PARTICIPATORY TECHNOLOGY RESEARCH : ISSUES AND FUTURE DIRECTIONS DRAWN FROM TWO EXAMPLES IN NORTHEAST THAILAND AND CENTRAL MALI

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ABSTRACT

Participatory development has been practiced for over 20 years. However, due to important differences in assumptions with state-led development, as well as with positivism that characterizes the natural sciences, difficulties often occur in its implementation. We consider four questions using two concrete examples of participatory programs carried out by JIRCAS and collaborating institutions in Thailand and Mali:

1. What kinds of technologies should be developed?
2. What are the objectives of technology development?
3. How can different objectives be reconciled in a way that increases synergy?
4. What are the relationships among different levels of actors, from individuals and households, to villages and regions, and how can they interact to increase mutual benefits at multiple levels?

Diversification in Northeast Thailand

Rainfed agriculture characterizes Northeast Thailand, where rainfall is lower and large-scale irrigation is less developed than other parts of Thailand. Cropping systems combining rainfed paddy rice for home consumption with the drought-tolerant cash crops sugarcane and cassava predominate. However, sugar cane has high production costs and prices are subject to fluctuations in the international market, so debt loads of farmers are high. The agricultural economy of the region has been termed a “sugarcane trap.”

To increase farmers’ options and reduce dependency, we have carried out a project over the past seven years to improve water use efficiency and increase diversification through a participatory research approach. We have addressed three methodological problems through this research.

Beyond diagnosis: Formation of farmers' experimental groups from farmers' "dreams" for the future

Participatory research and development often has difficulty moving from diagnosis of constraints and identification of farmer goals, to concrete programs for improvement. To address this problem, we organized a multidisciplinary, multi-institutional team combining technical and social / economic sciences to design and facilitate a farmer process for developing an on-farm research agenda.

The first step in this process was a visioning exercise. Farmers wrote their "dreams" of the kind of farming they would like to do five years later if water and marketing problems could be solved. Each dream was read out, classified into one of eight groups, and placed on the wall. Next, farmers self-selected into four groups to discuss constraints and successful examples for vegetables, fruit, livestock, and integrated farming. Farmers then organized visits to representative farms. Finally, three farmer groups were voluntarily formed with a total of 30 participating farmers.

Beyond farmer modification to farmer innovation and invention

Integrated farming in Northeast Thailand is based on use of farm pond water for rice and diversification activities (fruit, vegetables, and livestock). Farmers in the integrated farming group chose to begin with wet season vegetables, when prices are high, as a means to increase funds available for further diversification. The group carried out three years of on-farm trials with three vegetables. Farmers also recorded pond water use for all activities. This resulted in development of a water use planning tool that farmers can use with ponds of varying sizes to combine different activities in different proportions while assuring adequate water for rice water needs.

The dry season vegetable production group developed a method called "Incomplete technology as knowledge transfer technology" (KTT). Ten farmers used KTT to invent 44 technologies and test them on 56 plots. Researchers identified the scientific basis of water-saving methods from farmers' technology inventions and used this to offer further ideas for improvements.

Beyond extension to scaling out through farmer-to-farmer technology improvement

We describe two approaches. In the first approach, four new sub-districts (*tambons*) were selected based on a set of characteristics shared with the original pilot group. Farmers in the three pilot village farmer experimental groups presented methods and results of two-years of on-farm research and discussed needs and ideas for the new villages with representatives of the new villages. The representatives then meet with other farmers in their villages. A program of visits to successful sites, on-farm trials, and farmer-to-farmer trial visits and information sharing resulted in development of four technologies, only one of which came from the pilot village. After two years, 67% of the participating farmers were using one of these four technologies, and farm income increased 33% compared with a 10% increase for farmers not using the new technologies.

In the second approach, the KTT farmer group incorporated local technologies developed by other innovative farmers and joined hands with an existing pond project farmer group. Through a program of farmer-to-farmer visits between the two groups, farmers in 22 villages implemented KTT, leading to two-fold increases in yields.

