Needs and opportunity assessment (NOA)

A prerequisite for understanding farmers' production systems, constraints/problems and opportunities in a target area

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1. Rationale and background

We often see many technologies and recommendations that are released by research stations, but not adopted by farmers. This is especially true for crop and natural resource management. A few examples are: transplanting of rice in rows; planting of young (10-15 day old) seedlings; deep placement of urea super granule; draining of field before urea application; no pesticide application for the first 40 days after transplanting, and land leveling. Why is it so? Where is the problem? Is the recommendation or technology not suitable for farmers? Are the new recommendations or technologies not profitable to farmers? Is it more risky for farmers to adopt new technologies or recommendations? Do the new technologies need some adjustment or modification before they are acceptable to farmers? Are farmers aware of potential technologies that could solve their problems? Is there adequate understanding of farmers' constraints while adopting new recommendations and/or technologies? Is the research relevant to farmers' needs and circumstances? Many of these questions arise due to mismatch between farmers' actual needs and circumstances and research and technology development. 'Successful solutions require correct diagnosis'. The needs and opportunity assessment is a powerful tool that can help diagnose farmers' real problems and constraints and help develop appropriate solutions to them through relevant research and technology development.

2. Participatory needs and opportunity assessment (NOA)

Participatory needs and opportunity assessment (NOA) is the first step in the research-development continuum. It includes as many stakeholders as possible related to rice farming in the study area. It provides an opportunity for researchers and extension staff to directly interact with farmers and other stakeholders of the target area and share farming and related information and knowledge with them. Active participation of farmers and other stakeholders is vital for the success of this exercise: The NOA helps to:

- Improve the relevance of research and technology delivery,
- Improve stakeholder buy-in of the research-delivery process,
- Increase the probability of technology adoption, and
- **Enhance the livelihood of the stakeholders.**

The NOA helps as it

- Observes farmer's production systems as well as resource utilization and flow patterns;
- Identifies constraints and problems as well as potential opportunities for improvement;
- Leads to development of appropriate solutions and/or interventions to address the identified problems and opportunities for improving farmers' income and livelihood; and
- Educates researchers as to farmers' real problems.

While many approaches are possible, we have found the 2-day appraisal with farmers provides an efficient balance between time required and information collected. The 2-day NOA consists of:

- Secondary data: The collection of secondary data to enrich the planning process and ensure the relevance of the project;
- Transect walk: A transect walk and discussion with farmers and other stakeholders (e.g. laborers, input suppliers, etc.) in the study village to learn first-hand about the farming systems, resources and resource flow patterns, field activities, etc.;
- Consultation I: An interactive discussion with farmers and other stakeholders to identify and prioritize problems, and to explore the causes for priority problems;
- Consultation II: Consultation and working with farmers and other stakeholders to jointly develop farmer-acceptable interventions to identified problems and opportunities;
- Verification: Verification of information, problems, solutions, etc. with farmers; and
- Partnership: Joint development of an action plan and assignment of responsibility to local staff for follow-up on project implementation in the village.

The steps of an NOA include:

(a) site selection;

(b) collection of secondary data;

(c) planning for NOA;

(d) NOA field activities;

(e) site and domain characterization and mapping;

(f) stakeholder analysis;

(g) problem analysis and prioritization;

(h) synthesis of observations of Day 1 and planning for Day 2;

(i) problem-cause analysis;

(j) developing solutions/options with farmers;

(k) matching the solutions with farmers' needs and circumstances;

(l) preparation of the report;

(m) next steps (development of action plan for implementation); and

(n) establishment of key variables for baseline survey.

Typically the 2-day NOA includes 2 days of fieldwork and consultation with farmers plus 2 days travel time. A model program is given in Annex 1. The local team will prepare the report of findings soon after the fieldwork. The next steps involve activities including the development of an action plan that have to be followed up later by the team.

Finally, participants' impressions about the NOA exercise are provided for information and education of new participants.

If followed properly, this process allows you to understand and identify:

- What farmers perceive to be the key problems and appropriate solutions to address them;
- In addition, other potential opportunities for improvement (i.e., areas not recognized as problems by farmers);
- True causes of problems, and
- Incentives to change.

Needs and Opportunity analysis (NOAs) is a robust methodology for identifying problems faced by farmers and opportunities to address them.

3. Site selection for a project

The local team should define **representative** location(s) and target group(s) for implementing a project such as integrated crop management (ICM). Then, they should select the site(s) for NOA well in advance of the actual conduct of the field survey. Maps, socioeconomic profiles, past yield data (of districts/provinces), and local knowledge/expertise can be used to define the locations and target groups and to select the sites for NOA. The following criteria can be used to select the site (village or any local government unit):

- **Representative**: Select a village representative of the rice-based farming systems of the area, taking into consideration: socioeconomic factors (e.g., income, farm size, credit, infrastructure, input availability), cropping system, soil type, types of problems experienced, land type and use, water availability, and topography.
- **Access**: Select areas with good access (no more than about 2 hours drive from a city or district H.Q.) for easy contact and better follow up of project activities.

- **Avoiding clutter**: Avoid areas where there are too many ongoing projects and government programs, and where farmers are not eager or sensitive to yet another new project. This criterion is important to avoid over-use of some typical areas commonly recommended by local extension people for their own reasons and where farmers are used to (and/or fed up with) repeated surveys and/or interviews and would not provide real answers to questions.
- **Willing collaborators**: Choose areas where farmers engage in full time farming, are enthusiastic about the new project, and cooperate well in all project-related activities at later stages.
- **Impact potential**: Select areas with high potential for improving farm-level productivity and farmers' income (impact) through appropriate technical intervention. For example, in Tanjung Kubah village in North Sumatra, about 10-15% are the best or progressive farmers who obtain 5-6 t ha^{-1} dry grain (MC: 14%) in dry season and 3-4 t $^{-1}$ in rainy season, while 85-90% of the farmers obtain rarely 4-5 t $^{-1}$ and 2-3 t $^{-1}$ for dry and rainy seasons, respectively.
- **Transfer potential**: Select areas that can serve later as 'Lighthouse Sites' or training ground for technology dissemination agents including farmer groups.
- **Management potential**: For irrigated rice systems, locate areas with good irrigation (and drainage) system. If possible, select areas at the head and middle part (and not at the tail end) of the canal irrigation system. The tail end of the canal system has too many water-related problems that cannot be easily solved. Only when the project is designed specifically for tail end area of an irrigation system, a site from the tail end area can be selected for NOA.
- **Political considerations**: Be pragmatic and prepared to accommodate political considerations in selecting sites, when necessary.

