-collectivisation**
- **Land tenure reforms**

==> Fast changes in production systems

Agricultural systems

- Irrigated rice in lowlands (Tay)
- Maize (Tay)
- Rice and cassava in upland (Dao)



Fast changes in production systems

Return to slash and burn



Cattle raising

Free grazing

Market (meat, not milk)

Traction



The crisis

- Poor performances (crops and animals)
- Mining of the environment
- Vicious cercle of soil degradation and declining yields

No longer sustainable under the present situation

SAM (Mountainous Agrarian Systems) Project VASI/CIRAD/IRD/IRRI

**Initial objective (1998):
Finding alternatives to slash-and-burn systems
in order to stop de-forestation**

**The only hope relied in adaptation of CA
(DPPSC) to the difficult environment of
mountainous areas (1999)**

Competition crop/livestock

**Destruction of crops by animals
Competition for limited natural resources**

**Free grazing
Forage/mulch**

**A real revolution
Need of an important work at all scales
From competition to integration crops/livestock**

Finding technical solutions at field level

Developing sustainable and profitable cropping systems



Finding technical solutions at field level

Developing sustainable and profitable cropping systems

Simple mulching: risk on steep slope



Finding technical solutions at field level

Developing sustainable and profitable cropping systems



Producing mulch in the field: crop residues or cover crop

Finding technical solutions at field level

Developing sustainable and profitable cropping systems



Maize and Arachis pintoï

Maize and Brachiaria ruziziensis

Living mulch. Miniteraces

Finding technical solutions at field level



Soil regeneration by plants

Growing in difficult conditions
High biomass production



Finding technical solutions at field level

Soil regeneration by plants

Strong root system



Finding technical solutions at field level

Increasing biomass production and forage quality

Fodder trials (5 plots)

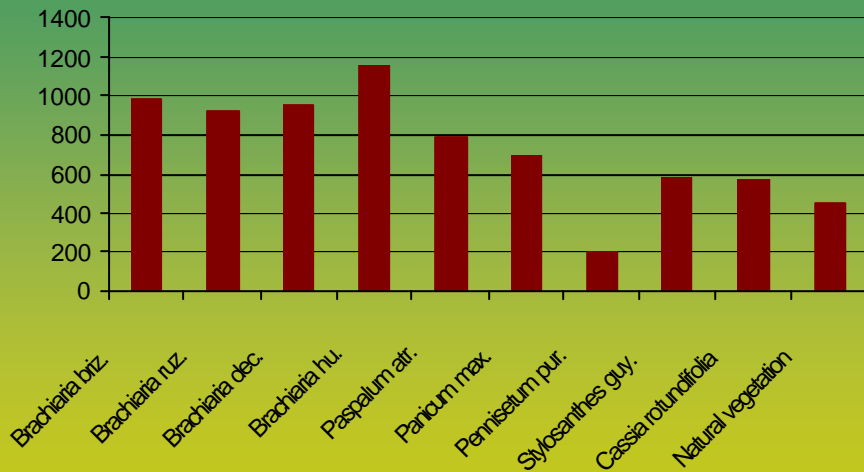
- ▶ 8 grasses & 2 legumes species
- ▶ karstic & ferralitic soils
- ▶ young fallows & degraded meadow
- ▶ with or without fertilisation