Natural Resource Management and Village Livelihood Improvement in Mali, West Africa

The Sahel region of West Africa, with annual rainfall between 300 and 750 mm, lies between the Sahara Desert and the wetter Soudanian and Guinean zones further south. It is characterized by sparse vegetation, low soil fertility, and low levels of crop and livestock productivity. Increased severity of these characteristics in the Sahelian zone and their spread to the Soudanian zone are termed "desertification." Examples of successful technologies can be seen, but how to insure their continuity at the village level, and how to expand desertification control from individual points to the wider zone through scaling out, are issues here as well.

We describe results from a site-selection survey of 10 villages that show that population density is a more significant factor affecting desertification than ecological zone, and that village development of recycling systems between crops and livestock can reduce desertification even in an ecologically less-favored zone. We also describe results from week-long participatory rural appraisal (PRA) carried in four site villages selected based on the initial survey. PRA results in two villages where no previous PRA had previously been conducted showed that improvement of resources contributing directly to villagers' livelihood had priority over natural resource management whose benefits are longer-term. These results contrasted with results from two villages where livelihood needs had been addressed through activities based on PRA conducted by an earlier JICA project.

Conclusions and Future Directions

Farmer-led approaches enable farmers to innovate and invent to develop a wide range of technologies for differing farm conditions. Farmer innovation speeds up technology improvement, increasing production and income, while at the same time providing opportunities for self-realization. These two objectives of technology development are mutually-reinforcing. Increasing farmers' ability to improve their own livelihoods is a precondition for natural resource management. Farmer groups provide a means for villagers with different interests to address different needs, thereby reconciling conflict. Farmer groups are also effective for scaling out beyond pilot villages.

Social and economic science can work with technical science to develop explanations of which differences among farmers are critical in determining differing technology impact, design indicators of villagers' self-realization achieved through technology development, help identify potential reasons for differing interests and facilitate social arrangements to reduce conflict and maximize synergy, and provide information from micro and meso level field research for decision –makers at the macro level.

Reaching agreement on priorities and sharing of common resources is only possible through

dialog. These results support the thesis of A. Sen that self-realization, democratic dialog, and development are integrally related. Participatory development can go beyond diagnosis, beyond testing, and beyond extension by using personal realization, dialog, and democratic decision-making to enable individuals, households, communities, and wider institutions to achieve self-sustaining development.

KEY WORDS
diversification, innovation, scaling out, desertification, livelihood

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   DLD: Ittiphon Phaowphaisal
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2. Mali
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   JIRCAS: R. Miyazaki, M. Yamada

- Introduction: 4 questions
- Diversification in Northeast Thailand:
  - Taking participation "beyond" in 3 ways
- Natural Resource Management in Mali
  - Human and environmental factors affecting degradation and desertification
- Conclusions & Future Directions
  - Linking technology, individuals, households, villages, and regions

4 Questions

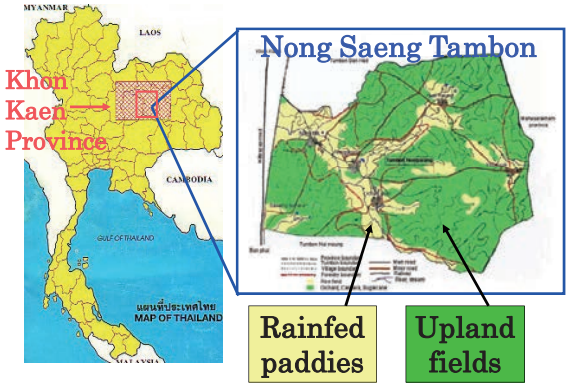
1. Kinds of technologies to be developed?
   Users, researchers, funding sources
2. Objectives of technology development?
   – Food and income increases?
   – Technology users' self-realization?
3. How to reconcile differing objectives and increase synergy?
4. Relationships among levels of actors: individuals, households, villages, regions