4. Secondary data

Prior to the NOA, the local team (research and/or extension staff) should collect the following information for selected sites through dialogue with local officials and key informants and consulting available secondary information sources. This information will be useful for planning the NOA and the related field activities. It will also help in deciding and planning the type of intervention(s) most suitable for the selected area.

4.1. Rice area and production statistics

Table 1. Rice area and production in the study village or district or province (state).

Ecosystem	Area, '000 ha	% area	% production	Production, '000 t (unmilled rice)	Yield, t ha^{-1}
Irrigated					
Rainfed lowland					
Upland					
Flood prone					
Total or Mean		**100.0**	**100.0**		

4.2. Farm size and numbers

Table 2. Farm size in the study village

Farm size	Category	Numbers	% of total
< 0.5 ha	Small		
0.5 – 1.0 ha	Medium		
> 1.0 ha	Large		
Total	**--**		**100.0**

4.3. Rural infrastructure

Briefly describe the availability in the village or at what distance in nearby town or village and their status (Two to three sentences for each category will be enough).

- Road network:
- Transportation facilities:
- Telecommunication:
- Electricity/Power supply:
- Marketing and warehouse facilities:
- Processing facilities (e.g. rice mills):
- Drinking water sources:
- Health centers:
- Sanitation and drainage facilities:
- Educational institutions:
- Recreation facilities:

4.4. Physical resources

- Mean annual rainfall: _____ mm; Rainfall distribution: Good, Satisfactory or Poor
- Type of irrigation: Canal: _____; Tank: _____; Tube well/Pump: _____; None: _____
- Water problems, if any: _____
- Water quality (saline, high K , etc., if known): _____
- Land use patterns: _____
- Soil types: _____
- Level of soil fertility: High: _____; Medium: _____; Low: _____
- Soils problems, if any: _____

4.5. Institutional linkages in the target village

- Village structure & governance (local govt., community council, etc.):
- Co-operatives:
- Farmer groups:
- Local extension service (govt., NGO, private, etc.):
- Training facilities: Farmer field school (FFS), training materials, radio & TV programs, etc.
- Sources of information: Farmer networking on communication:

4.6. Socioeconomic factors and constraints to change

- Capital: Is capital or credit availability a problem in technology adoption?
- Labor and wages: Are labor availability and wages a constraint to change?
- Inputs availability and price: Are input availability and price a constraint?
- Land tenure: Is land tenure or ownership a restraint to technology adoption?
- Rice market & price: Role of rice price in technology adoption and input use
- Rice income: Percent of rice income in total family income
- Farmer knowledge: What is the level farmers' knowledge in modern rice farming?
- Farmer receptivity: How do farmers perceive changes in existing practices or new technologies?
- Adoption: Chances of widespread adoption of a new technology?

Summary of production costs:

Factor	Labor requirements (person days)	Cost	Comments
Land preparation			
Crop establishment			
Water management			
Weed management			
Nutrient management			
Insect management			
Disease management			
Post-production costs paid for by farmer (Harvest, threshing, etc.)			
Total costs (A)			
Average yield (B)			
Home grain requirements			
Excess grain for sale (C)			
Average grain price (D)			
Average profit [(B*D)-A]			

4.7. Livestock

- Farm animals (type and numbers): _____
- Feed sources: _____

4.8. Rice cropping systems

- Major rice varieties grown in the village: _____
- Cropping patterns: Rice-fallow; Rice-rice-fallow; Rice-rice-rice; Rice-other crops
- Cropping calendar:

Jan Feb Mar Apr May Jun Jul Aug Sept Oct Nov Dec

4.9. Rice production practices

Crop establishment

- Rice crop establishment methods: TPR, DDS, WDS, etc.
- Seed rate: optimum? high?
- Seed quality: good? poor?
- Nursery type: dry, wet, dapog?
- Time of planting: early, normal? late?

- Plant population:

Organic manure & crop residues
Organic manure used? (type and amount):
Straw/residue management and disposal:

Local fertilizer recommendations

- Is there official fertilizer recommendation for the area?
- -NPK rates for each season
- -N splits
- -Micronutrients
- Do farmers follow official recommendation?
- Available fertilizers and types:
- Why do farmers choose certain types of fertilizers?

Local pest control recommendations

- Major insect pests:
- Major diseases:
- Major weeds:
- Are there recommendations on pest control?
- Do farmers practice IPM?
- Do farmers apply herbicide or other pesticides?
- Are farmers aware of safety issues in application?

Harvest and post-harvest practices

- Method of harvest: Manual, machine, etc.
- Threshing methods:
- Drying practices and problems:
- How is grain sold (i.e., market, direct to mill, traders, etc.)?
- What is the basis for grain price (quality, weight, moisture content)?

5. Planning for Needs and Opportunity Assessment (NOA)

Planning is critical for any activity, especially for field-based activities such as NOA involving several partners or stakeholders with different background knowledge and experience. Four important points to consider are:

(a) preparing the NOA team;

(b) completing the crop management survey sheets (CMSS) by local researchers and extension staff;

(c) preparing the host community (local staff and farmers); and

(d) organizing the logistics (transportation, accommodation, food and beverages, etc.) and materials needed for NOA.

(a) Preparing the NOA team

The NOA team consists of researchers, local extension staff (including NGO representatives), village leaders, farmers, and, if available, representatives of local processors and traders. One or two members of this team should have been earlier trained in participatory rural appraisal (PRA) or NOA to lead and facilitate the NOA. The steps involved are:

- Identify the local partners (researchers, extension staff, NGOs, etc.) who will act as 'Project drivers' for NOA and follow up activities.
- The NOA team must be multidisciplinary with as many subject matter specialists represented as possible (agronomist, soil scientist, entomologist, communication specialist, extension staff, etc).
- Identify an NOA-trained and committed local person with local language capacity to facilitate the NOA activities.
- Explain the purpose, objectives and methodology of NOA to all team members.
- Make sure that NOA team members forget their official status/position and interact with each other and with farmers on equal footing, treating them as equal partners in all NOA activities.

(b) Completing the Crop Management Survey Sheets (CMSS) by local research and extension staff

Discuss the CMSS (Annex 3) with NOA team members and allow each institutional group to fill up the information required in the CMSS for their respective project sites. Consolidate the CMSS information for the study (NOA) village by discussion with the local institutional group. This will provide the perception of local researchers and extension staff of farmers' problems and opportunities in the study area. Later, during the transect walk, the team members will collect farmers' perceptions of field problems and opportunities using the CMSS as a guide. The two sets of data on perceptions of actual problems and opportunities in the study area can be compared and reconciled through discussion with farmers and other stakeholders during the NOA.