cutting interval : 28 days
unit surface : 4 m²
cut at : 5 cm



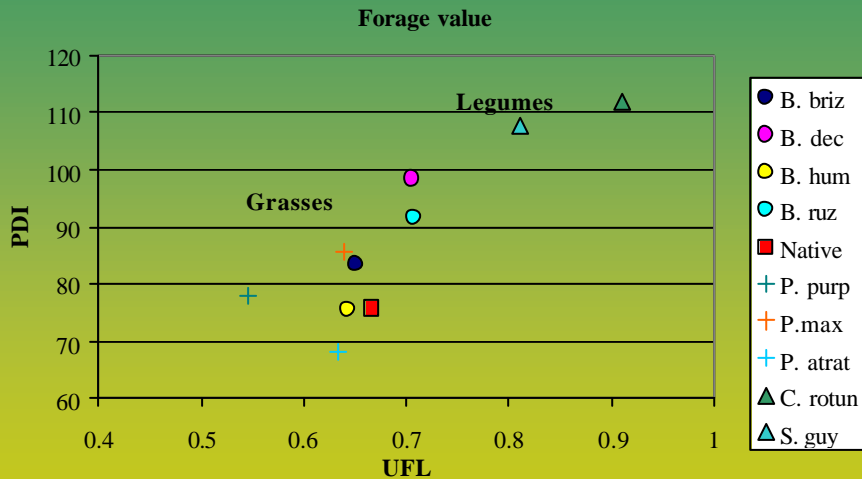
Finding technical solutions at field level

Kg DM/ha/month



Average monthly fodder production from April to October

Finding technical solutions at field level



PDI = Digestible Protein content (g/kg dry fodder) ; UFL = Energy Unit.

Finding technical solutions at field level

3 main systems enabling increase and share of produced biomass:

Perennial systems: Meadows, cover crops in orchards and plantations



Finding technical solutions at field level

3 main systems enabling increase and share of produced biomass:
Perennial systems: Meadows, cover crops in orchards and plantations

Intercropping, associations



Maïs /Arachis pintoï
Miniterraces



Cassava + Stylosanthes guy.

Finding technical solutions at field level

3 main systems enabling increase and share of produced biomass:
Perennial systems: Meadows, cover crops in orchards and plantations

Intercropping, associations

Relay cropping, rotations (use of winter periods)



Brachiaria ruzi. after maize



Oats in paddy fields

Finding technical solutions at field level

Forage conservation



Bana grass on hedgerows

Finding technical solutions at field level

A set of alternatives, including crops and forage production



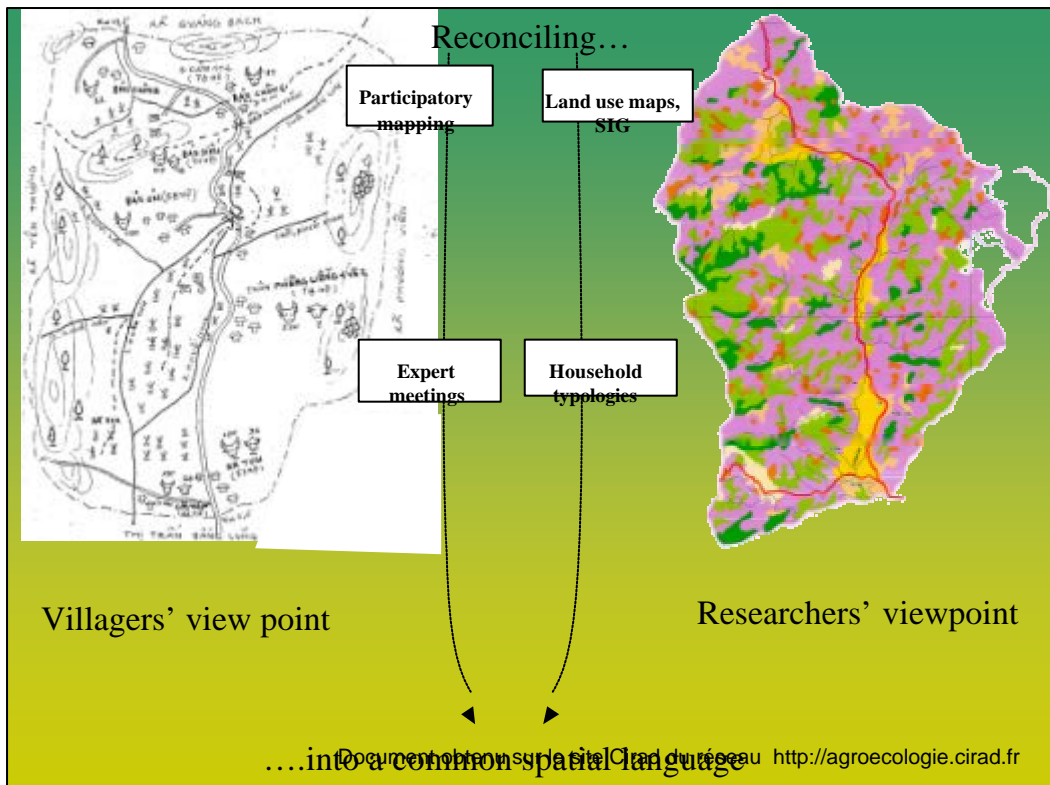
Integrating solutions at farm and village levels

