"Determinants of DMC technologies adoption among smallholders in the Lake Alaotra area, Madagascar"

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Outline

A/ Agrarian context of the lake Alaotra and BVLac project presentation

B/ Evolution of the extension of DMC technologies and first economic results

C/ Highlight on the methodology developed by the project

- **C1/ Territorial approach**
- **C2/ Farming systems approach (technico-economic modeling)**

D/ Conclusion

A/ Agrarian context of the lake Alaotra and BVLac project presentation

Lac Alaotra – localisation

- Located at 250 km North East of Antananarivo, 640 000 inhabitants including 540 000 farmers (85 %)

- With 100 000 ha of cultivated plains, it is considered to be the Madagascar's "rice granary" (300 000 T of paddy rice/year)

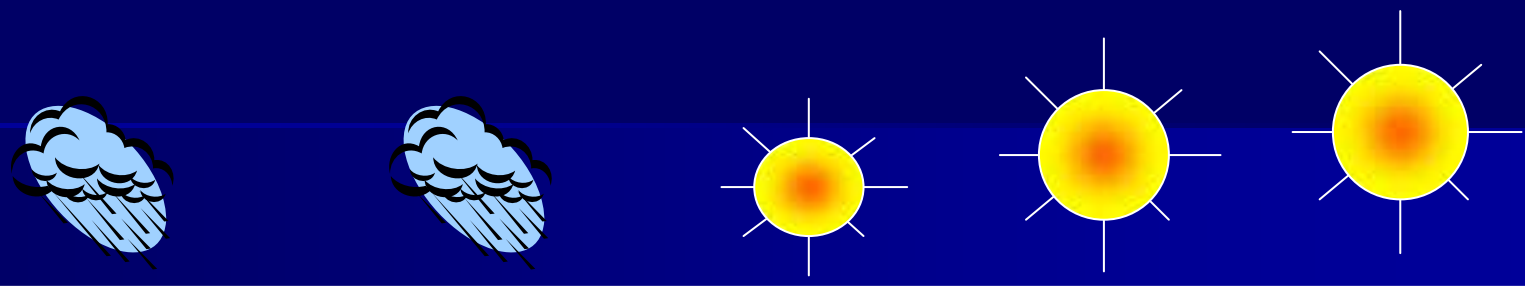
- Important area of migration with a population doubling every two decades ….

- More than 60 % of the rural population is considered as smallholders

A/ Agrarian context

- Plains : 100000 ha, distributed between 30 000 ha of irrigated perimeters and 70 000 ha of rainfed lowlands
- 7000 Km2 of watershed, with marked erosion features
- Saturation of the lowlands / cultivation of the hills has become essential for many farmers…

A/ The main cropping systems on the hills



Nov.	Dec.	Janv.	Fev.	Mars	Avril	Mai	Juin	Juill.	Aout

1/ Upland rice → bare soil

2/ Maize → bare soil

3/ Cassava  **→ monoculture**

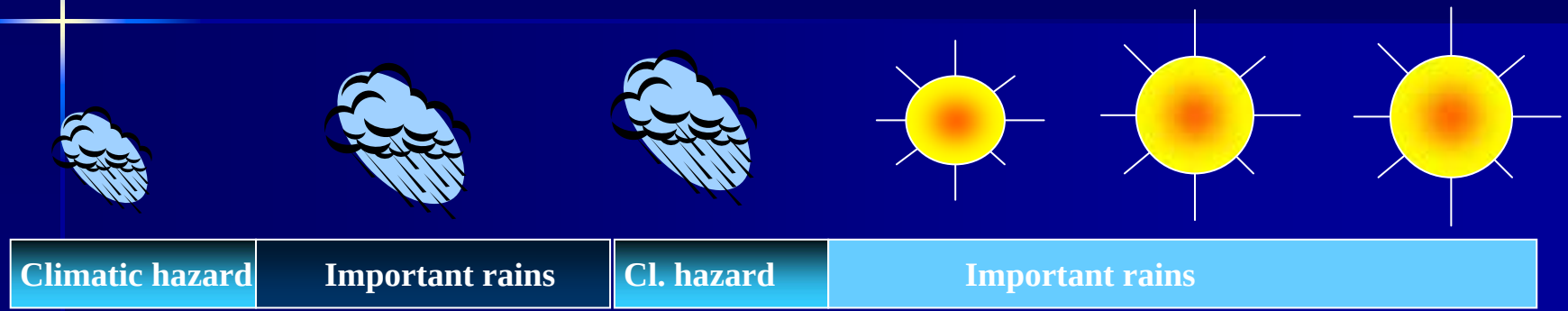
→ High technical and economic randomization + soil degradation

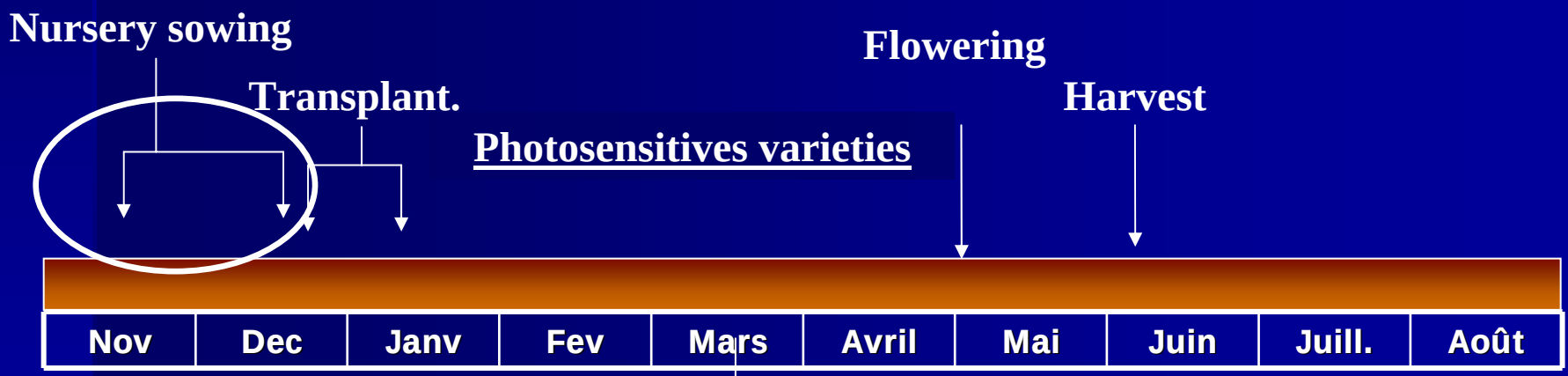
→ Irregular and decreasing profit margins