Collaboration and Contributions of Social and Technical Scientists

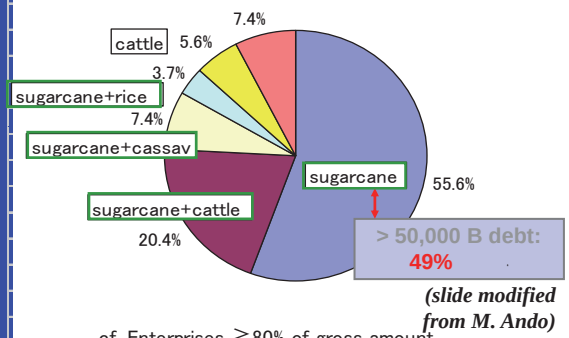
1. Kinds of technologies to be developed?
2. Objectives of technology development?
   – Food and income increases?
   – Technology users' self-realization?
3. How to reconcile differing objectives and increase synergy?
4. Relationships among levels of actors: individuals, households, villages, regions

- Introduction: 4 questions
- Diversification in Northeast Thailand
  - Beyond diagnosis *(S.Bachrein, BPTP, Indonesia)* to farmer experimental groups
  - Beyond farmer modification to farmer innovation and invention
  - Beyond extension to farmer-to-farmer scaling out
- Natural Resource Management in Mali
- Conclusions & Future Directions

Location of Research Site



Agricultural Income by Systems Type: "Sugarcane Economic Trap"

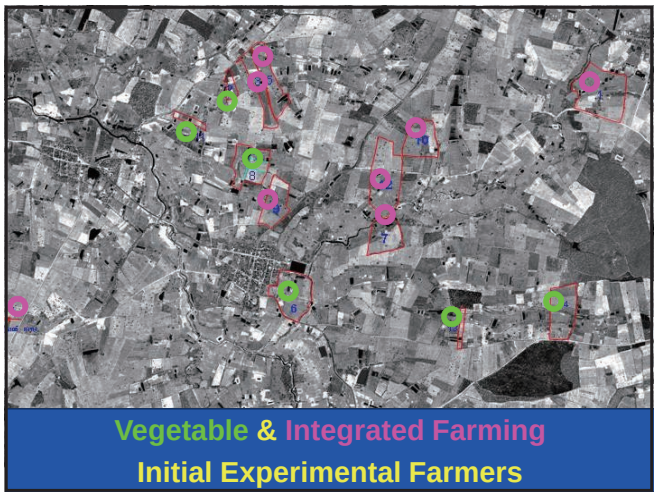


(slide modified from M. Ando)

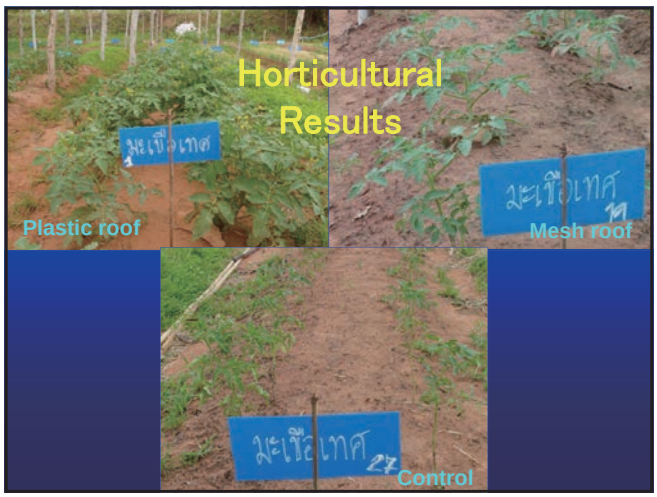
cf. Enterprises ≧80% of gross amount

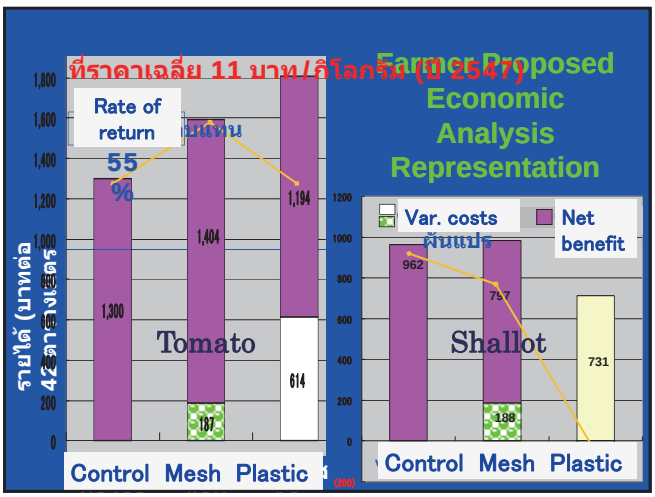
From "Visioning" & Focus Groups to Farmer Experimental Groups

