CIAT

Centro Internacional de Agricultura Tropical
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Natural Resources Management in CIAT: the role of GIS and remote sensing.

Grégoire Leclerc, Nathalie Beaulieu.

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CGIAR Consultative Group on International Agricultural Research

Natural Resources Management in CIAT

The role of GIS and Remote Sensing

Grégoire Leclerc, Nathalie Beaulieu, CIAT

NRM research at CIAT

- An approach that is :
  - ecoregional: hillsides, forest margins, savannas, and high andes
  - multiscale: local (->participatory) to regional (-> policy)
  - multiiciplinary, project based, cross-project
- GIS and RS more and more integrated
  - databases, models
  - organizational (DSS, training)

The key outputs in GIS

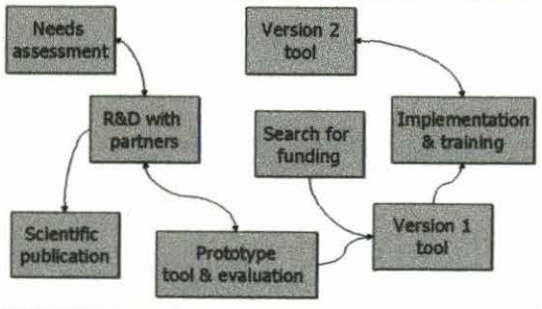
- Continent-wide databases: climate, population, agriculture, indicators, poverty
- Databases at municipio level and below (Mitch Atlas, Yorito-Sulaco, Pucallpa)
- Extrapolation methods (cross-scale)
- Information technology Decision support systems (Mapmaker, Habanero, whitefly..)
- In-house capacity: orthophotos, radar, digitizing

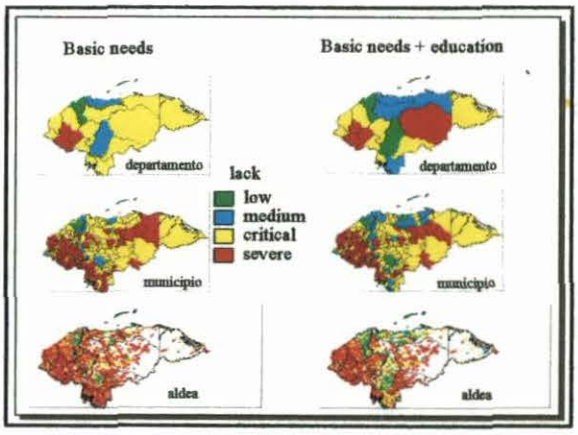
The new DSS: a suite of models*

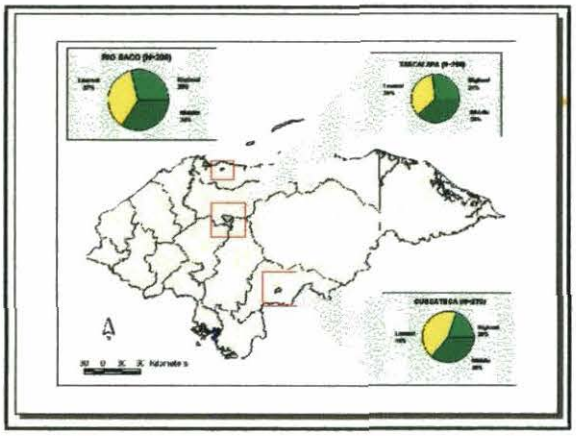
MODEL FOR:	CIAT EQUIVALENT:
Representation	→ Cross Scale, Virtual Reality
Process	→ Influence Diagrams,
Evaluation	→ hydrology
Change	→ Optimization, Fuzzy Logics
Impact	→ Land Use Models, Indicators
Decision	→ Habanero, Llanos