(c) Preparing the host community of the study village

Once the dates of NOA field survey have been determined, contact the appropriate local staff and lead farmers of the village and inform them about the dates and purpose of conducting the NOA and solicit their cooperation and support. It is always advisable that the local people are informed about the schedule of survey activities well in advance. Observe the following while preparing the host community:

- Let the local community know why you are coming to their village to conduct the NOA.
- Make sure that the host community is well aware of the date of commencement and duration of the field activities.
- Check whether the field-visit dates are convenient to the local people (there should not be any important political, economic, cultural or fieldwork events that will draw people away during the time of NOA field activities).

(d) Organizing the logistics and materials needed for NOA

Logistics

- Transportation: vehicles and fuel.
- Accommodation for the team in or nearby the study village.
- Food including clean water and drinks for the team and other participants from the village for 2 days.

Materials

Have the following materials prepared:

- Charts, papers, marker pens, cello tape, pins, glue, etc for the visualization activities.
- Small (pocket) notebooks for each member of the field team.
- Copies of the field survey sheets (e.g., Annex 2, 3 and 4)
- Visuals and equipment based on the availability of electricity in the village: slides or videos with projectors for villages with electricity and visuals of non-electronic format (pictures, posters, drawings, etc.) for areas with no electricity.

6. NOA field activities

There are five basic steps in field implementation of the NOA:

(a) Courtesy calls and preliminary meeting with local staff and village leaders

(b) Quick survey on the go in a car

(c) First planning meeting of NOA team members

(d) Introductory meeting with villagers

(e) Transect walk (10-15 km) across the village

(a) Courtesy calls and preliminary meeting with local staff and village leaders

Organize a preliminary meeting with village head, local extension and village staff, and lead farmers during the afternoon or evening before the actual day of field activities. Pay a courtesy visit to the heads of the village and local government and introduce the NOA team to them. Then, explain the purpose and objectives of the visit and the activities of NOA. The steps are:

- Get a base-map of the village (if available) as well as secondary data from the local staff/people/extension officer.
- Request the local staff to select a meeting place (an extension office or local government meeting room, village hall, etc.) for the meeting with farmers and group discussion after the field work each day.
- Request the village group to organize the farmers for the NOA field activities for the next two days.
- Farmers selected for the NOA should fully represent the various categories of farmers including women farmers in the study area.

(b) Quick survey on the go in a car

Use any travel time to assess the field situation in a target area. This preliminary assessment can be done through a "quick survey" in a car using the Table in Annex 2. This will be a first approximation of the farming situation of the target area. This information can aid in organizing the transect-walk later. (While the "quick survey" is useful, remember that diagnosis is best made through transect walks and discussion with farmers in the fields.)

(c) First planning meeting of NOA team members

Organize a meeting of the NOA team prior to meeting with farmers to explain the activities (this meeting will typically be the afternoon or evening of the day before the meeting with farmers). Discuss and finalize the plan of field activities, roles and responsibilities for the next day. Then:

- Identify the institutional groups (research, extension, NGO, local agricultural college, training center, etc.) represented in the NOA team.
- Provide one Crop Management Survey Sheet (Annex 3) for each institutional group and request them to fill up the farming related information as much as they know in about 30 minutes. Note that it is not necessary that they have to fill up everything in the CMSS.
- After 30 minutes, bring the groups together, and discuss and, over a board or a paper pinned on the wall, consolidate the information on farming practices and related issues of the study village.
- This will constitute the perception of research + extension staff on current farming practices, primary problems and related issues in the study village before NOA (e.g. Table 3). This will also provide a basis for additional information to be collected from farmers during the transect-walk next day.

(d) Introductory meeting with villagers and preparing for the transect-walk

- First meet with farmers and local staff in the meeting room and introduce the NOA team to them. (Typically, the process can accommodate 15 to 30 farmers. If too few, there is a risk of the farmer group not being representative. If too many, then mechanics of the meeting and participant involvement can be difficult.)

- Let one local staff explain in local language the objectives and methods of NOA to participants (20-30 minutes).
- Then, form 3 to 4 groups of 6 to 10 members each for transect walk across the village.
- Identify one local facilitator for each group to facilitate the interaction and discussion with farmers in the fields.
- Give each group leader a copy of the Crop Management Survey Sheet (Annex 3) for use as a guide to collect the required information.

(e) Transect-walk (10-15 km) across the village

Do a field survey with farmers and local staff, preferably in the morning. Essential aspects of the transect walk are:

- Keep an open mind to learn from farmers, talk less and listen more to what they say, probe but do not argue on issues that you wish to learn more about, and do not push your own agenda at any time.
- Try to be on equal footing with farmers in order to establish rapport and build trust.
- Slow walk, keen observation of farming and farming-related activities, discussion with farmers in their fields, and talk with input distributors, millers, small enterprise owners, workers, etc in their respective work places are the keys to success in the transect walk.
- Use the Crop Management Survey Sheet (Annex 3) as a guide to get all the relevant information from farmers on their management practices, problems, opportunities, etc.
- In addition, members of each group will observe, discuss with farmers, and note down various field problems and issues that may not be apparent to farmers. For this purpose, you can use the Field Observation and Farmer Survey Sheet (Annex 4) as a guide.
- Look for and note down any relevant indigenous knowledge systems and/or innovative farmer-practices.
- One member of the NOA team plus one local staff should traverse the village in a motorbike to note down the boundary and other details of the village, if necessary.

Table 3. Example of pre-and post-NOA understanding of rice farming practices and related issues in TG-07 of San Juan village, Tarlac, Philippines, by research-extension groups (using the Crop Management Survey Sheet as a guide) (2001).

