NRM Practices and Limitations

• Background
• Project models: lessons learned
• NRM practices: what they are and lessons learned
• Case studies
• Recommendations
  ➢ Helpful studies
  ➢ Project model
  ➢ Watershed approach
  ➢ Technical interventions
  ➢ Scaling up

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Haiti is mainly mountainous, 60% rural

Farms are small and complex
- 3 to 4 plots, avg. total area 1.7 ha
- Land held under several modes of access (own ~75%)
- Plots are located in different ecological zones

Farmers are market directed, not subsistence directed

Agriculture is not the only domain of economic activity
Long term: intensive hillside agriculture is not the future

- It is too expensive and risky on such a degraded resource base

- Farmers will always want to do some annual cropping

- Population is increasing and plot size is decreasing

- Acute poverty: 82% of rural population below $2/day

- Rural families have other objectives
Short and medium term: lessons learned can be applied

• It is worthwhile to do projects in watersheds
  ➢ Speeds up landscape restoration
  ➢ Restore ecosystem function
  ➢ Mitigate poverty
  ➢ Slow anarchic growth in cities

• Some of the old project models have had successes

• There appears to be a convergence of development ideas

• Market forces can lead development, but other support is needed

• Animals and tree crops are the most important on-farm revenue
Project Models: Types

- Équipement du territoire
- Jobs creation civic infrastructure
- Plot-based
- Watershed-based
- Cross border
- New mutual-interest coalitions
- Participatory local community development
- Mixed models and the convergence of ideas
Project Models: Lessons

- No project has covered entire watersheds
- Long-term relationships build trust
- Working through local NGOs, CBOs, work groups can be effective
- Must build in a method for getting and using input from farmers and field staff
- To maximize coverage in a watershed, a mixed project model will be needed
- Regional infrastructure projects using paid rural labor need to consider how other on-farm projects operate
- Social scientists working with technicians is effective
Linear structures:
Rock walls, Hedgerows, Bann manje, Tram
Economics drives technology evolution

- Leucaena hedgerows protected by adjacent row of cassava
- Cotton hedgerows in response to Saut d’Eau lantern market
- Bann manje evolve from hedgerows in response to markets for high-value perennials
Soil conservation, ravines
Hardwood tree planting

- Farmers always planted fruit trees and living fences
- Trees are a store of value
- Tree tenure can be separate from land tenure
- Farmers rarely planted trees for fuel, timber, or soil conservation; or top-grafted fruit trees before 1981

DCCH rootrainer nursery, Laborde

Planting neem on Morne Zephyr, 1982
Fruit trees

Mango and aki nursery, delivery to coop in Gros Morne

Mangos being harvested in Ti Lacombe
Top-grafted mango
Water

Water storage on farm is an environmental buffer and facilitates marketing high value crops—but the threshold cost is high.
Technologies

Estimated relative costs, benefits, and risk of agroforestry practices

<table>
<thead>
<tr>
<th>AF practice</th>
<th>Cost of installation</th>
<th>Cost of management</th>
<th>Amount of benefits</th>
<th>Timing of benefits</th>
<th>Risk of loss</th>
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<tbody>
<tr>
<td>Hedgerows</td>
<td>varies</td>
<td>med.-<strong>high</strong></td>
<td>varies</td>
<td>med.-<strong>long</strong></td>
<td>med.-<strong>high</strong></td>
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<tr>
<td>Crop bands</td>
<td>med.-<strong>high</strong></td>
<td>med.-<strong>high</strong></td>
<td><strong>high</strong></td>
<td><strong>short</strong></td>
<td>med.</td>
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<tr>
<td>Rock walls</td>
<td><strong>high</strong></td>
<td>low-med.</td>
<td>low-med.</td>
<td><strong>short</strong></td>
<td>med.</td>
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<tr>
<td>Gully plugs</td>
<td>med.-<strong>high</strong></td>
<td>low-med.</td>
<td><strong>high</strong></td>
<td>short-med.</td>
<td>low-med.</td>
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<tr>
<td>PLUS trees</td>
<td>low</td>
<td>low</td>
<td>med.-<strong>high</strong></td>
<td>med.-long</td>
<td>low-med.</td>
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<tr>
<td>Grafted trees</td>
<td>low-med.</td>
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<td>med.-<strong>high</strong></td>
<td>short-med.</td>
<td>low-med.</td>
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Technologies: Lessons

- Technologies evolve over time-no recipes
- Farmer motivation is economic, minimize risk, build social capital
- Trees and ravines appear to be the most cost effective to farmers
- Local micro-environments can be changed by soil conservation if enough resources are brought to bear
- Some practices have been widely adopted: hardwood tree planting, fruit tree top-grafting, gully plugs
- Constraints to adoption include: threshold cost, insecure access to land, long time until pay back, lack of technical assistance and training, project support period too short
- Animals influence management of soil conservation structures
Case Studies
Fond des Blancs: Value added

- Tree distribution
- Woodlots in the landscape
- Harvest
- Saw mill
- Furniture making
Perche-Acul Samedi: hardwood tree management

- Trees are very evident over large areas between Terrier Rouge and Acul Samedi
- Agricultural practices have been modified to include hardwood trees
- Most charcoal in this area made from project trees, charcoal exports increased substantially
- Trees coppice—multiple harvests
- Active market for acacia poles
Ti Lacombe: Local area transformation

- 15 farmers, 9 hectares
- Early 90s treeless, weedy
- PLUS project demonstration site
- Emphasis on gully plugs (>50), bann manje, training
- Project invested $665/ha over 5 yrs