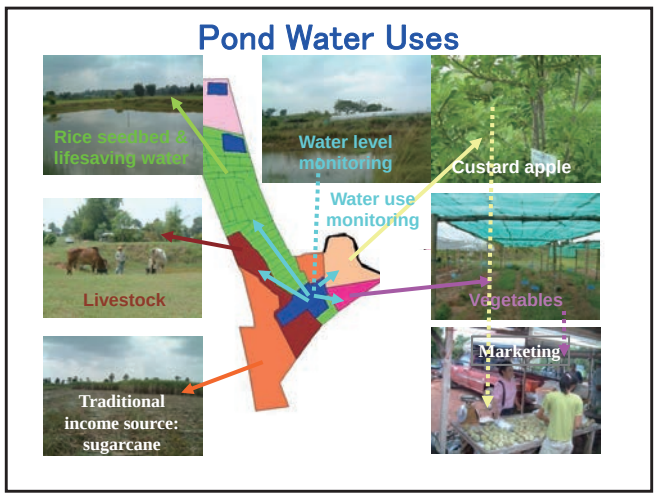
Category	goals	focus group	exptl. farmers
→ integrated farming	20	10 →	8
vegetables	2	4 →	6
fruit	5	5	
livestock	7 →	16 →	16
rice	4		
ponds & irrigation	3		
infrastructure	8		
others	4		
total	53	35	30

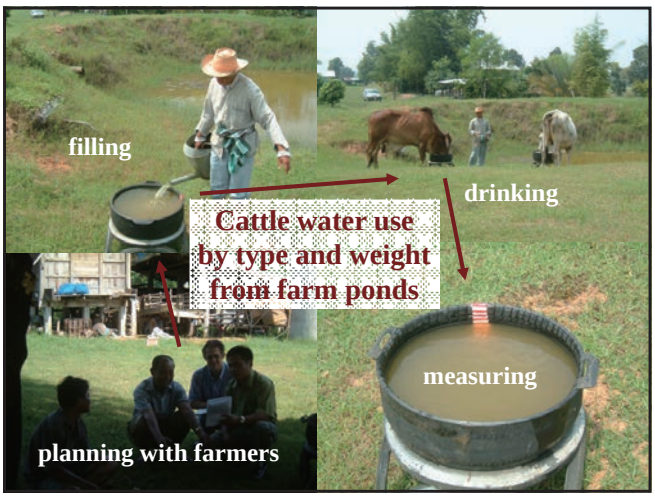

Vegetable & Integrated Farming
Initial Experimental Farmers


Integrated Farming Group Start:
Technology to Capture
High Prices in the Wet Season
1. Clear plastic roof
(researcher idea)
(U. Sukchan)
2. Local mesh roof
(farmer idea)
3. No roof

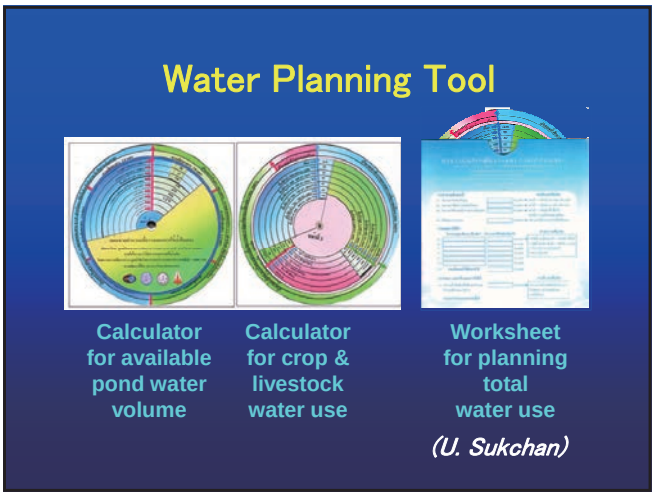

Horticultural
Results
Plastic roof
Mesh roof
Control


Farmer Proposed
Economic
Analysis
Representation
Rate of
return
55
%
Tomato
Shallot
Control Mesh Plastic
Var. costs
Net
benefit
Control Mesh Plastic