Crop Management practices		**Researchers and extension staff perceptions**	
		Before NOA	**After NOA**
1.	Cropping system	Rice-rice and fallow/Rice-non rice cropping	Rice-Rice/Corn/Vegetable/Sugar cane; Mungbean, string bean, corn in high areas of the fields during Dry Season (DS) with shallow well irrigation
2.	Land preparation	Dry plowing; residue management; land preparation over longer period	4-wheel tractor for first dry plowing (primary tillage), followed by 1-2 wet harrowing and puddling for one week; irrigation water is used for land preparation for only one week
3.	Varieties	Some use late maturing variety attacked by tungro; prefer IR64 for grain quality	PSBRc 54 & 18, IR8, varietal rotation, varietal purity is a problem due to poor seed quality
4.	Crop establishment	Transplanting, start to use direct seeding, old seedlings (30 d; 21 d preferred); community nursery can be recommended; some late planting	Transplanting, 25-30 day old seedlings; 5 seedlings/hill to compensate for losses due to snail; 15 person days per ha and cost P1500/ha; canallettes to collect snail; some direct seeding in late-planted, low-lying, poorly drained fields
5.	Weed control	Family labor, manual and herbicides	Herbicides; manual 2 times with 10-12 person days per ha per weeding; weed seed in carabao (buffalo) manure and organic fertilizers and so less use of farm manures;
6.	Fertilizer use	Small amount; wrong timing of application (why???); lack of capital, lack of supply, high cost	Low knowledge, can improve efficiency. Mix compound (14-14-14), straight fertilizers (urea, ammonium sulfate) and organic fertilizers and apply 1-2 times per season. The effect of organic fertilizers lasts for 7-10 days only. Cost per 50 kg is: urea P 380; Ammonium sulfate P 250; 14-14-14 P 400; 10-16-20 P 380; Organic P 200
7.	Pest Management	Insects, SB, GLH, BLH, snails, rats, blight, leaf and sheath blight, stray animals	Snail, SB, leaf and sheath blight; calendar-based prophylactic pesticide application; no protective clothing while spraying and hence some experience nausea in nights; no IPM practice
8.	Water Management	Continuous flooding; schedules not followed; use of additional shallow pump; conveyance canals; maintenance of structures; conflict between irrig. Vs. rural water supply for domestic use; complaints of domestic water supply affected in adjacent areas; some farmers not covered by the system; NIA constructs elevated water tanks for domestic water supply for those affected by the NIA deepwell system	Deep well and lined canals for irrigation; target area 50 ha, but actual coverage only 37 ha; water is priced by volume or hours of pumping for each field or group of fields; shallow well for supplementary irrigation; conflict between irrigation & domestic water supply; Poor drainage in low-lying areas, adjust planting date of wet season (WS) crop; still use cont. flooding w/ shallow tube well to supplement deep well in DS, fish pond is a possibility in low-lying areas, seepage loss is high in areas with light textured soils. Less water demanding crops (mung bean, string bean, peanut, corn) are grown on elevated fields with shallow tube well irrigation.

9.	Harvest	Manual, some use combine harvesters, time of harvest	High natural calamity and drying problems for WS rice; some use combine and pay 12% of the harvest; payment for manual labor is 10.5% for harvest + 6% for threshing during WS; and 7% for harvest + 6% for threshing during DS; lower labor cost in DS is due to higher yields and dry weather at harvesting and threshing; use straw as cattle feed
10.	Drying	WS harvests: not enough dryers; coop dryers are needed	Drying problem for WS rice; low price for wet rice; village level cooperative dryers preferred
11.	Milling	Enough mills, mobile millers; sold to traders or paid to lenders as rough rice (palay)	Taking loans with high interest rates forces farmers to sell rough rice at low prices at harvest; low profit
12.	Seed processing/seed quality	Part of the bulk harvest as seed	Most farmers exchange seeds among themselves; some buy certified seeds from technicians; both farmers' and certified seeds are of poor quality; hence farmers use high seed rates
13.	Marketing	Low price at harvest, buyers are adequate; wet rice sold at low price;	Moneylenders force farmers to sell their rice at low prices at harvest to pay back loans with high interest; inadequate drying and storage facilities for WS harvests.
14.	Knowledge access (& extension)	Simplifying the technical knowledge into farmers' language; est. of demo farms	Farmer cooperative to be strengthened to gain bargaining power; good extension support with periodic visits to fields and monthly meetings; farmers should follow recommendations; palay banking can be developed; radio and TV are limited
15	Farm animals	---	Carabao (buffalo), cows, pigs, chicken; sold for emergency cash
16	Off-farm employment	Very limited	Tricycle and jeep transport; rice trading; sari-sari shops (small stores)
17	Labor availability	Short during transplanting, harvesting	High labor cost
18	Inputs availability	High cost	Available; but high costs
19	Average and highest yields and yield gaps	WS = 4 t/ha; Highest = ? DS = 4.6 t/ha; Highest = 5.5 t/ha Yield gap of 0.9 t/ha (DS); if yield gap is high we have to find reasons for it.	WS: Mean yield = 3.5 t/ha; Highest = 5.0 t/ha DS: Mean yield = 5.0 t/ha; Highest = 6.0 t/ha Yield gap = 1.5 t/ha (WS) & 1.0 t/ha (DS)

7. Site and domain characterization and mapping (small group discussion)

After the transect-walk (usually in the afternoon), local staff and farmers divide into small groups of 5-6 each, and analyze the field observations in terms of site characteristics and domains. The facilitator will move around and interact with all groups to finalize the following maps.

- Use the base map to delineate major sub-areas or domains, based on soil types, topography/slope, cropping systems, type of irrigation and water availability, farm size, labor availability, etc. Fill in the details for each domain in Table 4
- Rainfall distribution and seasonal cropping calendar.
- Time trends of crop yields, climatic changes, income, or population growth for the target region, if not for the village.

