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

Agragamee-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

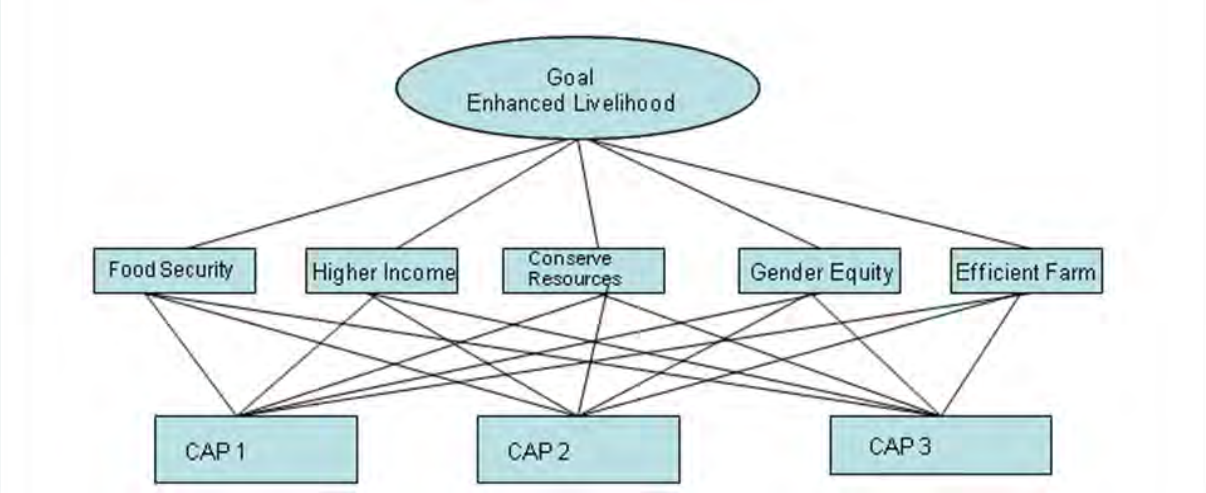
Local Initiatives for Biodiversity, Research and Development (LI-BIRD)

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

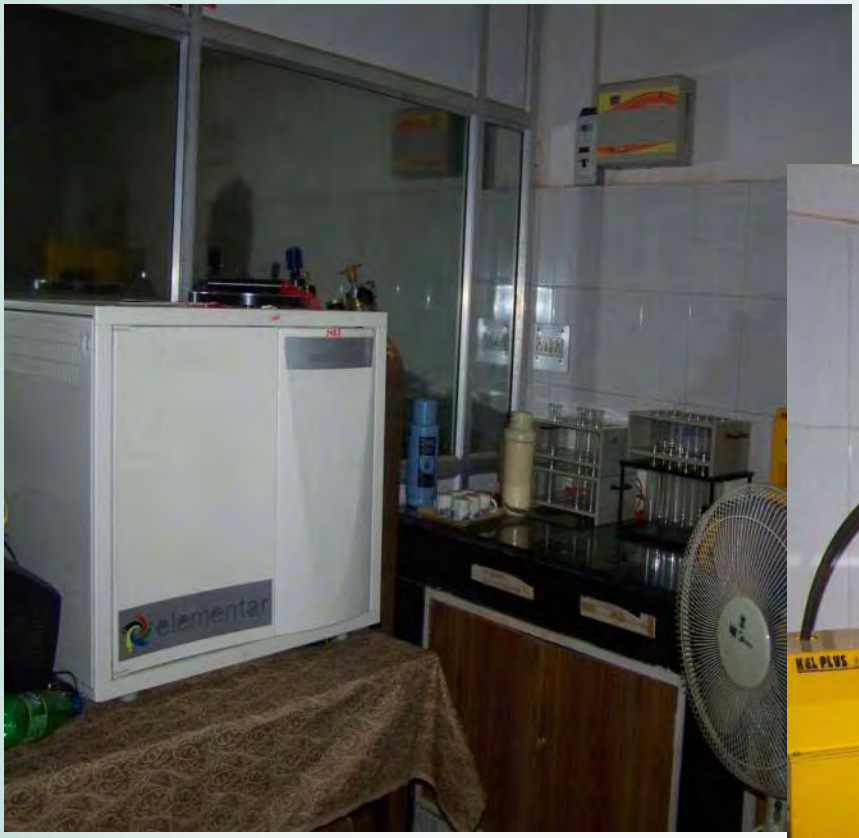
- Formation of sustainable agro-ecological systems
- Optimization of land use
- Improvement in environmental quality
- Enhanced food security
- Improved gender equity: participation and decision-making
- Improved community self-reliance
- Strengthened supply-chain coordination for smallholders
- Formulation of robust policies and institutional arrangements for CAPS