Everyone acts firstly as an individual, according to his own project and strategies

- **Farm typology**
- **Need to jointly design solutions, adapted to farmers' strategy and based on opportunities given by DPPSC**
- **Need a common understanding of the problems**

We rarely perceive fully the impact of the sum of individual behaviors at the scale of a village

- **Need to have a common spatial representation of the territory as tool for awareness raising and mediation**



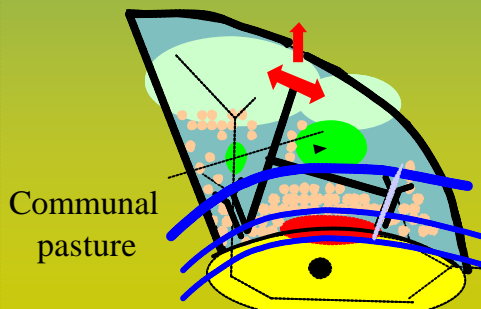
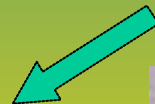
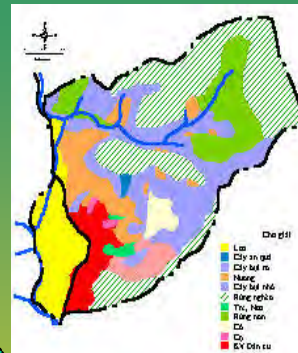
Elevation 3D model