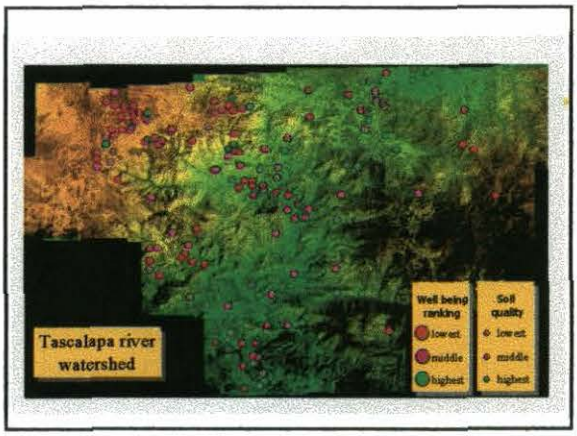
*Steinitz, 1993

Path of model development



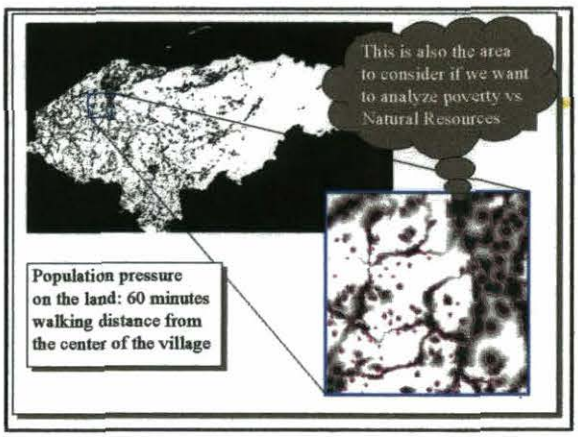


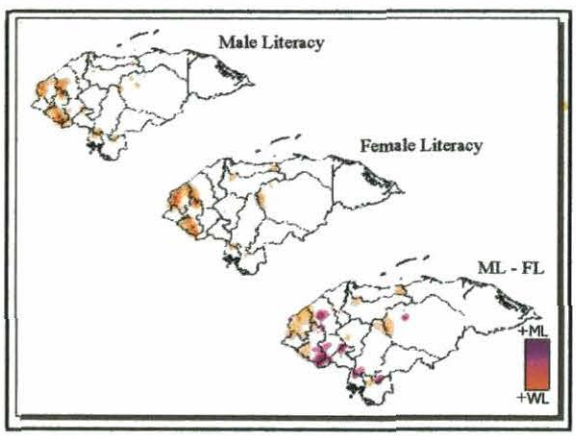


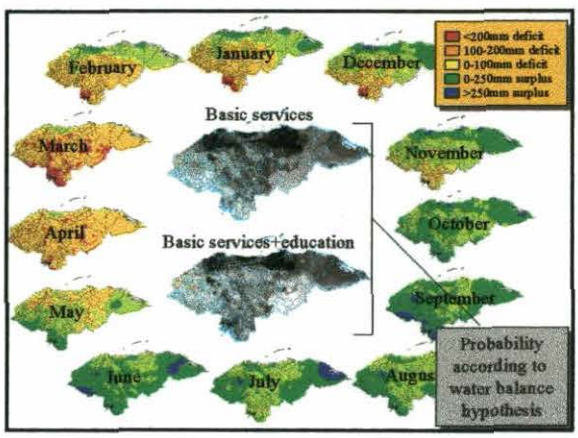


Some "real" relationships with respect to NRM

Factors that depend on poverty levels	Factors that depend on where people live
•Food security, health	•Food security, health
•Land tenure	•land tenure
•Type of animals, crops	•Type of animals, crops
•Own natural forest	•Own natural forest
•Source of fuelwood	•Source of fuelwood
•Soil management, tillage method	•Soil management,tillage vs slope, soil problems
•Transportation	•Transportation
	•Maize and beans varieties







Some hypotheses

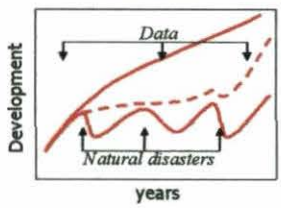
Agroecological potential and poverty
- climate, climatic risk, soils, slope

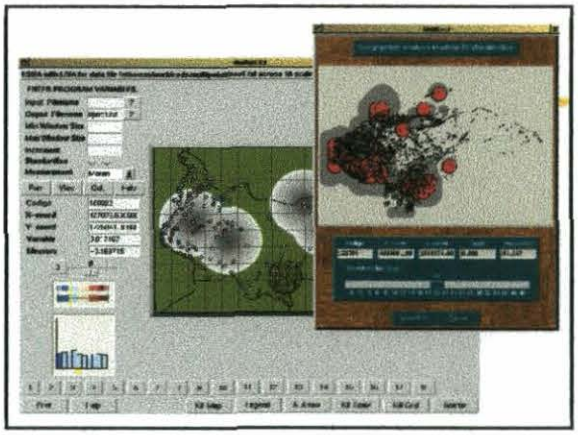
Influences
- population density, ethnicity, migration, transportation network, land degradation (erosion)
- Export crops

Some problems

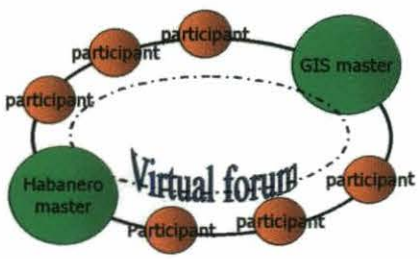
- Conceptual
- Scale
- Analysis at detailed level
- Data
- Methods
- Policies

The unplanned





ITDSS from CIAT-UGA



Role of the masters

HABANERO MASTER(s):
- Facilitate
- Stimulate participation
- Monitor/reports
- Train/debug/orient
- Summarize
- Integrate documents
- provides www Links

GIS MASTER(s):
- Obtain/Integrate data
- Know and apply models/statistics
- summarize model results (reports, graphs)
- Train
- Tech support
- www Links