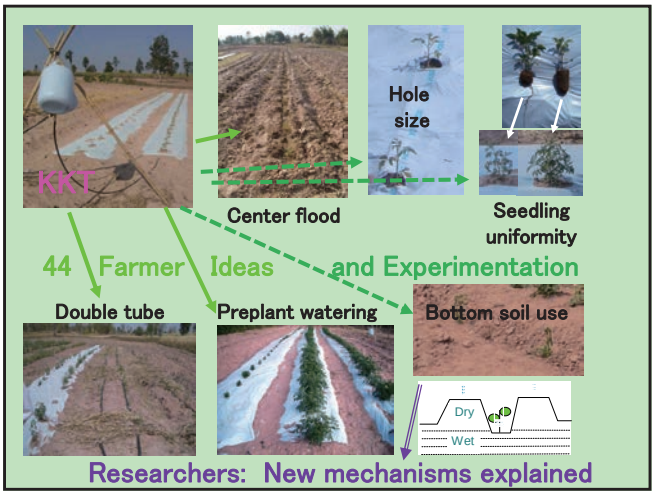

Pond Water Uses
Rice seedbed &
lifesaving water
Water level
monitoring
Custard apple
Water use
monitoring
Livestock
Vegetables
Marketing
Traditional
income source:
sugarcane

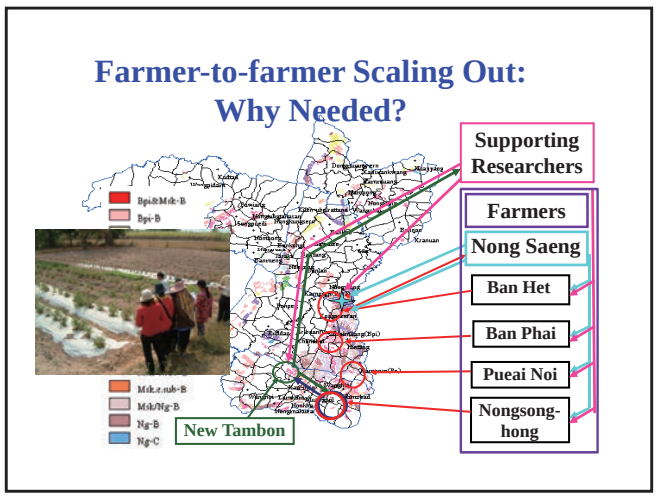

filling
drinking
Cattle water use
by type and weight
from farm ponds
measuring
planning with farmers


recording
On-farm
cattle
feeding trial
(Ittiphon P).
feeding
analyzing and sharing
results with farmers


Water Planning Tool
Calculator for available pond water volume
Calculator for crop & livestock water use
Worksheet for planning total water use
(U. Sukchan)


Dry Season Vegetable Group:
KKT: Knowledge Transfer Technology
Incomplete → stimulate farmer ideas
(M. Oda)


KKT
Center flood
Hole size
Seedling uniformity
44 Farmer Ideas and Experimentation
Double tube
Preplant watering
Bottom soil use
Dry
Wet
Researchers: New mechanisms explained


Farmer-to-farmer Scaling Out:
Why Needed?
Supporting Researchers
Farmers
Nong Saeng
Ban Het
Ban Phai
Pueai Noi
Nongsong-hong
New Tambon


Target: involve 2,308 farmers through farmer-to-farmer sharing
Farmers as presenters and facilitators
Self-realization

Results from 4 Tambons

1. Four technologies shared and adapted
   - custard apple pruning & water mgt.
   - organic fertilizer
   - herbal pesticide
   - cassava-based animal feed
2. After 3 years:
   - 67% of 100 farmers using ≧1 new technology
   - Income increases:

adapting	non-adapting
33%	10%

(Krailert T.)