Extracting and representing information



Spatial data transfer



Slopes

Piedmonts

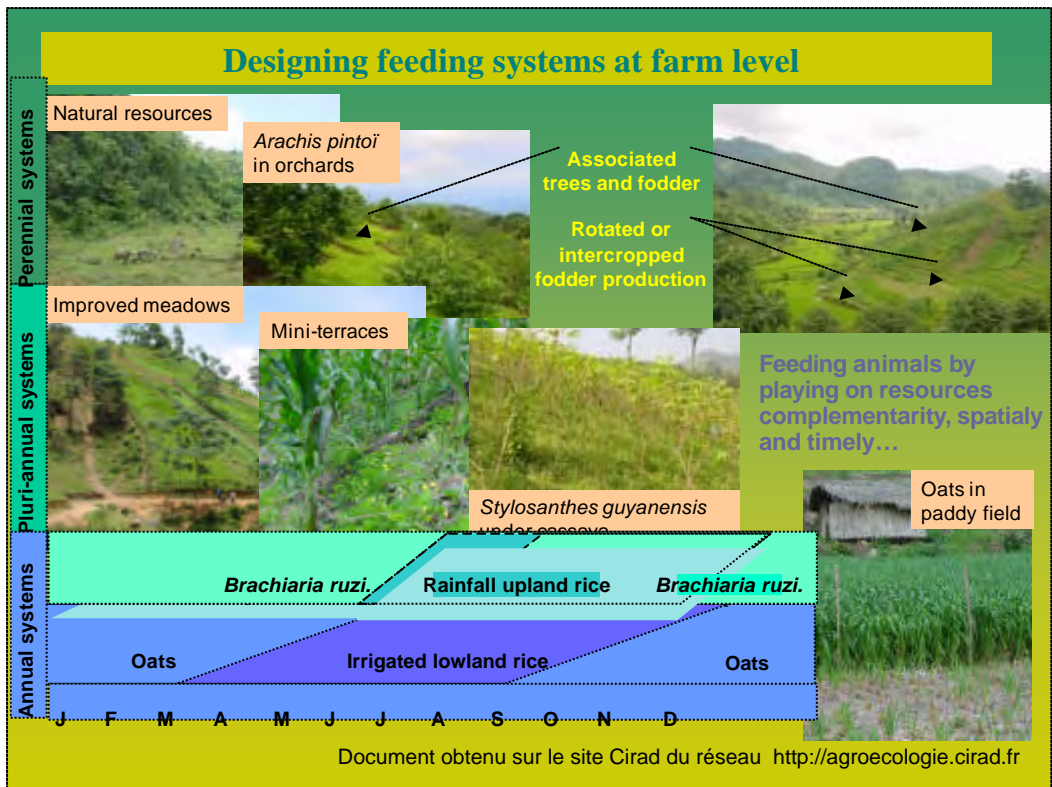
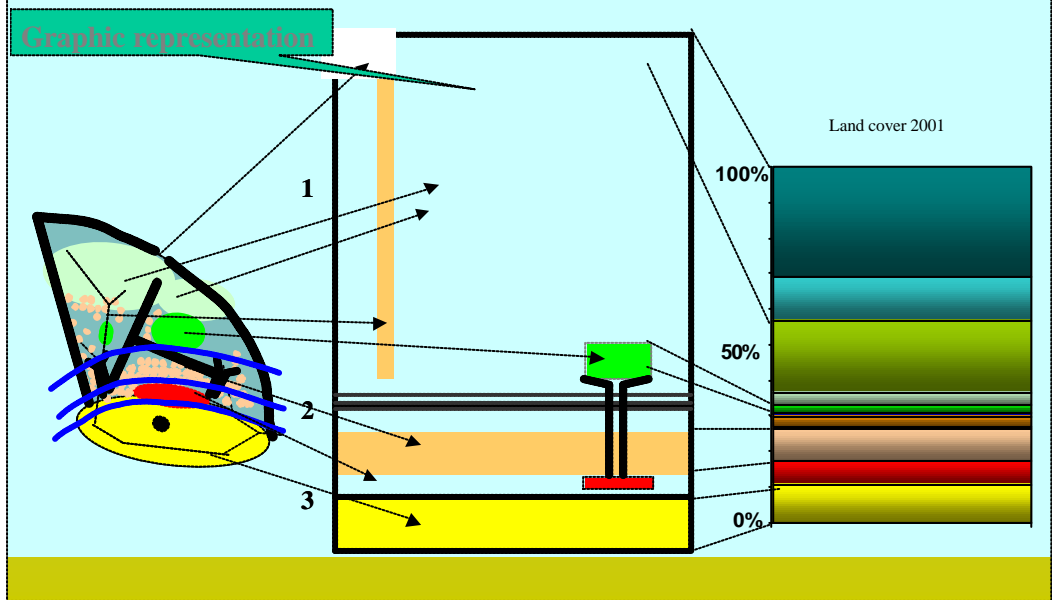
Village & gardens