→ Erosion

Main cropping systems on rainfed lowlands

Highlights on traditional management



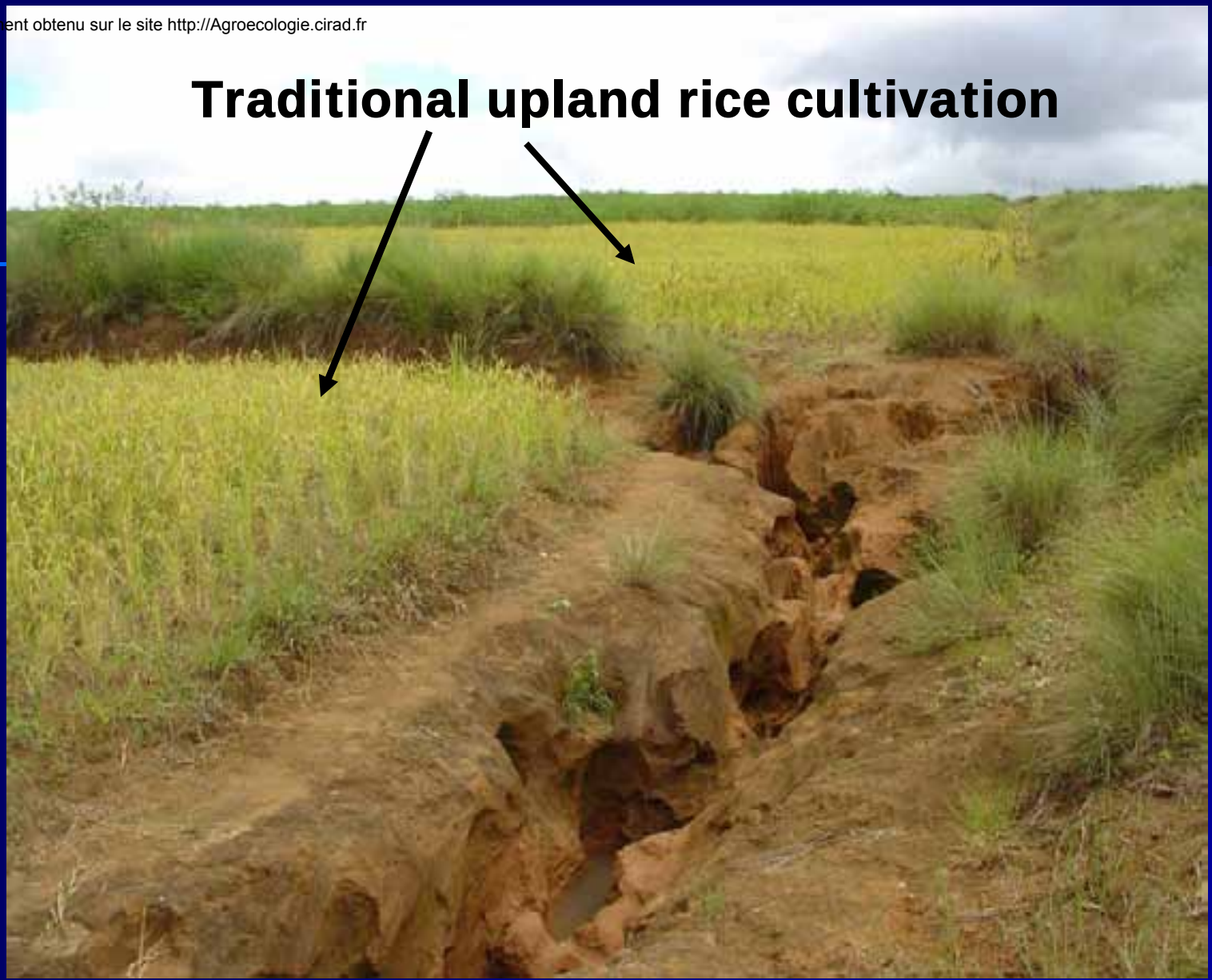


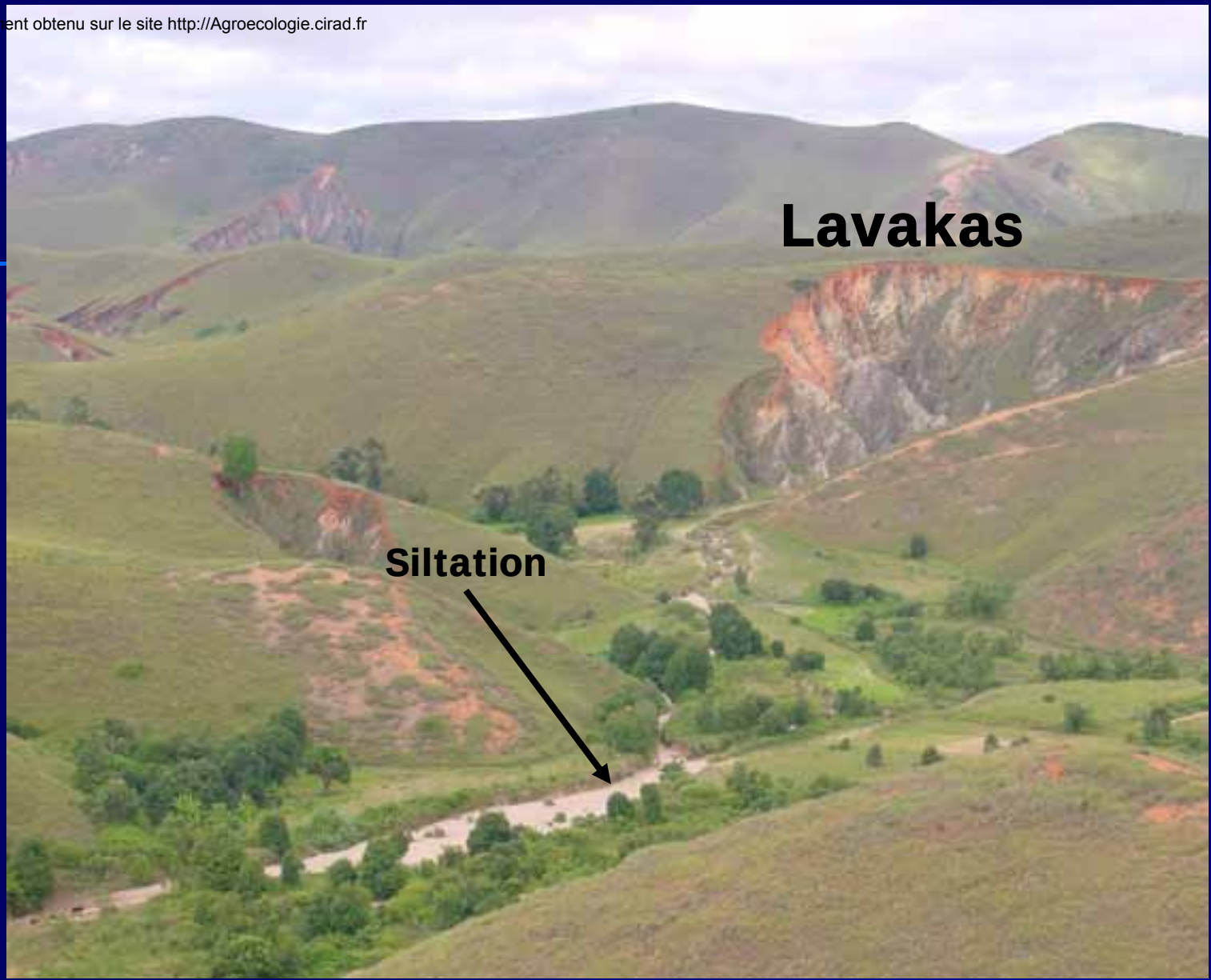
Uncertainties as regards the date of transplantation or sowing