Farmer-to Farmer: Linking 3 Farmer Groups

Original KKT group
44 technology ideas
10 farmers, 1 village

Local innovators
invention & improvements

JBIC pond group
2-fold income increase
58 farmers, 22 villages

(M. Oda)

- Introduction: 4 questions
- Diversification in Northeast Thailand:
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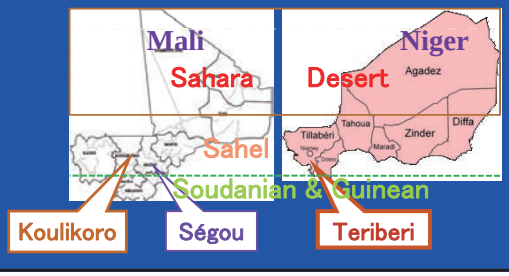
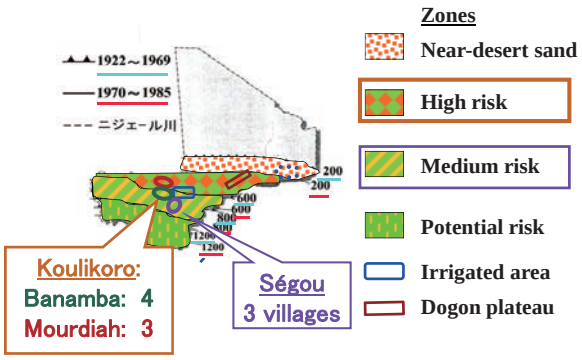
  - Human and environmental factors affecting degradation and desertification
  - Village needs prioritization: 2 approaches
- Conclusions & Future Directions

Mali-Niger Natural Resource Management Project

- Focus on the Sahel ("coast") between:
  Sahara Desert to the North,
  Soudanian & Guinean Zones to the South



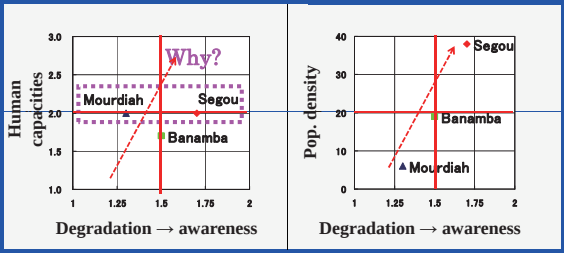
Ecological Zoning for Site Selection



Scoring Qualitative Assessment

Domain	Banamba				Mourdiah		
	Sin-zana	Yaya-Bou-gou	Kas-sela	Nga-noun-koro	Doua-Bou-gou	Koira	Mour-diah
Water	1.7	1.9	1.9	2.3	2.2	1.3	1.3
Soils	1.1	2.5	0.7	0.6	0.2	0.5	0.6
Forest	2.3	0.9	2.2	1.0	2.2	1.3	2.0
Agric.	2.2	1.5	1.5	2.0	2.0	1.3	1.7
Ave.	1.9	1.6	1.5	1.2	1.5	1.0	1.4
Gender	1.7	2.2	1.4	1.7	2.5	2.3	1.8
Assoc.	1.6	1.6	1.1	1.6	2.1	1.5	1.5
Ave.	1.7	1.9	1.3	1.7	2.3	1.9	1.7

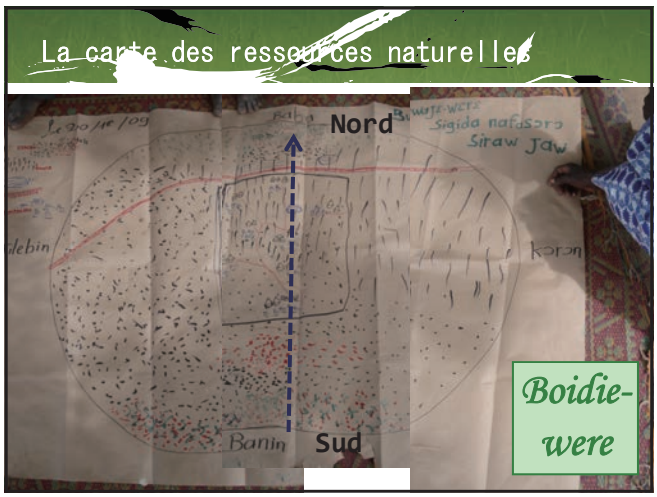
Factors Affecting Degradation: Initial and Revised Hypotheses