Visit to Orissa, India
March 2010

With OUAT Team, Bhubaneswar

OUAT Laboratory Facilities

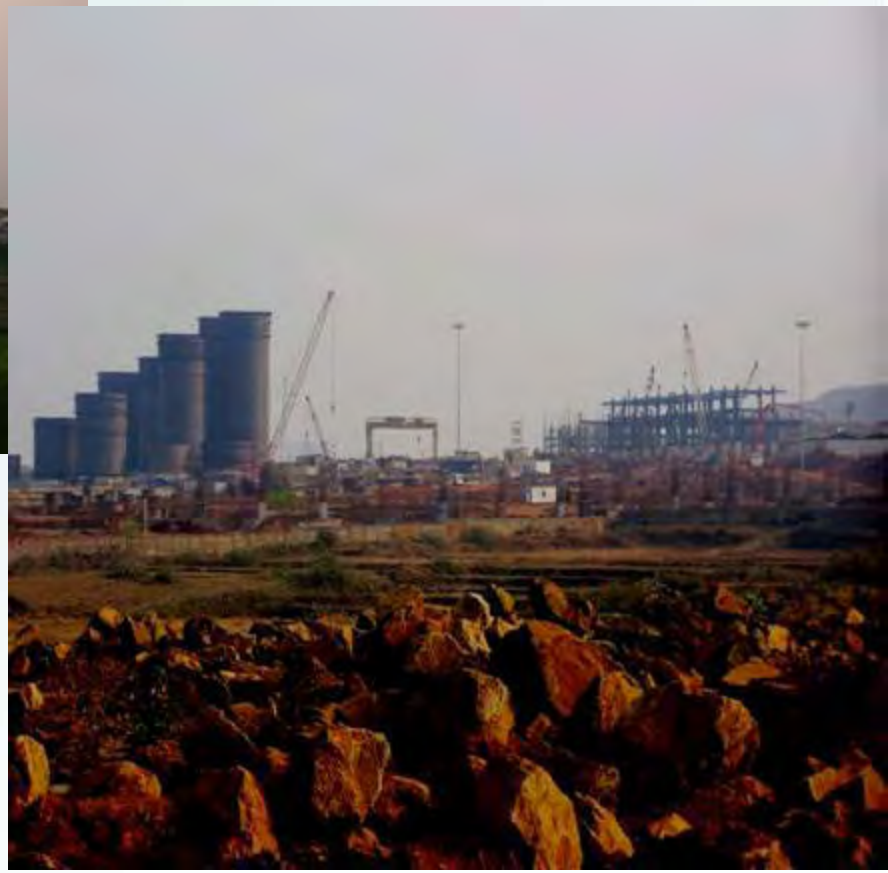
OUAT Laboratory Facilities



Agragamee Campus-Koraput

Organic Agriculture Demonstration

Villages in KBK Region



CLASSIFICATION AS PER REVENUE DEPT., GOVT. OF INDIA

DONGAR I (HILL TOP)
>25° FOREST SPECIES

MOSTLY USUFRUCT RIGHTS

DONGAR II (MID LANDS) HORTICULTURE SPE and Forest Species
15°-25°
1. STONE MANGO
2. SEEDLING CASHEW
3. JACKFRUIT 4. TAMARIND
5. OXHEART 6. CUSTARD APPLE
7. GUAVA 8. WOOD APPLE LICHI

DONGAR III (HILL SLOPE) MIXED CROPS
10-15°
MILLETS, LEGUMES W/ HORTICULTURE SPECIES
VILLAGES · GUNNAR (ONLY COSTOMARRgHts)
MARCHIGUDA

MOSTLY TENURE LAND

VALLEY BOTTOM
0-10°
90% RAINFED W/SOME IRRIGATION

MONOCROPPING MOSTLY
MILLETS, LEGUMES, NIGER
ALSO SAW MIXED CROPPING OF VEGETABLES
VILLAGES - MRCHIGUDA, RASIJHIRI
BRAHMARUDI (ALL LAND IN PICS).

"JHOLA" LAND (STREAM BEDS) MOSTLY PADDY

In Dongar III-
Coutour Bunding, Bench Terracing, Contour Farming i.e growing crops across the slopes. Mixed and Intercropping. Cereals include(Sorgum, Fingermillet-Ragi etc.) Legumes include(Arghar, Rice beans,Cow Pea, Urad Dal). Oil Seeds inclde(Castor, Niger).
Mixed Cropping controlled includes Intercropping in a specific allignment and strip Cropping in alternative manner. It includes 2 dissimilar crops in two strips. Strip1: Maize(broadcast, an open canopy crop, allows direct water input and when flowing down checked by the second crop in strip II. This is cow pea (bradcast 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 Dongar 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-Millets, Pulses, Fruit & Nut Trees

Crop Residue Cover Variable

Fallow Periods Common in Uplands

Site Preparation: Slash and Burn

SAMPLE CAPS DESIGN BY AGRAGAMEE

000 - PERENIAL TREES (ACACIAS, ALBIZIA LEBBECK, DALBERGIA SISSOO

- GREEN FENCE (LANTANA)

- PERENIAL INCOME (MANGOES, CASHEW, SIMARUBA, MIXED) GENERATING TREES.