- 2 ravines stabilized, running water, no damage to road, micro-climate changed
- Trees cover plot, few annuals grown, linear structures gone, gully plugs maintained
- Est. 2005 income $221/ha from 5 ha plot, 80% from tree products
- Social capital increased, farmer donates poles

Wangari Maathai visits 1995

Ti Lacombe plot transformed into a tree garden
Recommendations
Studies

- Do a tree inventory and charcoal production and market study in areas where project tree coverage appears to be significant (e.g. Fond des Blancs, Perche/Acul Samedi)

- Look at the cost/benefit and cash flow of areas where contiguous soil conservation and tree planting appear to have succeeded (Ti Lacombe, Champaigne, Maissade)

- Do a charcoal consumption study in Port au Prince and other large cities to support energy production strategy
Recommendations: The Model

- Select the watershed region based on previous studies
- Select farmer groups and NGOs
- Develop a regional watershed management plan
- A mixed model should be adopted
  - Grants to umbrella NGOs who contract with local groups
  - Project supported plot based activities: trees, grafting, soil conservation concentrated in home gardens and ravines, home garden cisterns, group and institution strengthening
  - Consider getting Veterimed involved in the region to address animals, complement with browse from trees
  - Support MARNDNR regional stations and Haitian universities to do tree seed improvement and research on *Jatropha*
  - Support mutual interest coalitions based on regional economic engines
  - Public works to repair infrastructure, diminish downstream risk
  - Marketing
Recommendations: general

- The overall idea is to encourage a shift from annual cropping to perennial cropping on hillsides

- Agroforestry interventions should be promoted as money-making ventures, not conservation practices

- USAID should have a 20-year commitment in watersheds

- Consult with and complement other donors’ development projects where possible

- Umbrella NGOs: social scientist with decision-making authority, knowledge of Haiti, empathy for farmers, horizontal management style
Dry areas

- Energy and essential oil plantations (Portnoff presentation)
- Silvopastoral systems (animals-forage-trees)
- Fruit trees and top grafting, orchards where appropriate
- Ravine treatments, both on farm and in larger ravines as public works
- Tree planting for charcoal production

Humid areas

- Soil and water conservation and soil fertility practices
- Perennial crops (coffee, cacao, yams, fruit trees)
- Vegetable market gardens
- Animal improvement
- Production of forage plants
- Ravine protection both on-farm and in larger ravines as public works
- Tree planting
Recommendations: Hardwood trees

- Establish NGO-operated small-container nurseries and distribute hardwood trees at no charge
  - Focus on areas needing protection, such as springs
  - Focus on groups engaged in soil conservation
  - But also do widespread distribution to the extent possible
  - Gather and use feedback from farmers

- Policy support to explicitly allow wood harvest from managed plots

- Work with farmers on woodlot management and with nurseries to ensure better seed

- Tree seed improvement

One-off solutions needed, such as community forests, taungya with absentee landlords, co-management
Recommendations: Fruit trees

- Promote both community and on-farm fruit tree nurseries, and direct seeding where appropriate
- Concentrate on fruit having an existing market (e.g. mango Fransique), but also look at niche export crops (e.g. quenepe)
- Teach top grafting, facilitate access to improved budwood
- Establish a seed improvement component, e.g., embryo selection in mangos
- Look into situations where orchards can be established instead of individual trees (e.g., Jose Sylvain)
- Encourage the creations of companies and coops for fruit transformation in watersheds having good production potential
- Assist women's organizations already active in fruit processing to grow their market share
- Link all fruit tree activities to the market
Recommendations: Soil conservation structures

• Proposed practices should be appropriate for the productive potential of the site
• Analyze the threshold and maintenance costs of a practice before widespread recommendation
• Emphasize gully plugs and link those to markets for high-value crops
• Emphasize practices that supply raw material to value added activities
Recommendations: Water

- Access to home cistern credit can be used to encourage soil conservation
- Link the cisterns to vegetable production, marketing, and to nearby public health programs
- Support construction of small irrigation systems if there are promising water sources in the region
- Consider developing hillside irrigation ponds and community cisterns associated with high-value crops
- Rehabilitate irrigation systems in the plains to encourage annual crop production there and diminish annual crop production on the hills
- Pump irrigation might be practical in some arid plains
Recommendations: Energy

- Use the charcoal market as an economic motor, do not prohibit it but look for positive ways to make it more efficient
- Work to improve charcoal production efficiency: management & kilns
- Encourage the formation and strengthening of charcoal & wood coops
- Promote the Recho Mirak: publicity, training, loans, tax policy
- Expand plantation of bio-energy crops: wood, *Jatropha*
- MARNDR carry out *Jatropha* production and selection with donor support
- Policy changes: make tree harvesting of managed woodlots legal
Marketing

• Marketing efforts must fit in to the total watershed model, strengthening the farming systems in the targeted area

• Facilitate development exchanges between watersheds and in those having high potential for NRM improvement

• Promote environmentally friendly (perennial, tree-based) products to DR, Antilles, North America

• Develop marketing campaign connecting Diaspora to Haitian products

• Encourage development of organic certification and marketing for tree crops

• Charcoal “branding” for managed plots
Recommendations: Animals

- Pig multiplication if needed
- Don’t fight goats, take advantage of them
- Invite in Veterimed where possible
- Link animals to trees and marketing; introduce more productive varieties of cows and goats
- Introduce improved forage crops