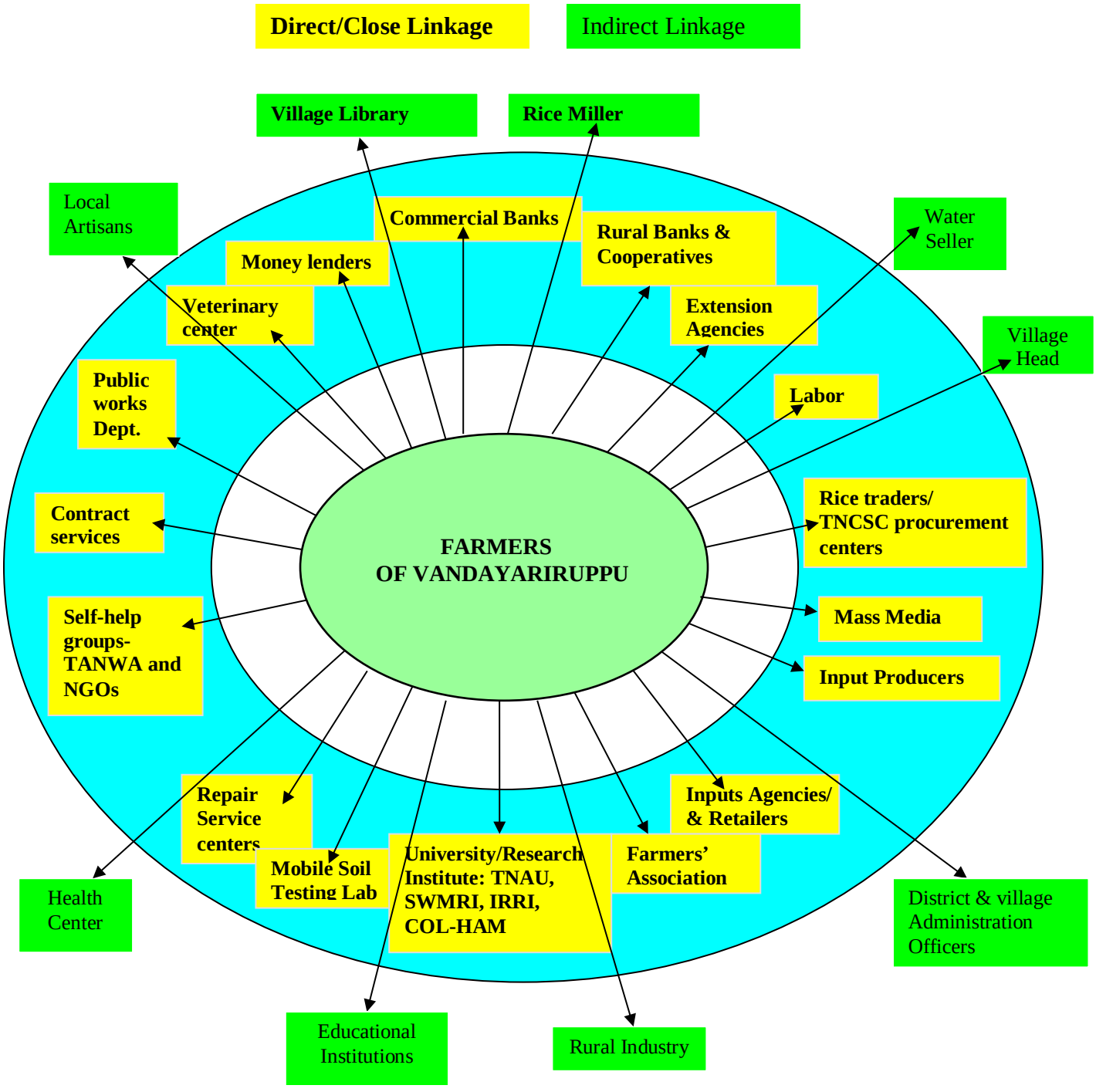
Table 4. Domain delineation

Domain	Key factor determining the domain (soil type or Cropping System or topography, etc	Estimated area for the domain (ha)	Important socioeconomic factors?	Important farmer characteristics?
1.				
2				
3.				

8. Stakeholder analysis

A number of stakeholders, institutions and/or service organizations directly or indirectly influence the farming and related rural development activities in the study village. An analysis of the institutions and stakeholders related farming of the study area is important to assess their relative influence and contributions to farming. This analysis will also help to identify suitable partners for project implementation. Figure 1 shows an example of institutional and stakeholder linkages in Vandayariruppu village, Tamil Nadu, India.

Figure 1. Institutional and stakeholder linkages with farmers in Vandayariruppu village, Tamil Nadu, India (2001)



9. Problem analysis and prioritization

Once the maps are completed, discuss with farmers and local staff as a single large group (plenary) to identify problems and issues by adopting the following procedure.

- Let farmers enumerate their problems one by one and list them all on a white board or a flip chart (brown paper). Problems may be technical and/or infrastructure-/policy-related.
- Request farmers to choose, by consensus, five problems they consider most important. Keep this list of farmer-perceived priority problems separately.
- Make a ranking matrix of all problems: Discuss the problems one by one and assign scores (1 to 5) for each problem using the different criteria given in Table 5. Farmers in some countries may not be comfortable in dealing with abstract numbers for scoring. Then, try to design a method (cards, sticks, raising fingers, etc. to indicate their scores for various problems) to facilitate farmers' active participation in the prioritization exercise.
- Note: Please note that certain criteria such as 'area affected' will be applicable only to field problems, and not to problems related to storage, cash flow, etc.
- From ranking matrix, sum up the scores for each problem and prioritize them based on total scores. If total scores for different problems are very close to each other (e.g. 24.0, 24.5, & 25.0), treat them as one category for prioritization purpose. In other words, adopt the range of scores (e.g. I = 24-25; II = 22-23; III = 21-22, IV = 19-20, and V = 17-18) rather than absolute scores for prioritizing problems. Continuously check with farmers and get their consensus during this process.
- Note: For pests, develop relative criterion-scores and ranking for individual insect pests and diseases.
- Compare the top five problems derived from this process with the five most important problems mentioned by farmers earlier. Often, they will tally. If not, explain to farmers the differences in their perception and arrive at a consensus on priority problems. It is important that farmers agree with your prioritized problems.

Table 5. Criteria and scoring for prioritizing farmers' problems

Problem	Scoring: 1 to 5*							
	Area affected	Frequency of occurrence	Extent of damage	Estimated yield loss	Feasibility of solution	Others	Total score	Rank

* Scores: 1. Very low; 2. Low; 3. Medium; 4. Fairly high; 5. Very high

Note: In Table 5, the first four criteria refer to severity of problems, while the criteria of "Feasibility of solution' looks at the level of efforts needed to solve a problem. This criterion ('Feasibility of solution') can be removed from Table 5, if the participants do not feel comfortable dealing with it.

Note: In the discussion process, the facilitators, researchers and extension staff must be very careful not to push their own agenda onto the farmers. If farmers are not aware of a problem or an option, then it can be noted as a possible technology for field demonstration. Generally, farmers are not convinced by what the researchers say about a technology, until they themselves see the results in their fields. To get the most out of this exercise, participants should follow certain points:

- Keep an open mind and listen more to what the farmers have to say so as to learn from them.
- Do not push your own agenda (e.g. a technology, a tool, or a concept you have developed that you think will solve certain farmers' problems).
- Make the farmers feel that you are truly interested in learning about what they think and do with regard to the topic at hand.
- Be conversational. The field interview is some sort of directed story telling where you probe and pursue issues that come out during the conversation.
- Empathize - try to be on equal footing with farmers in order to establish rapport and build trust.
- Although you have more expertise, never engage the farmers in a debate nor pass judgment on their views or practices. Always remember your objectives in talking to farmers – to learn what they are doing, find out their problems, identify the root causes, and perhaps explore how your "tool" could find a way into their crop management and decision-making system.

"Perceptions versus reality": An important goal of the NOA is to discover the understanding of the farmers in relation to their perceptions of problems and what are actual problems. At times farmers may perceive a problem that is not really serious (or they may have identified the wrong cause of a problem). At other times they may not be aware of a problem. Knowing the perceptions of the farmers is important as this represents their "reality". The following table summarizes these factors and shows the appropriate response to each.

	Farmers perceive a problem	**Farmers do not perceive a problem**
Factor is "really" a Problem	OK – Jointly look for solutions	Need to raise awareness of farmers
Factor is not "really" a problem	Need to help change farmer understanding	OK – no action required.