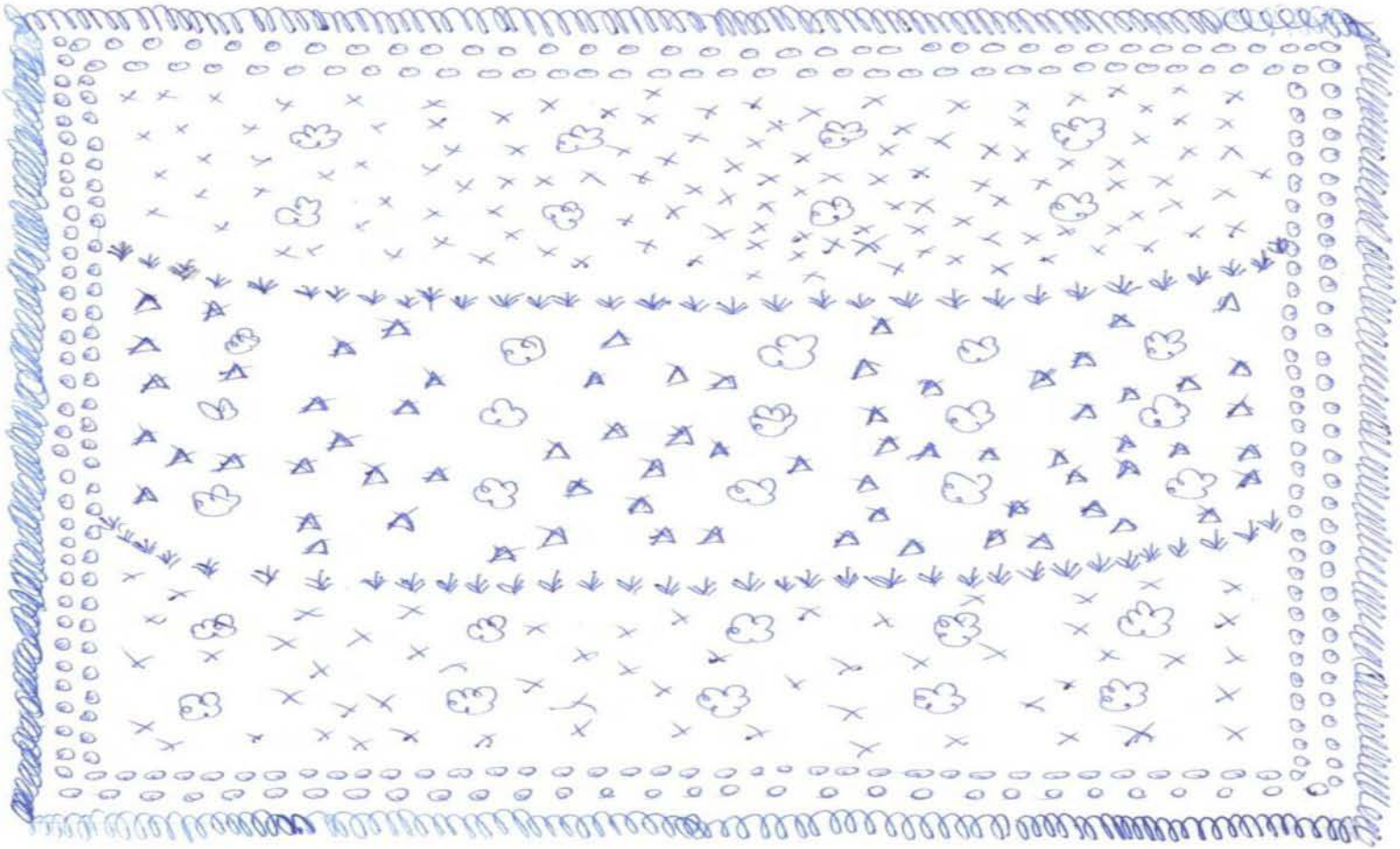
*** - CONTOUR ROW PLANTS. (GREEN/LIVE CONTOUR BUNDS) (SUBABUL (used as fodder/firewood), AGAVE, SUN HEMP ↳ (fibre for rope)

xxx - LEGUMES

ΔΔΔ - MILLETS > (COVER CROPS) VARIOUS TYPES

4 VILLAGE + 10 FARMERS. EXPERIMENTAL PLOTS LIMITED TO 2 PLOTS EACH PRODUCTION - ALL PLOTS INCLUDED. VILLAGE TECH WILL KEEP MONTHLY RECORD

S ← W E → N



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