Uncertainties as regards the retreat of the Water lame

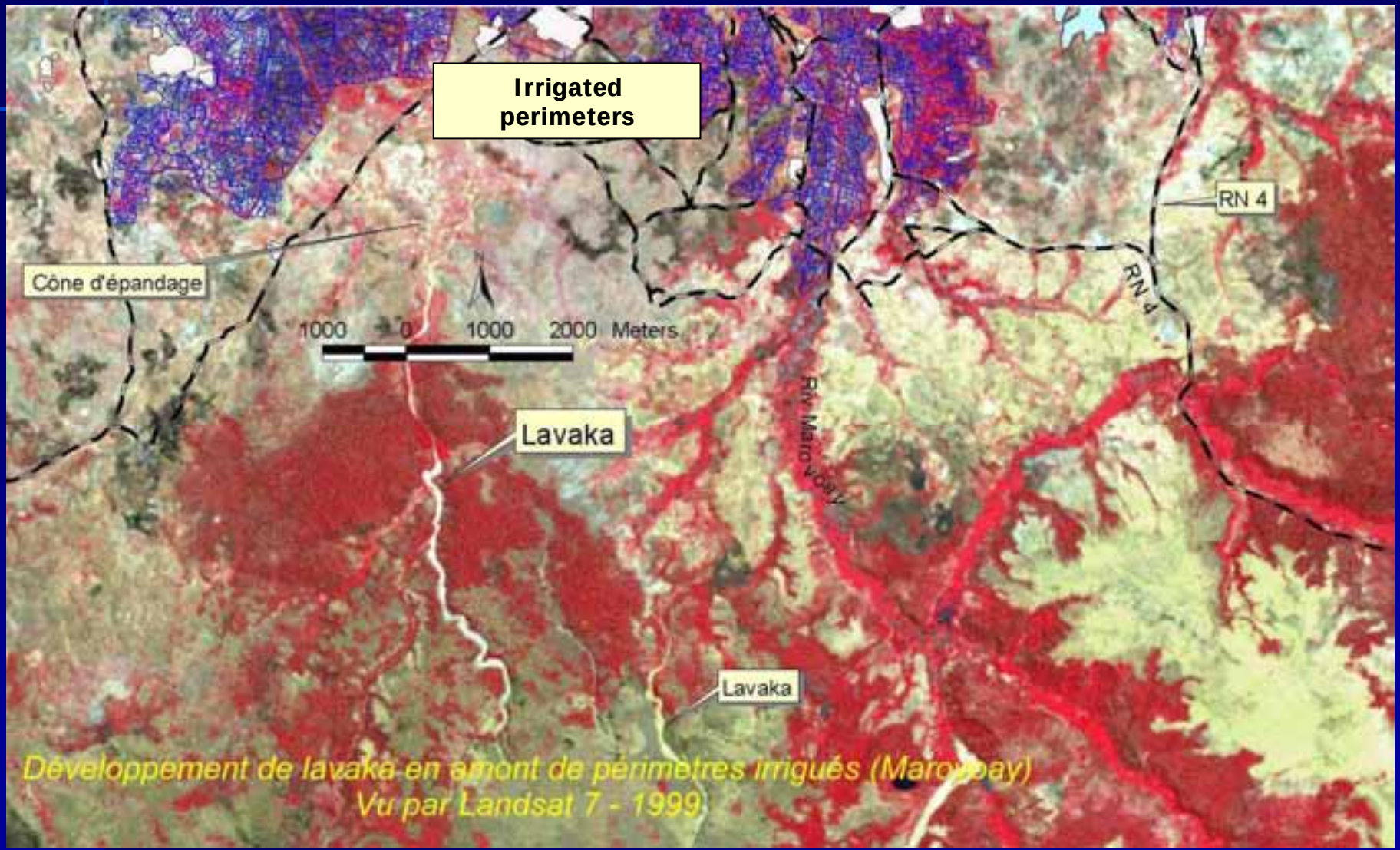
Consequences of erosion.....

Traditional upland rice cultivation





« Lavaka's » development upstream of the irrigated perimeters



Damages in irrigated perimeters…..

Breaking dike…

(Lac Alaotra, Photo L. Seguy, 2003)

The « projet de mise en valeur et protection des Bassins Versants du Lac Alaotra »

(1) Improving the incomes of local populations

(2) Avoiding natural resource degradation in order to secure important irrigation infrastructures on the lower side of the watersheds

(3) Strengthening the capacity of farmers' organisations and local collectivities to become responsible for their own development

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GSDM

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Interests of DMC technologies in the context of the lake alaotra.....