10. Synthesis meeting of the day's activities

Members of the NOA team will meet in the late afternoon or after dinner and discuss the day's activities, experiences, and the information collected. The facilitator will:

- Let each member express their experiences in relation to their expectations.
- Synthesize the additional information on farming practices and related issues collected from discussions with farmers to complete the remaining column of Table 3 on perceptions of farming practices and related issues by research + extension staff after the transect walk and discussion with farmers.
- Plan the strategies for the activities of the next day, paying careful attention to enhance farmers' interest and active participation in all activities and to get to factual information as much as possible.
- Identify knowledge gaps and consider what would be the incentives for farmers to change their present practices.

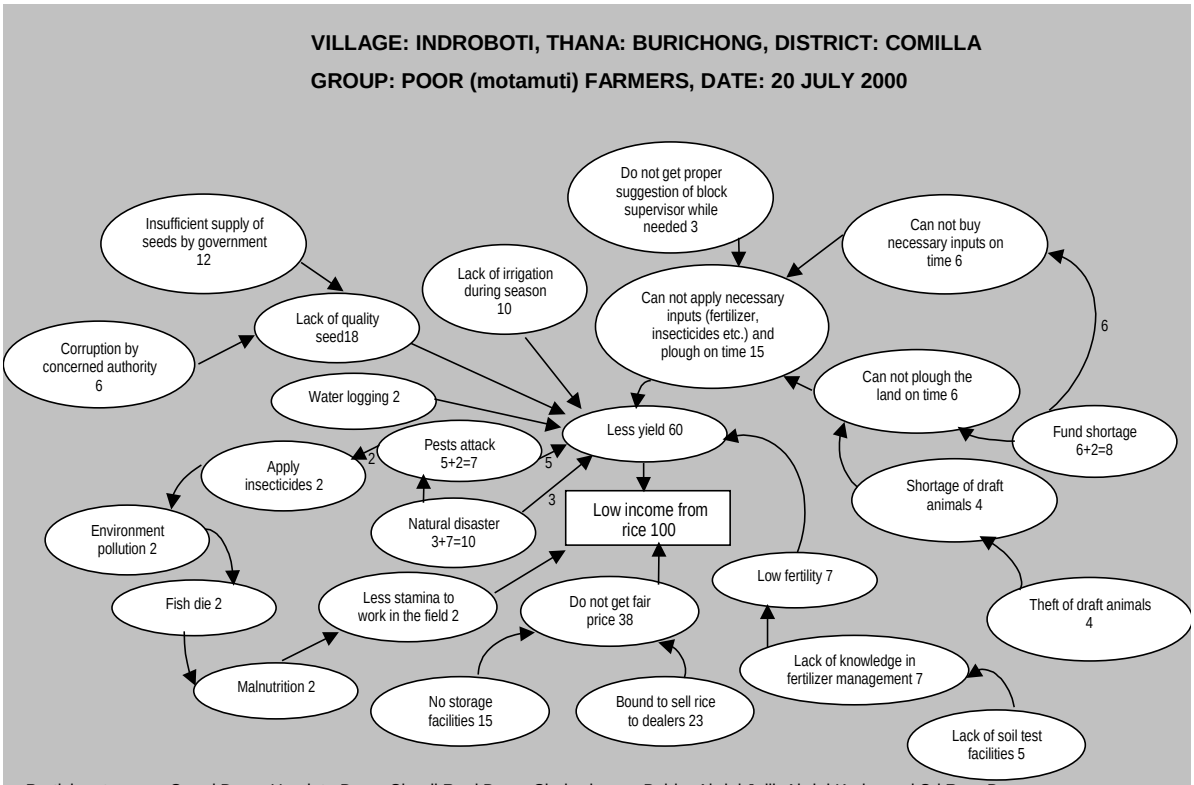
11. Causal analysis and construction of the problems tree

Day 2: Causal analysis helps to examine the causes and effects of problems and to identify the root causes that need to be addressed. A problem may have several causes including a link with other problems. The facilitator(s) will use the cue cards to record the responses of farmers and other stakeholders with respect to causes for each problem. Finally, the participants will differentiate and record the intermediate and root causes for each problem, using Table 6 as a guide. We must address the root causes to solve a problem satisfactorily.

Table 6. List of intermediate and root causes of problems

Problem	**Intermediate cause(s)**				**Root cause(s)**	
e.g. High cost of fertilizers	Poor availability	Poor roads	High transport cost		High import duty	Monopoly of dealers
e.g., Stemborer attack	Wide spread of planting dates				Water not available when needed for planting	

Select the priority problems for further analysis to determine the root causes and if needed, prepare the problem-cause diagrams (problem tree). Here is an example of the Problem-Cause diagram from Bangladesh.



12. Developing solutions – farmers' and researchers' solutions to problems

One person should facilitate the discussion among farmers, local staff, and other stakeholders on possible solutions to identified problems and suggestions to exploit potential opportunities. First, encourage the farmers to come up with their own solutions to prioritized problems. Then, let researchers present the technology options and other interventions to address the same set of problems. The facilitator will:

- Use cue cards to record and post suggestions first from farmers and then researchers on a board or on a flip chart paper for all to see and react.
- Record both farmer-suggested local knowledge solutions and researcher-proposed technical options (Table 7).
- Develop a consensus on a set of options for further action (selected options). Four types of options will emerge: (a) Options ready for delivery or expansion; (b) Options requiring on-farm validation; (c) Issues requiring further research (research gaps); and (d) Policy and infrastructure related issues.

Listen to and learn from good farmers

Table 7. Selection of options for addressing problems

Problem	Cause(s)	Farmers' solutions /options	Scientists' solutions/options	Selected option

13. Matching solutions with farmers' needs and circumstances

Careful matching of proposed solutions with farmers' needs and circumstances is critical. Let farmers express their opinion on the utility and compatibility of selected solutions and/or technology options to their own circumstances and needs. Use the criteria given in Table 8 to analyze farmers' opinions on technology options. Again use the cue cards to record and post the responses on a board or paper for all to see and react. If total scores for different solutions/options are very close to each other (e.g. 28.0, 28.5, & 29.0), then treat them as one category for determining the level of farmer acceptability of selected solutions/options. In other words, adopt the range of scores (e.g. I = 28-30; II = 25-27; III = 22-24, IV = 19-21, and V = 16-18) rather than absolute scores for prioritizing solutions/options. Continuously check with farmers and get their consensus during this process. Farmers generally prefer technology options that have low risk, high benefits, low labor requirement, and low input costs, that are easy to learn, and that will fit the existing farming systems well. Finally, get local farmers' consensus and agreement to try out in their farms the commonly agreed solutions to their problems through participatory evaluation and adaptation.

Table 8. Matching solutions with farmers' circumstances and needs to determine the probability success or the potential level of farmer adoption.