Role of the participants

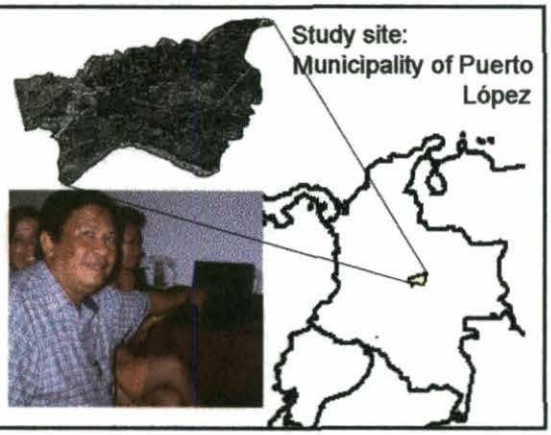
TO PROVIDE:
- Ideas
- Documents
- Reports
- Contacts
- www Links
- Data
- Feedback
- Informed decisions

TO OBTAIN:
- Feedback from others
- Rigorous procedure
- Information

TO GENERATE:
- Development projects
- Empowerment in the region

Land use planning in the Colombian Llanos

- To generate participatory methodologies for municipalities to plan, with small communities and farmer associations, the management of their land in function of environmental possibilities and constraints as well as labour and market opportunities, to enhance economic development while preserving the natural resource base.



The approach

- a) Initiate support to the municipal government of Puerto López in planning rural development
- b) Investigate local and scientific knowledge on:
  - Promissing non-traditional crops and fruits, their agronomic requirements, possible derived value-added products and markets.
  - Constraints on land use and agricultural intensification related to landscape units
  - Natural vegetation (gallery forests and grasslands), conservation strategies
  - Strategies to diagnose and restore degraded agricultural land; methods to develop an arable layer.

Approach (ctnd)

- Develop and test guidebooks based on the investigation mentioned in b), targeted to municipal planners, agricultural extensionists, who work with individual farmers and farmer associations.
- d) Establish criteria for planning of land use, levels of agricultural intensification, conservation, crops and establishment of agroenterprises; Develop spreadsheet-based models to be able to apply these criteria to land units.

Approach (ctnd)

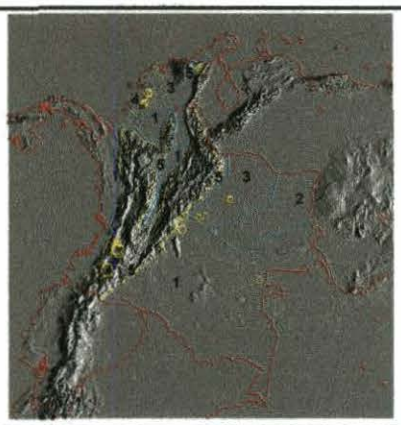
- Develop a GIS database for the municipality of Puerto López with land units and the corresponding data necessary to apply the criteria mentioned in d). Use a freely distributable Spanish language GIS program.
- f) Plan and help execute pilot operational production projects with four communities in the Puerto López municipality, using the GIS and other tools (see fiche Strengthening NARS/CIRAD-AMIS presented by SN-1).

Tools in development

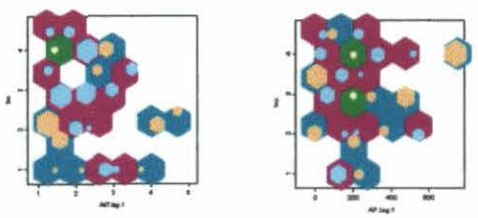
- Floramap (version 1)
- Whitefly (beta)
- Habanero (beta)
- Sustainability Indicators (version 2)
- Cross-scale modeling (version 1)
- Accessibility (version 1)
- Mapmaker (custom version)
- Extrapolation (beta)
- Diversity indices (version 1)

Started collaboration with France (GIS focus)

- Agroenterprises in the llanos (CIRAD-fiche)
- Cassava Bacterial Blight (IRD-fiche)
- Geography of genetics (IRD-some in fiche 13)
- Epidemiology of whitefly (some in fiche 12)



Incidence of CBB vs Rainfall and Temperature



Possible new collaborations with MT

- DSS (CEMAGREF, INRA, CIRAD)
- Virtual landscapes (CIRAD-AMIS)
- extrapolation, data mining, knowledge (INRIA)
- Remote sensing (ENGREF, INRA, CNES): radar, hillsides, pattern recognition
- Bioeconomic modeling and cellular automata (CIRAD-TERA, -AMIS)

Proposed collaboration Ctnd)

- Natural disasters and global change (CEMAGREF, IRD)
- Poverty targeting (INED)
- Crops and the environment
- Other to be defined

The mechanisms: what CIAT can bring

- Project $ (Dutch trust fund for methodological support to ecoregional program, Colombia, EC)
- In kind (software, hardware, exchange of scientists)
- Other partnerships (JPL, JRC, NASA, CCRS, Novartis, National agencies)
- Consortium for Spatial information