Main challenges related to DMC technologies in the Lake Alaotra area:

improvement of the smallholders' incomes on the hills

An important technical referential has been created by CIRAD in order to produce cash crops on the hills

Main challenges related to DMC technologies in the Lake Alaotra area:

Integration « agriculture-livestock »

Staple crops in association with forage, providing quality pastures to smallholders….

Main challenges related to DMC technologies in the Lake Alaotra area:

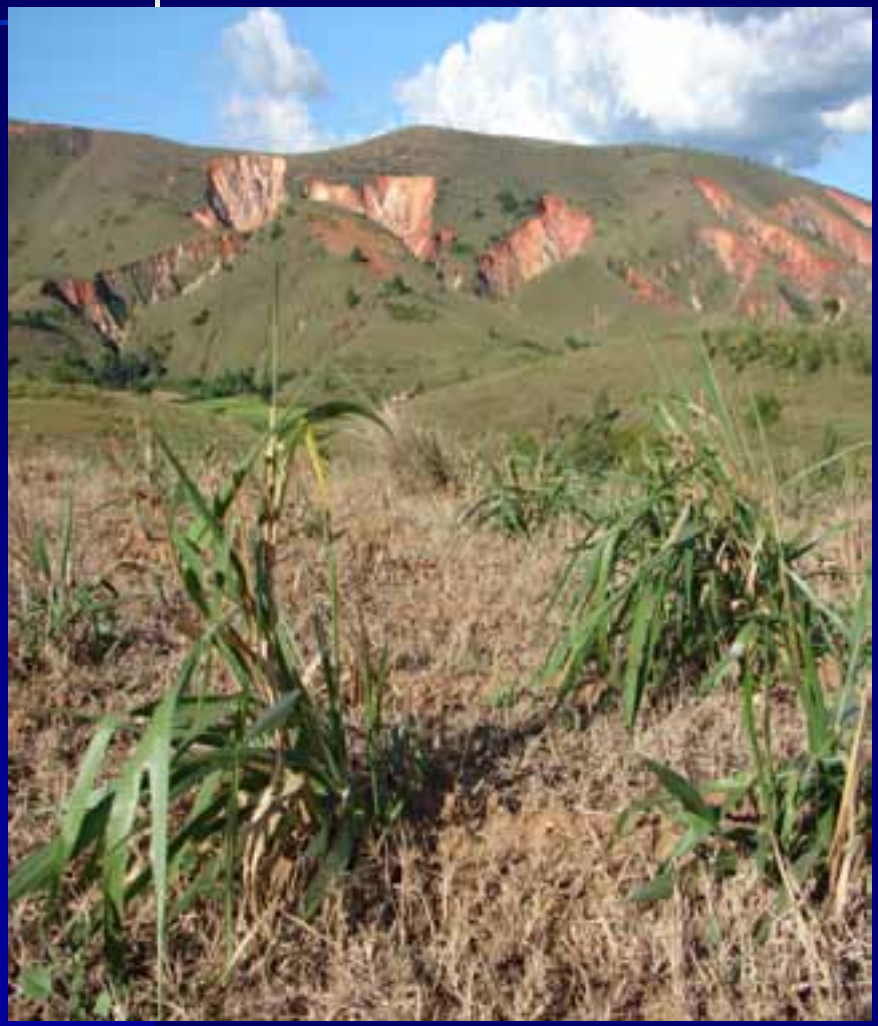
The rainfed lowlands

Use of SEBOTA varieties which can be cultivated in irrigated, rainfed and/or upland conditions

Important challenges at the provincial and national scales...

Main challenges related to DMC technologies in the Lake Alaotra area:

