Sustainable Management of Agroecological Resources in Tribal Societies (SMARTS)

University of Hawaii-Manoa
Background

• Tribal farmers in India and Nepal practice traditional shifting cultivation
• These systems are becoming increasingly unsustainable due to:
  – Increased population and land pressures
  – Displacement due to large-scale development
  – Cultivation of marginal lands
  – Loss of forest cover
  – Subsidized large-scale staple crop production
  – Out-migration to seek wage labor
  – Erosion of existing socioeconomic structures
Background

• Outcomes are environmental degradation, increasing poverty, malnutrition, and even outright starvation

• Agricultural biodiversity and food security are threatened

• Cultural integrity and ways of life are at risk
Background

• Tribal communities in India and Nepal have significant resources to promote sustainability
  – High agricultural biodiversity
  – Diversified production systems
  – Sited near rivers or streams
  – Organic production system (by default)
  – Centuries of traditional knowledge
  – Strong family and community ties
  – Use of non-wood forest products
  – Dedicated NGO’s working with farmers
Objectives/Major Activities

1. Determine set of CAPS to study using participatory rural appraisal (PAR), including risk analysis
2. Explore stakeholder preferences for CAPS
3. Implement preferred CAPS and conduct training on production, management, and product marketing
4. Use a participatory action research (PAR) to promote reflection, evaluation, and continuous improvement
5. Build capacity of farmers, local NGOs, and universities to scale up CAPS
University of Hawaii-Manoa Team

Travis Idol, PI-Natural Resources and Environmental Management
- tropical agroforestry, biogeochemistry, carbon sequestration

Catherine Chan-Halbrendt-NREM
- international agriculture and natural resource economics

Chittaranjan Ray-Civil and Environmental Engineering
- Soil and water conservation, hydrology, water quality analysis

Carl Evensen-NREM
- international agricultural systems, water quality extension

Theodore Radovich-Tropical Plant and Soil Science
- sustainable and organic farming systems
Project Location: India

Kalahandi-Bolangir-Koraput (KBK) region of southern Orissa state in India
Host-Country Partners-India

Orissa University of Agriculture and Technology
- agronomy
- soil science
- horticulture
- agricultural and resource economics

Aragamee-NGO
- human rights
- food security
- women’s groups
- community development

Swaminathan Research Foundation
Institute for Crops Research In the Semi-Arid Tropics (ICRISAT)
Project Location: Nepal

Trishuli River region of Central Nepal
Project Partners-Nepal

Tribhuvan University, Institute of Agriculture and Animal Science

Local Initiatives for Biodiversity, Research and Development (LI-BIRD)
Approach

1. Determine set of CAPS to study using participatory rural appraisal (PAR), including risk analysis
   1. Baseline survey of natural and human resources
   2. CAPS theoretical cost-benefit analysis
   3. CAPS potential risk analysis
   4. Women’s participation emphasis
   5. Results to be presented to farmers
Approach

2. Explore stakeholder preferences for CAPS
   1. Agroecological Knowledge Toolkit Model (AKT-5)
   2. FALLOW Model
   3. Analytical Hierarchy Process decision support
Approach

3. Implement preferred CAPS and conduct training on production, management, and product marketing
   1. Researcher- and farmer-controlled plots
   2. Crop productivity and nutritional quality
   3. Soil cover and weed presence
   4. Soil fertility
   5. Soil physical properties and erosion
   6. Soil carbon cycling and sequestration
   7. Farmer training on CAPS implementation and evaluation
Approach

4. Use a participatory action research (PAR) to promote reflection, evaluation, and continuous improvement
   1. Farmer, technician, and scientist training
   2. Adaptive management framework
   3. Workshops for reflection, follow-up training, and setting goals for next cropping cycle
Approach

5. Build capacity of farmers, local NGOs, and universities to scale up CAPS

1. Community-level training, field days, and village technicians

2. Local NGOs and regional universities—student fellowships, collaborative research, workshops and training in Hawaii

3. Scaling up—farmer sharing of outcomes, district-level forums, NGO network-building, SANREM knowledge-base publications
Expected Outcomes