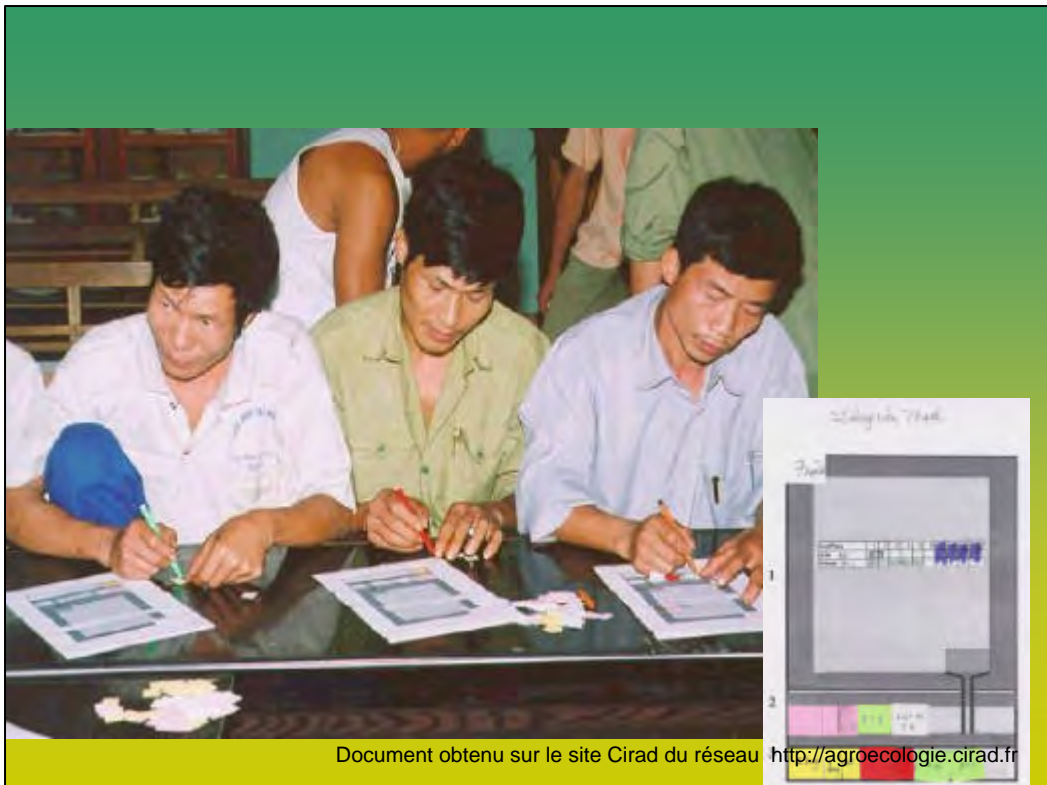
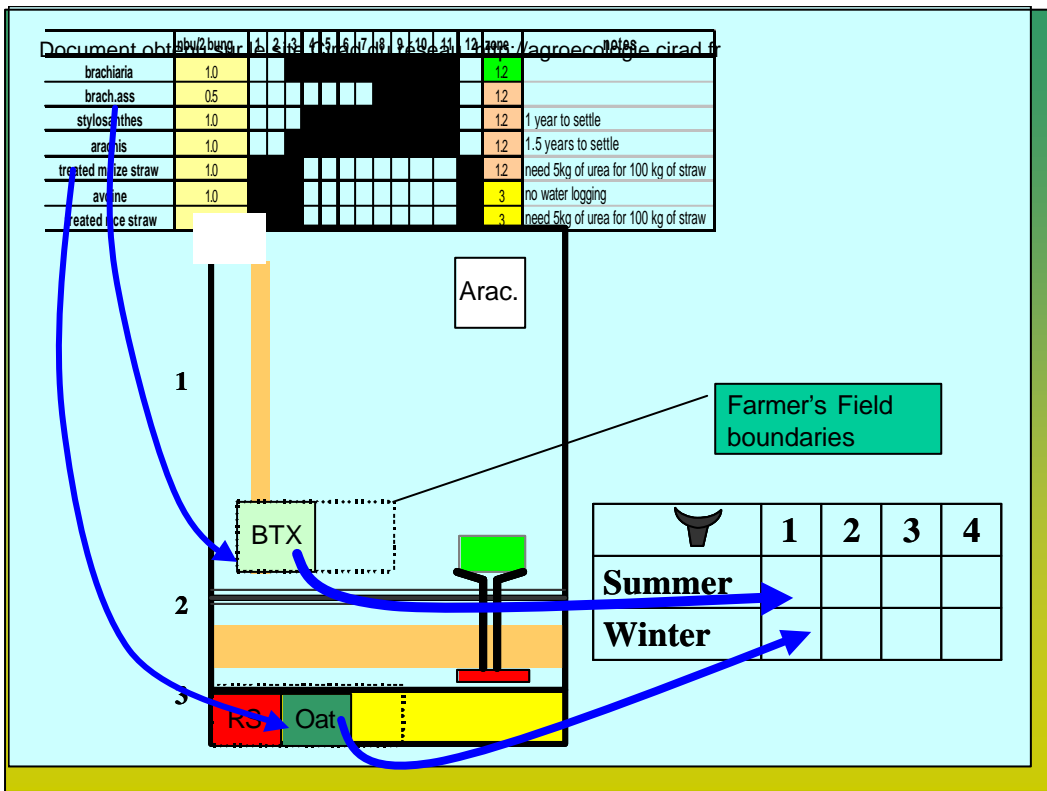
Lowland (rice)