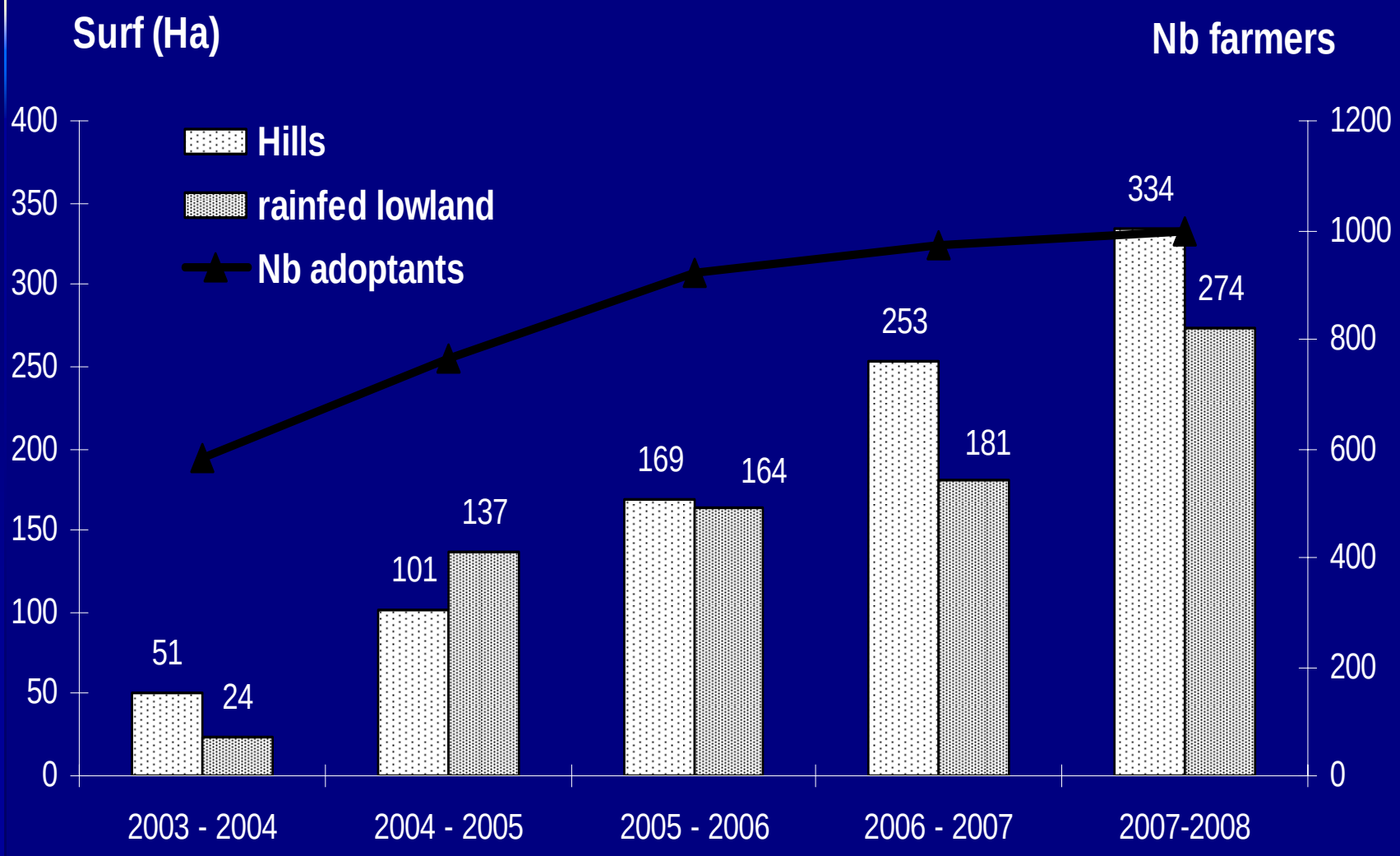
Environmental preservation



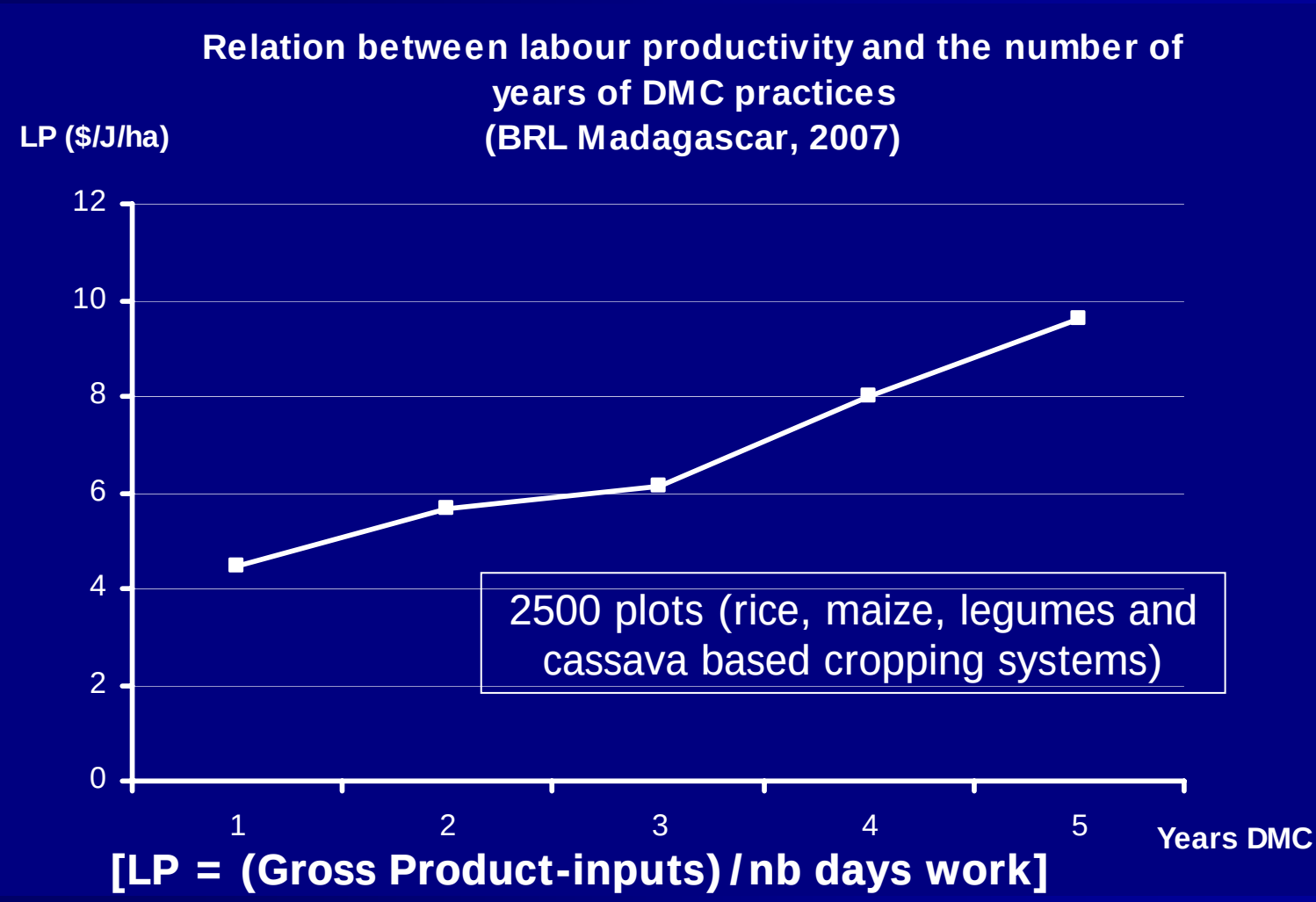
Development of forage cover crops on the hills (*Brachiaria sp)* for erosion control…