- Formation of sustainable agro-ecological systems
- Optimization of land use
- Improvement in environmental quality
- Enhanced food security
- Improved gender equity: participation and decision-making
- Improved community self-reliance
- Strengthened supply-chain coordination for smallholders
- Formulation of robust policies and institutional arrangements for CAPS
Visit to Orissa, India
March 2010
With OUAT Team, Bhubaneswar
OUAT Laboratory Facilities
OUAT Laboratory Facilities
Aragamee Campus-Koraput
Organic Agriculture Demonstration
Villages in KBK Region
SANREM CRSP Phase IV Kick Off Meeting

Classification as per Revenue Dept., Govt. of India

DONATI (HILLTOP)
725°
FOREST SPECIES

MOSTLY
USURFRT
RIGHTS

DONATII (MID-LANDS)
15°-25°
HORTICULTURE SPECIES
1. STONE MANIO
2. SEEDLING CASHEW
3. JACKFRUIT 4. TAMARIND
5. SWEET HEART 6. CUSTARD APPLE
7. GUAVA & WOOD APPLE

DONAT III (HILLSIDE)
MIXED CROPS
10°-15°
MILLETS, LEGUMES, NIGER
VILLAGE: GUNNAR (ONLY COMMARIKAS)
MARCHIGUDA

VALLEY BOTTOM
0-10°
90% RAINBED, SOME
IRRIGATION

NON-CROPPING MOSTLY
MILLETS, LEGUMES, NIGER
ALSO SAW MIXED CROPPING OF
VEGETABLES
VILLAGES: MARCHIGUDA, RASINHRI,
BAHMARUJODI (ALL LAND IN PIES).

"JHOLA" LAND (STREAM BEDS)
MOSTLY PADDY

In Donati III:
Contour Bunding, Bench Terracing, Contour Farming (i.e. growing crops across the slopes). Mixed and Intercropping. Cereals include (Sorghum, Finger millet - ragi etc.) Legumes include (Arhar, Rice beans, Cow Pea, Urad Dal). Oil Seeds include (Castor, Niger).

Mixed Cropping controlled includes Intercropping in a specific alignment and Strip Cropping in an alternative manner. It includes 2 dissimilar crops in two strips.

Strip 1: Maize broadcast, an open canopy crop, allows direct water input and when flowering down checked by the second crop in strip II. This is cow pea (broadcast as a closed canopy crop) and it checks the water run off. The width of the strip depends on the steepness of the land.

Paired cropping with minimum space. Legumes with Millet.

In Donati III and Valley Bottom: Rice and Vegetables but would required irrigation.
River Valleys-Paddy Rice
Household Vegetable Production
Maize as Key Early Yielding Crop
Irrigation of Lowland Systems Possible
Uplands-Millet, Pulses, Fruit & Nut Trees
Crop Residue Cover Variable
Fallow Periods Common in Uplands
Site Preparation: Slash and Burn
SANREM CRSP Phase IV Kick Off Meeting

- Perennial Trees (Acacias, Albizia Lebbeck, Dalbergia Sissod)
- Green Fence (Clantana)
- Perennial Income (Mangoes, Cashew, Simaruba, Mixed)
- Contour Row Plants (Subabul (used as fodder/firewood), Green Line Contour Bonds Above Sun Hemp)
- Legumes (Cover Crops)
- Millets (Various Types)

4 Villages + 10 Farmers. Experimental plots limited to 2 plots. Each production - all plots included. Village tech will keep monthly record.
Host-Country Partner Preferences

Selection Criteria:
1. Farmers with tenured land
2. Rainfed areas
3. Feasibility based on quality of land.

CAPS Conditions:
1. Entire area is declared as organic farming zone
2. Use of bio-pesticides preferred
3. Use vermi-compost and other traditional manure as there are good substitutes for P&K.
4. Organic inputs as defined by Indian traditional farming systems