Graphic representation with simple symbols

Simplified quantitative representation Model with compartments





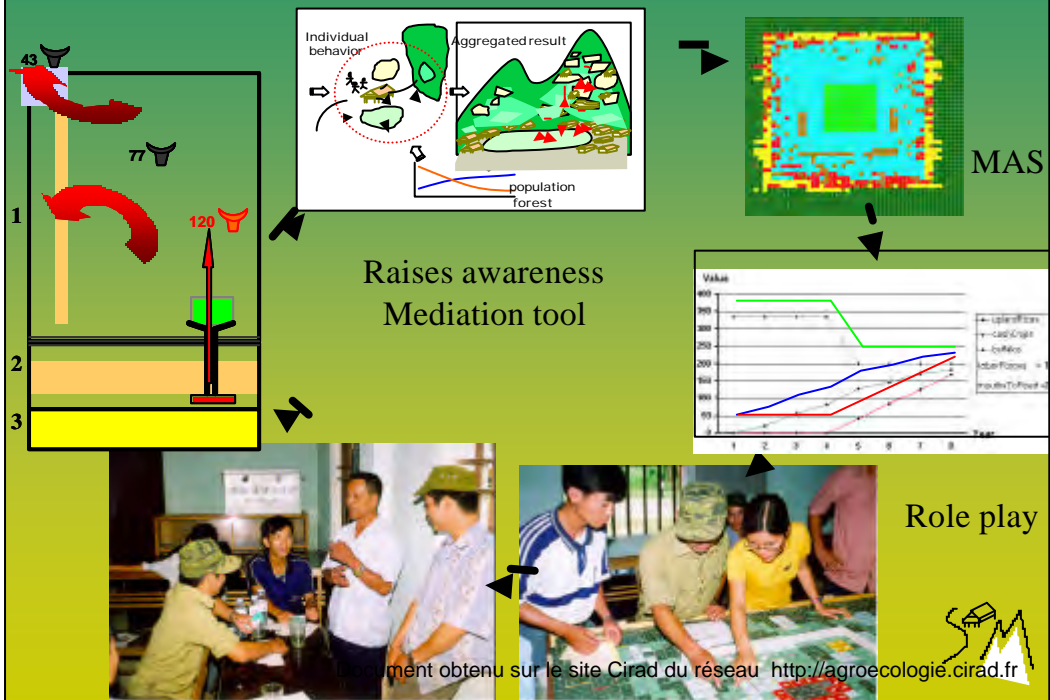
Farmers experiments

Work on management and practices



Fencing or not fencing?

Integrating solutions at village levels




Conclusions

- Technical solutions (even if economically attractive) often are not sufficient
- But necessary: DPPSC brings solutions for integration of animals, crops and trees



Conclusions

- The conflict over the resources sharing between animals and crops became a strength for extension of DPPSC
- For very different situations (South America, Africa, Asia), solutions are based on the same principles. Only the application conditions change. Behind heterogeneity, some universal processes exist. Importance of exchanges and transmission of experiences.



Muito Obrigado!
Xin Cam On!