B/ Evolution of the extension of DMC technologies and first economic results

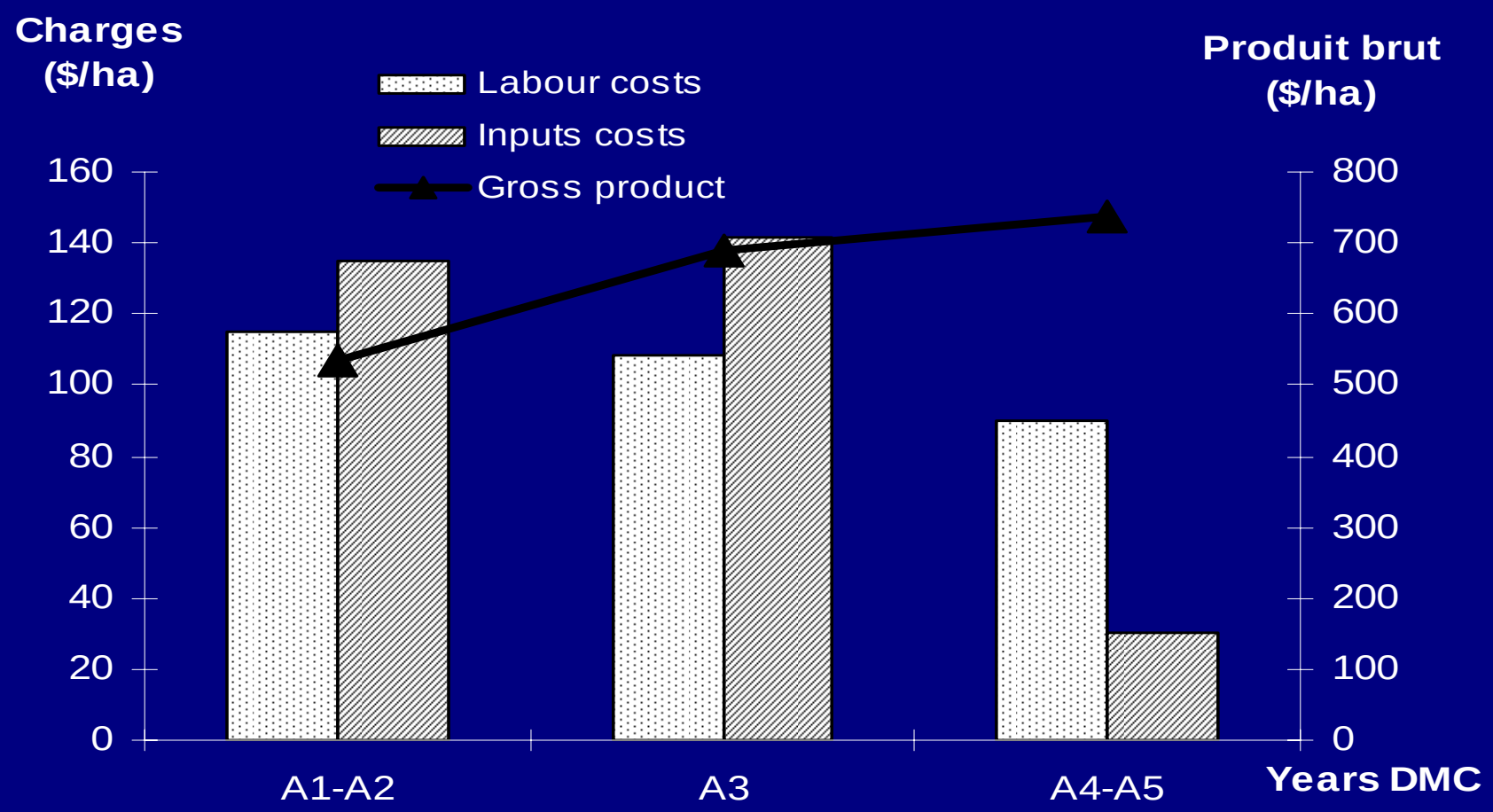
Evolution of the extension of DMC technologies (BRL, BVLAC, 2007)



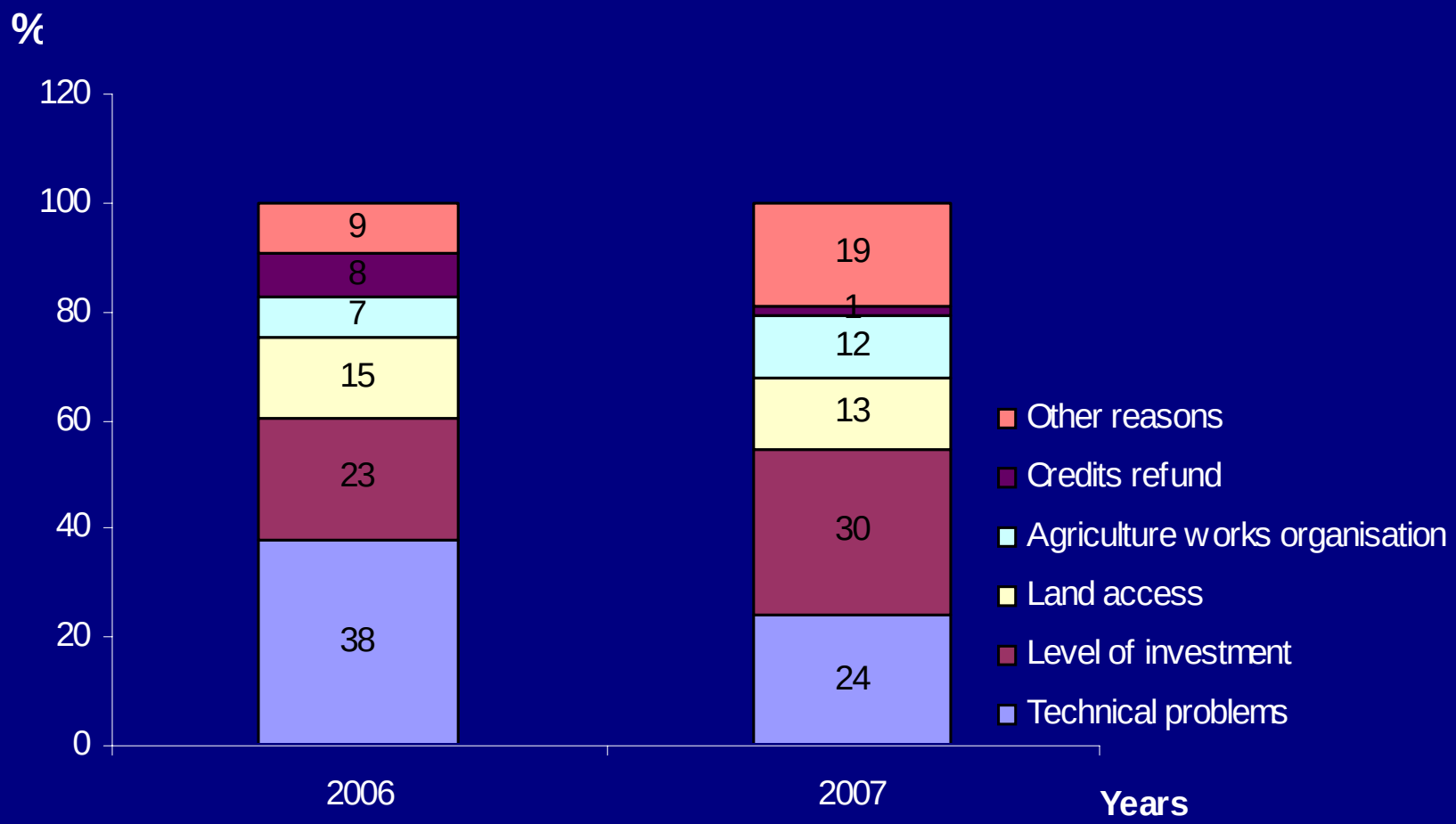
First economic results....