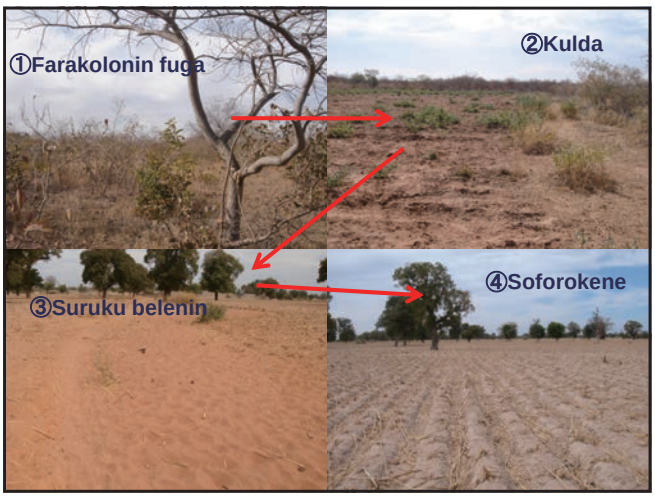


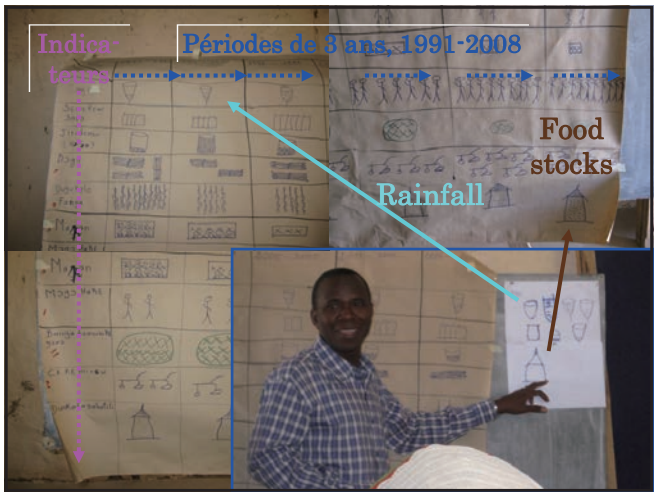
(R. Miyazaki)

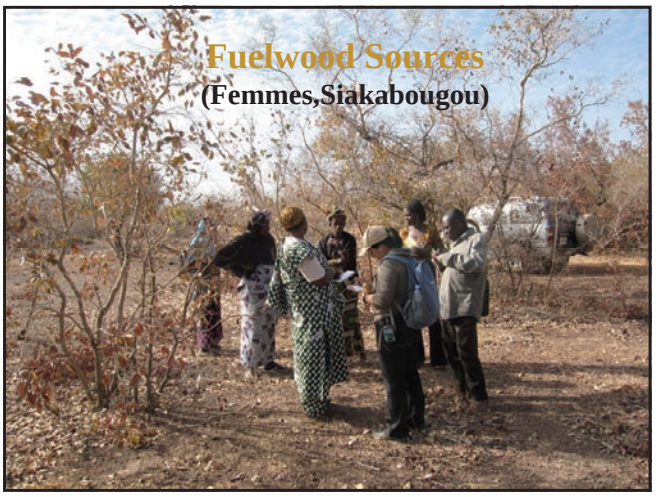
Two Kinds of PRA ("MARP") In Four Villages

1. General MARP :
   Objective : overall village priorities
   Tools : transect, livelihood activities, priorities
2. Focused MARP (after general MARP) :
   Objective : natural resource priorities
   Tools : transect, resource evolution & uses, priorities