Technology options	Farmers' scores: 1-5*							Total scores	Rank
	Benefits	Risks	Costs of inputs	Addi-tional labor need	Learn to use	Fit with farming system	Other		

* Scores

Benefits: 1. Very low; 2. Low; 3. Moderate; 4. High; 5. Very high
Risks: 1. Very high; 2. High; 3. Moderate; 4. Low; 5. Very low
Cost of inputs: 1. Very high; 2. High; 3. Moderate; 4. Low; 5. Very low
Labor need: 1. Very high; 2. High; 3. Moderate; 4. Low; 5. Very Low
Learn to use: 1. Very difficult; 2. Difficult; 3. Less difficult; 4. Easy; 5. Very easy
Fit with FS: 1. Very poor; 2. Poor; 3. Moderate; 4. Good; 5. Very good

14. Preparation of the NOA report

After completing the field activities, the local partners will further analyze the data, refine the results, and prepare the report. The possible outline of a full report is given below.

1. Introduction
2. Site selection and characterization (based on secondary data and survey results)
3. Probable domains (2-3) and their characteristics
4. Current agronomic practices and level of technology use
5. Perception of farming practices and issues by researchers + extension staff before and after NOA (discussion with farmers in the field).
6. Stakeholder analysis
7. Priority problems as validated by farmers
8. Causal analysis with diagram and/or Table of intermediate and root causes
9. Proposed solutions and their suitability to farmers
    - Options/solutions requiring institutional and/or policy interventions
    - Research gaps (problems requiring research)
    - Options requiring on-farm validation
    - Options ready for expansion or dissemination
10. Next steps
11. Conclusions

The above will provide a full documentation of the process. If the above data is available and the exercise is a follow-up to a previous NOA or other survey, then the key points to record are Tables 1,2,3,4 and 7.

15. Next steps: Development of an action plan

Develop an action plan including all the follow up activities and assign responsibility to appropriate local staff for implementation.

For options ready for delivery

- Identify the domain(s) where the technology fits in most.
- Develop criteria and simple protocol for farmer testing of delivery options.
- Design testing procedure; e.g. key farmers with test or demonstration plots.

- Identify and train partners to work with farmers for testing the options in their fields.
- Farmers' Day for key farmers to explain the test/demo results to fellow farmers.
- Distil the information (option) to key principles and in simple language so the message can be passed on to farmers at large.
- Develop strategies for packaging the message to attract farmers' attention.
- Identify the types of partners and mass media for spreading the message.

For technology options that require on-farm validation or verification

- Develop simple on-farm experimental designs to evaluate and/or verify the technology options in farmers' fields.
- Researchers/extension staff and farmers jointly execute the trials and collect the data.
- Identify and train local partners to work with farmers in evaluating the technology options in their fields and to collect the data.
- Farmers' Day for farmer-evaluators to explain the technology evaluation results to fellow farmers and others.
- Finally, develop delivery strategies for successful technology options.

For problems that require further research (research gaps)

- Convey research gaps or researchable issues to researchers.

<u>For problems and issues related to infrastructure and/or policy</u>

- Convey infrastructure and policy related issues to decision-makers in the government for positive action.
- Work with decisions-makers to address the policy-related issues and develop a favorable environment for affected farmers to operate efficiently.
- Wherever possible, make arrangements for farmers to interact with concerned government authorities directly or through any communication system to discuss and, if possible, resolve their policy-related problems and issues.
- Work with decision-makers to create an environment for enhanced farmer adoption of new technologies.

Table 9 provides an example of the action plan developed for Vandayariruppu village, Tamil Nadu, India.

Table 9. An example of the action plan developed for Vandayariruppu village (Tamil Nadu, India) to solve the identified problems (July 2001)

Rank	**Matching solution identified**	**Category of solutions**	**Action plan**
I	a) IPM training (cultural practices, INM)	Dissemination	SWMRI will give hands on training to the farmers of Vandayariruppu on all aspects of IPM including cultural practices and INM.
	b) Crop rotation	Research issue	SWMRI will evaluate the proposed cropping pattern of pulse – rice – pulse in a small area in Vandayariruppu village.
II	a) Mechanization	Dissemination	On farm demonstration will be conducted on the use of land leveler attached with tractor, rice transplanter, and combine harvester.
	b) Direct seeding	Validation	SWMRI will organize on farm trials on the use of drum seeder for direct wet seeding.
	c) Dealers training	Dissemination	Training will be given to local pesticide retailers on the *technical know how* and on selection and use of pesticides & herbicides.
	d) Nursery weed management	Dissemination	On farm demonstrations on the proper use of herbicides to control weeds in nursery.
III	a) Balanced nutrition	Validation	SWMRI will conduct on-farm SSNM trials and train farmers on balanced NPK use.
	b) Training on herbicide use	Dissemination	SWMRI will train farmers on the selection and proper use of herbicides.
	c) Training on seed production	Dissemination	SWMRI will train farmer seed producers in the village on quality seed production & processing
Nil	Credit	Policy	Consistent government policy on farm credit is needed; Linking of government rice procurement agency (TNCSC) and banks for loan disbursement and recovery; & Farmer clubs to facilitate credit management.
	Milk producer cooperative for higher income	Policy	Assistance to Tamil Nadu Women Association (TANWA) entrepreneurs to form the milk producer cooperative in the village.
	Community threshing floor	Infrastructure	Work with District Rural Development Agency to construct threshing floors in the village.
	Irrigation canal maintenance	Policy/ Infrastructure	Farmers in Vandayariruppu to form the irrigation group, collect money for farmers' fund, and contact the Irrigation Management and Training Institute (IMTI) to get matching grants for deposit in the bank. The interest will be used for maintenance of canals.
	Deep tubewell for irrigation	Policy/ infrastructure	Organize bank loans for tubewell construction by groups of farmers.
	Govt. dev. Schemes not publicized to people	Policy issue	Will be forwarded to Govt. decision makers.

16. Establishment of baseline for monitoring progress

- Identify key variables to establish the baseline in relation to chosen technology options.
- Develop a simple methodology including the questionnaire for data collection.
- Conduct individual farmer-survey to collect the data.
- Establish a simple and common database for all sites for data entry, analysis and management.
- Train the local partners on data analysis and database management.
- Analyze the data and establish the baseline information for key variables.