Disagregation of the Labour Productivity (Maize based cropping systems, 435 plots, BRL Madagascar, 2007)



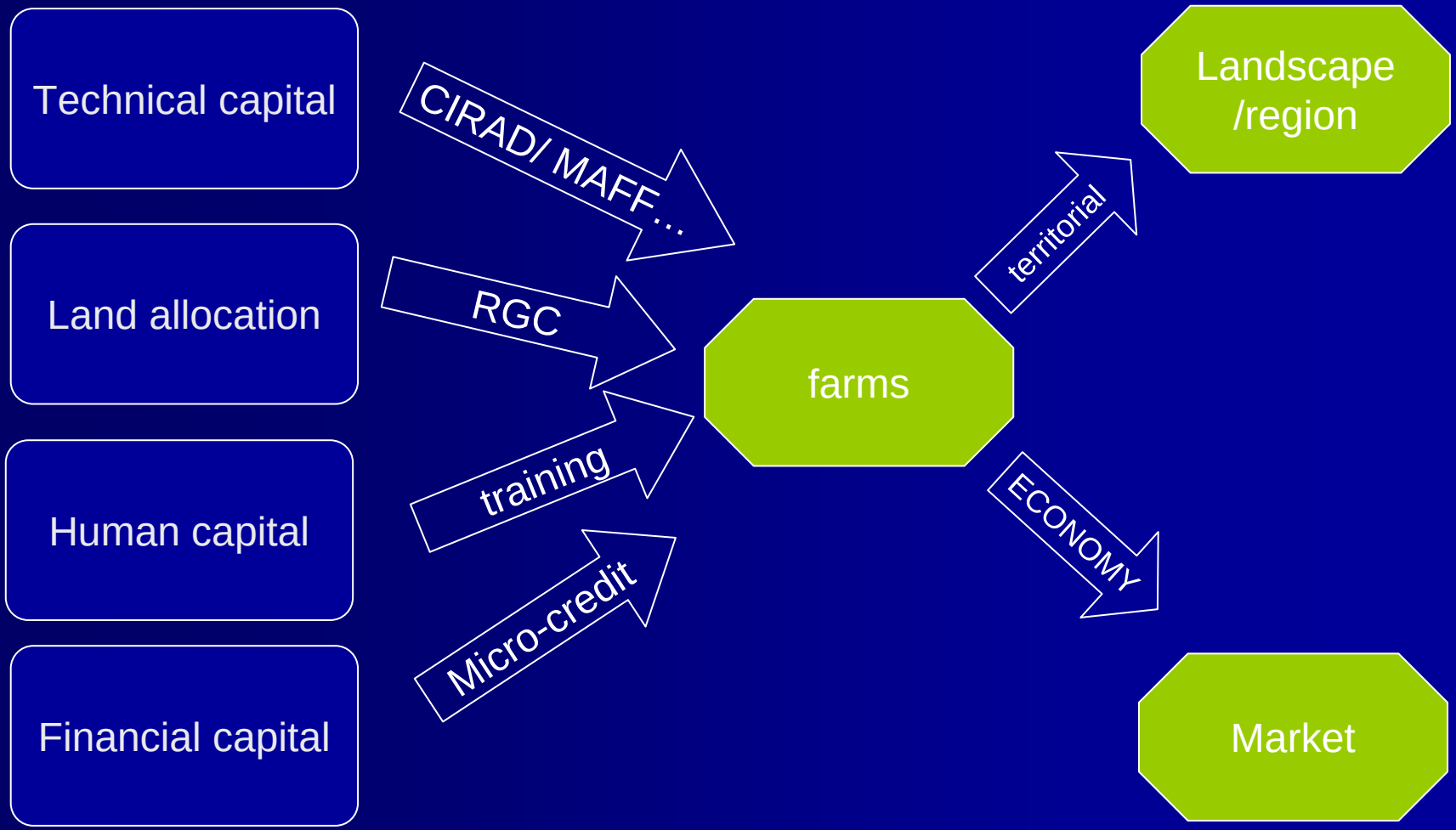
Durability of the adoption



the C.S., (3) qualitative approach at territory and farming system scale

C/ Highlight on the methodology developed by the project

C1/ An holistic approach for a sustainable development….



C1/ Socio-territorial approach

« Guicher foncier », BVLAC, 2007

- ✓ 100 farmers organisations, involving some 1000 farmers
- ✓ Acess to bank credit: about 150 000 $ in 2007
- ✓ Land access : 400 land certificate were delivered in 2006…
- ✓ Market access :production contracts with private companies (rice and maize sectors)
- ✓ Improvement of forage availability and erosion control at the village scale

C/2 Farming systems typology (BVLAC, 2007)

- Type A : « Rice producers »
- Type B : « Rice producers with irregular yields »
- Type C : « Self-sufficient farmers cultivating the hills »
- Type D : « Self-sufficient farmers with diversified productions »
- Type E : « non self-sufficient farmers and agricultural workers »
- Type F : « non self-sufficient farmers and fishers »