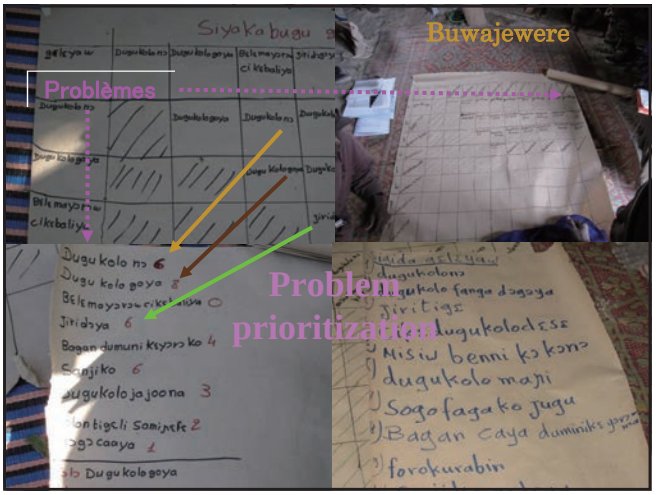






Women's Time Use

(Femme,Yayabougou)



Ranking of Problems: Focused MARP

(Segou area, ♂♀ together)

Boudiewere	Siakabougou
5. Degraded land	6. Dry soils
5. Animals in mud	5. Grazing land
4. Building wood	4. Rainfall
3. Forest loss	3. Erosion
2. Soil fertility	2. Forest loss
1. Erosion	1. Soil fertility

Ranking of Problems General MARP

(Sinzana)

Women	Men
	6. Forest loss
	5. Animal prod.
4. Agric. income	4. Drinking water
3. Gardens	3. Literacy
2. Millet milling	2. Agric. prod.
1. Literacy	1. Transportation

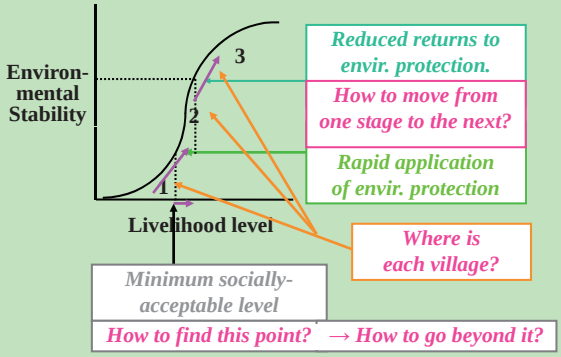
Ranking of problems
General MARP
(Yayabougou)

Women	Men
5. Fuelwood	7. Roads
4. Agric. prod.	6. Forest loss
3. Lack of funds	5. Lack of funds
2. Literacy	4. Animal prod.
1. Lack of water	3. Agric. prod.
	2. Literacy
	1. Lack of water

Sustainable Common Resource Management

1. How to go beyond dependence?
2. How to link investments and benefits from common resource improvements?
3. Village microfinance for individual improvements of resource use?
4. Village–to village visits:
   - natural resource management
   - village common resource funding

A 3-stage Curve Hypothesis: for Environment & Livelihoods



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4 Questions & Roles

1. Kinds of technologies to be developed?
   Farmer invention expands range
   Technical researchers:
   identify new mechanisms behind farmer innovations & inventions
   Technical & social science researchers:
   which farmer differences critical in determining differing impact?

4 Questions & Roles

2. Objectives of technology development?
   - Technology users can achieve self-realization through technology innovation and sharing
   - Self-realization: a motor for increasing production & income
   - Social and technical scientists: design indicators of self-realization through technology development

4 Questions & Roles

3. How to reconcile differing objectives and increase synergy?
   - Increasing ability to improve livelihoods: precondition for natural resource mgt.
   - Dialog and empowerment necessary for consensus on common resource mgt.
   - Farmer groups enable villagers with different interests to address different needs, reducing & reconciling conflict

4 Questions & Roles

3. How to reconcile differing objectives and increase synergy?
   - Social scientists :
     - identify reasons for differing interests
     - facilitate social arrangements to reduce conflict, increase consensus, & maximize synergy

4 Questions & Roles

4. Relationships among levels of actors: individuals, households, villages, regions
   - Farmer groups effective for scaling out
   - Social scientists: provide information & plan linkages from micro (farm & village) & meso-level (sub-region, region) field research & development to macro-level decision-makers

Future Directions

1. Thesis of A. Sen: Integral relationships among:
   - personal realization
   - dialog
   - development
2. These relationships can take us beyond diagnosis, modification, & extension, to enable individuals, households, communities, and regions to achieve self-sustaining development

Merci!… Aw ni Ce! …
ขอบคุณครับ ! ありがとう !