THE INTEGRATED NATURAL RESOURCE MANAGEMENT APPROACH: A SUSTAINABLE WAY IN AGRICULTURAL AND RURAL DEVELOPMENT

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Energy and Environment: A view from the margin.

• Those in rural and remote areas exploit without mercy the natural resources for their own energy needs (fuel, food, feed, and fiber).

• But, in the end, they still remain poor.
Threat to the environment: **Poverty**

- **UNDP**: More than a billion persons every day go to bed hungry.
- Billions of dollars spent for agricultural research annually, but problems persist.
- In countries like VN and China, food production increases fast while income does not.
For many of the 1.1 billion people living in severe poverty, nature is a daily lifeline -- an asset for those with few other material means. This is especially true for the rural poor, who comprise three-quarters of all poor households worldwide. Harvests from forests, fisheries and farm fields are a primary source of rural income, and a fallback when other sources of employment falter. But programmes to reduce poverty often fail to account for the important link between environment and the livelihoods of the rural poor. As a consequence, the full potential of ecosystems as a wealth-creating asset for the poor -- not just a survival mechanism -- has yet to be effectively tapped.  

Forget him not. Forget him not.
He is toiling his land
dawn to dusk with
poverty and dirty body
Forget him not. Forget him not.
What are the solutions?

• Poverty reduction
  – Improve the livelihood
  – Increase income
• Food security
• Protect the environment
The approaches (1)

• Top down programs
  – By government
  – With assistance from donor agencies
  – After 50 years:
    • still nearly 1 million hungry.
    • Environment degrading
The approaches (2)

• Participatory programs
  - Involving more stakeholders
  - BUT: Mostly localized, small investment.
  - Single disciplinary/activity
The needs

- World population will reach 8-10 billion in the next 25-50 years while food demand will be doubled.
- Requirements to meet: sufficient, safe, and nutritious food.
- Natural resource management and environment protection.
Agenda 21 at Rio 1992

- Need major adjustments in agricultural, environmental and macroeconomic policies at both national and international levels to create conditions for sustainable agriculture and rural development;
- Involve education initiatives, utilization of economic incentives and the development of appropriate and new technologies.
- Ensure food security and environmental protection.
State of natural resources

- Degrading soil resources
- Limiting water resources
- Growing concern for animal welfare
- Consumer preference for naturally produced food and food safety;
- Reducing biodiversity.
Johannesburg Summit 2002

• World summit on sustainable development redefined sustainable agriculture: the poor must be assisted to gain better livelihood while they themselves safeguard their environment.
Concept of sustainability

- Conserving land, water and biodiversity;
- Environmentally non-degrading;
- Technically appropriate;
- Economically viable;
- Socially acceptable.
Low vs. High External Inputs

**LEI**
- Lower increase in production
- Labor intensive
- More environmentally sustainable

**HEI**
- High and rapid increase in production
- Capital intensive
- Risk of environmental degradation
Drawbacks of single disciplinary R&D approach

- Narrow minded, little consideration for other disciplines.
- Confusing farmers with low technical level.
- Non holistic >> unsustainable.
Formation of the INRM Group

• Through a series of annual meetings from 2001 by the CG centers and interested scientists.

• Coordinating: CIAT at Cali, Columbia.

• Debate continues, no clear direction on R&D.
Sustainable Agriculture and Rural Development (SARD)

• An initiative of FAO
  - Ensure basic nutritional requirements
  - Provide durable work and sufficient income
  - Enhance the productive capacity of NR without disturbing the environment
  - Reduce the vulnerability of the agricultural sector.
The Integrated Natural Resource Management (INRM)

- An innovative approach toward sustainable agricultural development
- Targets: the poor farmers living in poor infrastructure understand and being able to manage their human and natural resources.
- Need a multidisciplinary team to work with local stakeholders.
21st Century criteria for appropriate agricultural production systems

• Exploiting local comparative advantages to produce biomass competitively and transform it into food, feed and fuel for local consumption and sale on world markets,

• Ensuring that the selected systems are sustainable economically, ecologically, sociologically and ethically.

• Ensuring that livestock are complimentary to, and not in competition with, crop and forest production.
INRM procedure - Step 1

- Identify local problems and state of resource degradation
  - Use secondary data (physical and socio-economic)
  - Apply comparative advantages
  - Estimate severity of the problem
  - What foreseeable options?
  - What benefit and efficiency?
INRM procedure - Step 2

• Analysis of the data in Step 1. Choice of crop, livestock, fish... and compare options to. Each discipline may proceed to undertake research design to test the appropriateness of the technologies.
INRM procedure - Step 3

- Undertake collective research activities within the selected farming system to verify the results in Step 2 in order to provide local farmers with resource management guidelines.

- Partnership among various stake-holders from policy maker to farmers is utmost essential.
INRM procedure - Step 4

• Formulate policy guidelines to extrapolate the verified results to similar agro-ecosystem.
• Monitoring and evaluating the impacts based on the five criteria of sustainability.
• Refinement, if necessary, will be inputed to the design step.
The integrated farming system

- Rice
- Rootcrops
- Oil palm
- Sugar palm
- Sugar cane

- Ducks
- Pigs
- Buffaloes
- Cattle

- Biodigester

- Ponds
  (water plants, fish)

- Market

- Food flow:
  - Rice to Family & Market
  - Pond to Family & Market
  - Biodigester to Family & Market

- Nutrient cycle:
  - Residues to Biodigester
  - By-products to Biodigester

- Excreta cycle:
  - Excreta to Biodigester
  - Fuel to Biodigester

- Biomass flow:
  - Biomass to Ponds
  - Biomass to Biodigester

- Nutrient flow:
  - Nutrients from Rice, Rootcrops, etc., to Ponds, Family & Market, Biodigester
Identify key rural poverty and NRM problems

System production Services guidelines

Identify minimal trade-off Between food production and Ecosystem services

Extrapolate principles behind results – disseminate results Implementation of policies

Impact assessment

Other ecosystem Services guidelines
Shift in research paradigm

OLD

• Centralized, top down
• Mono-disciplinary
• Input-intensive
• Maximizing crop yields
• Disregard gender
• Isolated research and development agencies

NEW

• Farmer centered, participatory.
• System approach
• Efficient input use
• Diversified farming
• Gender sensitive
• Networked partnership of stakeholders of common interest.
Choices of system components

• Perennial crops of high biomass for transformation into food, feed and fuel which help to restore soil fertility and act as sinks for the greenhouse gases ($\text{CO}_2$ and $\text{CH}_3$).

• Multi-purpose livestock which recycle crop residues and by-products, produce cash income and fertilizer; contribute to food and economic security, employment for women and children.
Choices of system components

- Technology for on-farm fuel production (low-cost biodigesters).
- Varietal improvement.
- Agronomic improvement.
Policy issues: Indispensable linkages

- Farmer-farmer (agri-cooperatives)
- Cooperative – enterprise – market.
- Cooperative – rural credit and input supplies.
- Cooperative – agri-extension and training.
- Right policies: Government – Producers – Business.