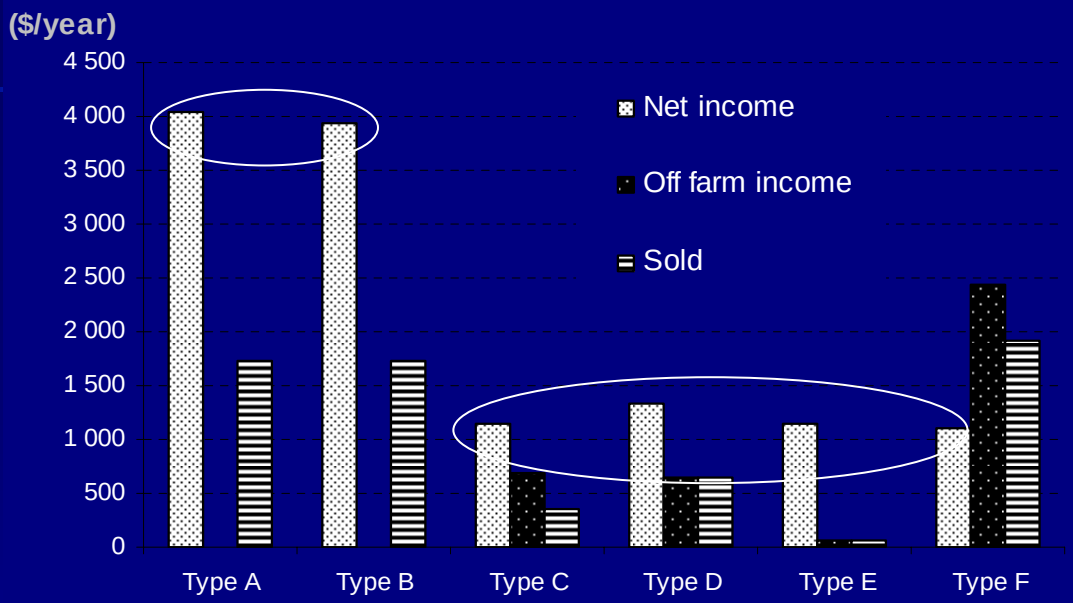
TYPES	Total area	Rice self sufficiency	Livestock production	Off farm activities
A	TA > 9 ha	Self sufficient Commercialisation	Bovine	No
B	TA > 7ha	Self sufficient Commercialisation	Bovine	No
C	TA < 5 ha	Self sufficient	Bovine, pig, poultry	Commerce, handicrafts
D	TA < 3,5ha	Self sufficient	Pig, poultry	Commerce, farm worker
E	TA < 1,5 ha	No Self sufficient	Poultry	Farm worker
F	TA < 1,5 ha	No Self sufficient	Poultry	Fishing

Survey realised on 100 farms

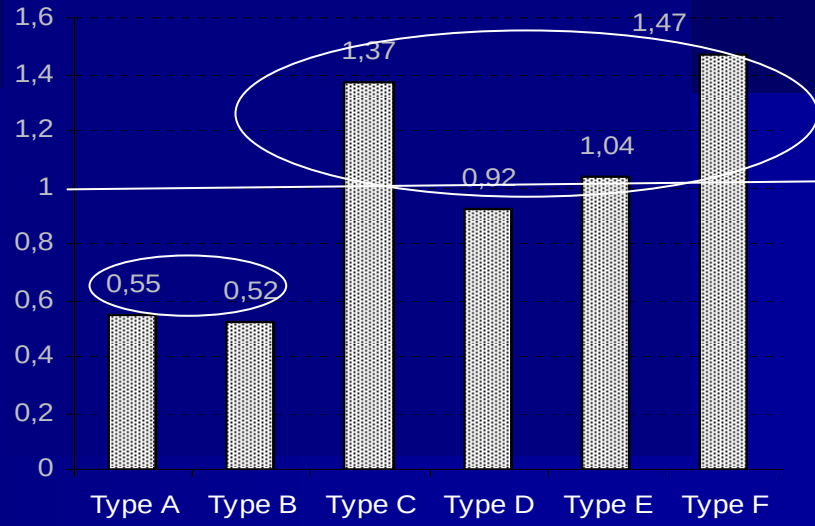
Tools : software Winstat / Olympe

C/2 Some economic elements...

Economic performances comparison



Ratio "familial charges / agricultural revenues"



- **Two groups A and B with high investment capacities but different strategies : (A) securised rice production ; (B) risky production**
- **Types C,D,E : Diversification / integration with livestock / off farm activities / diverse investment capacities**
- **Type F : livelihood systems orientated towards fisheries (66 %)**

C/2 Technical proposals in function of the farming systems types

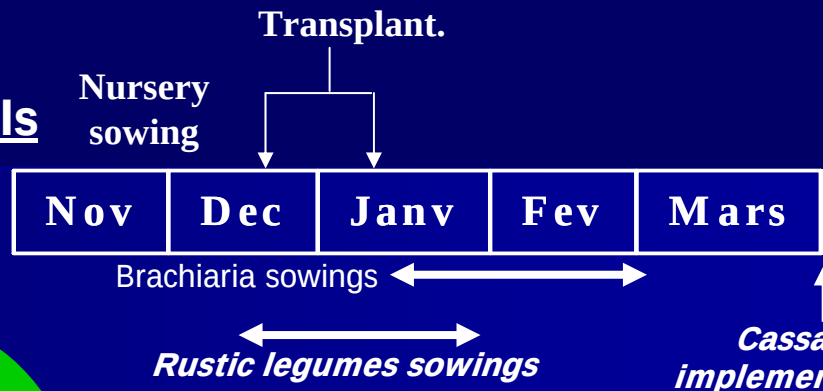
Type	Interests	Constraints	Technical proposals
A (3)	Forage availability Diversified productions	Prioritisation of the ricefield activities	Forage-based cropping systems / flexibility of the cultural calendar
B (1)	Securisation of the income provided by the rainfed lowland and the hills	Ø	All the cropping systems / integration of the mecanisation (heavy)
C (1)	Securisation of the income on the hills Integration with livestock (cattle and pig)	Ø	Diversified rotational sequences / integration « agriculture-livestock » ; high level of intensification possible
D (1)	Securisation of the income on the hills Integration with livestock (pig, poultry)	Risk	Diversified rotational sequences / intégration « agriculture-livestock » ; different levels of intensification following investment capacities
E (2)	Ploughing removal Improvement of the incomes	Risk	Cropping systems without chemical inputs
F (3)	Additional incomes Reconversion in agriculture	Livelihood systems	All the cropping systems

(1) High propensity to adopt DMC technics
(2) Interests but some constraints can retrain the adoption
(3) Few interests and/or important adoption constraints

Some examples : farmers of type A....

Brachiaria ruziziensis

Ricefiels



Voanzea sp. DMC

Cowpea DMC

Some examples : farmers of type C...

Hills

Peanuts

Maize + legumes

Upland rice

Rainfed lowland

Aromatic rice (SEBOTA)

Production of cash crops on the hills and rainfed lowlands / pig fattering

Small mecanisation

Some examples : farmers of type E...

« Ecobuage »






Stylosanthes based cropping systems

D / Conclusion…..

- The extension of DMC technologies become significant in the region of the Lake Alaotra
- The training is neccessary but not sufficient : the adoption determinants have to be considered at territory and farming systems scales
- The degree of adoption can vary depending on (1) the advantages found by each farms categories in the systems proposed, and (2) the ability to implement these new technologies.
- The South-East of Asea context is different : possibility of developing an approach crossing regions/territories with sectors of intervention
- Experience has shown that changes in crop management sequences are often more difficult in traditional, self-subsistence agriculture situations…

Thank you for your kind attention