17. Impressions of the participants on the benefits of NOA

Participants of NOA training courses in various countries provided the following impressions about the NOA exercise. NOA:

- Exposes the research and extension staff to the holistic view of farming and the real-world situation, in which farmers live and work.
- Traces all the stakeholders and institutions that influence farmers and farming in the study area.
- Gives an opportunity for direct interaction with farmers and other stakeholders.
- Is an interactive learning for all participants including farmers.
- Facilitates good feedback and suggestions from farmers on various issues.
- Is an user-based approach to tackle farmers' problems and provides better clue to develop an action plan.
- Enhances the awareness of all concerned on problem–solution relationship and shows linkages of various issues and problems.
- Helps farmers develop a common understanding of problems, causes, and potentials in the study area.
- Gives scientists more ideas for planning research on actual field problems (resulting in higher relevance of research to field problems).
- Helps researchers develop a common understanding of complex, multidisciplinary problems that confront farmers.
- Helps research managers to identify multidisciplinary projects based on actual field problems.

- Creates awareness among farmers about new and/or existing technologies that could solve their problems.
- Facilitates the transfer of technologies.
- Provides a better understanding of farmers' constraints while adopting new technologies.
- Helps in the clarification and/or removal of certain myths or mis-beliefs in farming.
- Helps develop a joint action plan for follow up during project implementation.
- Helps fix responsibility for each stakeholder in the implementation of the jointly agreed action plan.
- Develops a better linkage between providers and users as well as with other stakeholders.
- Increases the confidence of research and extension staff in effectively interacting and/or working with farmers.
- Increases farmers' confidence on and respect to research and extension workers who they view as genuine helpers.
- Enhances administrators' and policy makers' recognition of field-oriented scientists and other staff.
- Facilitates a joint action on policy-related issues by the institutions concerned.
- Develops a lighthouse site for training on successful strategies and technologies.

18. NOA training folder

Based on the participants' responses, the following items need to be included in the NOA Training Folder or Kit.

- A copy of NOA paper
- Transparencies / Flip charts / Slides of NOA power point presentation
- A copy of model NOA report
- A set of NOA field survey sheets
- A set of Tables for use in problem and solution analysis
- Examples of resource maps, rainfall distribution vs. cropping pattern, yield trends over 5-10 years, stakeholder diagram, problem tree diagram, etc.
- An information sheet on how to facilitate interactive discussion with farmers
- An information sheet on how to use cue cards for recording the salient points of discussions

- List of logistics and supplies including audiovisual equipment and camera needed for NOA
- A model program for a 2-day NOA exercise
- A model budget for conducting a 2-day NOA

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Annex 1. A model program for NOA (2 days field work + consultation with farmers)

Day of arrival at the site

1500: Arrival at the NOA site
1530-1700: Courtesy calls and meeting with local govt. authorities and village leaders.
1900-2000: Dinner at hotel
2030-2230: First meeting of NOA team members to plan for next day activities. (This can be done during the afternoon if time allows)

Day 1

0900-0930: Introductory meeting with farmers and local leaders
0930-1000: Coffee break
1000-1015: Divide into 3-4 small groups for transect walk & assign a facilitator for each group
1030-1300: Transect walk
1300-1400: Lunch
1400-1530: Site characterization and mapping (small groups)
1530-1600: Coffee break
1600-1730: Problem identification and prioritization (Plenary)
1730: Return to hotel
1830-1930: Dinner
2000-2200: Second meeting of NOA Team to review: Synthesis of day's activities

Day 2

0900-1030: Problem-cause analysis
1030-1100: Coffee break
1100-1230: Identifying farmers' local knowledge and researchers' technical solutions to problems
1230-1330: Lunch
1330-1430: Presentation of some potential technologies by researchers
1430-1600: Matching solutions with farmers' needs and circumstances
1600-1630: Coffee break
1630-1700: Wrap up session with farmers and local leaders
1700: Leave for hotel
1900-2000: Dinner
2000-2200: Third review meeting of NOA team: Synthesis and plan for next steps

Day of return to respective institutions

0800-1000: Third review meeting of NOA team (continue, if necessary)
1000-1030: Coffee break
1030-1200: Action plan: Discussion on next steps and follow up activities
1200-1300: Lunch
1300: Leave for respective institutions

Annex 2. Quick survey on the go in a car

You can make use of your time travelling in the car to quickly assess the field situation in an area. Pick fields randomly. Start with any field and fill in the observations for that field. When finished, document the next field seen – do not select. This can be done as a group to encourage interaction amongst the car group.

Date: _____ Name of staff: _____ Area/region: _____

Fields #	Crop stage (1-9)	Crop uniformity (Y/N)		Weeds obvious (Y/N)	Crop color	Comments
		Height	Spatial			
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
etc.						

Crop stages:
Vegetative: 0 = Germination; 1 = Seedling; 2 = Tillering; 3 = Stem elongation
Reproductive (35 days): 4 = Panicle initiation to Boot; 5 = Heading; 6 = Flowering
Ripening (30 days): 7 = Milk; 8 = Dough; 9 = Mature

Annex 3. Crop Management Survey Sheet (CMSS)

Site/region:_____ Season: _____ Year: _____

Production factor	Priority	Done by whom?*	Present practice	Preferred scenario	Comments (Cause, if a major problem)
Cropping systems/ crop rotations		Not applicable			
Land preparation					
Primary tillage					
Residue management					
Secondary tillage					
Land leveling					
Timeliness					
Varieties		Not applicable			
Current varieties					
Expected PI					
Expected flowering					
Expected maturity					
Crop establishment					
Seed quality		Not applicable			
Planting date					
Timeliness					
Planting method					
If direct seeding, seed rate (kg/ha)					
If transplanting, nursery type (wet, dry, dapog)					
Seedling age (days)					
Spacing (cm x cm)					
Seedlings per hill					

* By hired labor (male or female) or family labor (male or female).

Production factor	Priority	Done by whom?	Present practice	Preferred	Comments (Cause, if a major problem)
Weed control					
Herbicide					
Manual, how many, when					
Nutrition & fertilizer use					
Type & amount (kg/ha)		Not applicable			
Timing (when applied?)					
Balanced NPK use?					
Micronutrients applied?					
Organic manure used?					
Pests					
Insects					
Stemborer, leaf roller, rice bug, Brown plant hopper, sting bug		Not applicable			
Diseases					
Blast, sheath blight, BLB, Tungro, grain discoloration		Not applicable			
Rats		Not applicable			
Snails		Not applicable			
Water management					
Irrigation type: canal, pump, well, etc.		Not applicable			
Water level at vegetative phase					
Water level at flowering/maturity phase					
Water table level					
Drought/flood damage					

Post-production factor	Priority	Done by whom?	Present practice	Preferred	Comments (Cause, if a major problem)
Harvest					
Reaping/cutting & hauling					
Threshing					
Cleaning					
Drying					
Storage					
Milling					
Grain quality		Not applicable			
Seed processing					
By product use (straw, rice hull, ash, etc.)		Not applicable			
Marketing, rice price					
Knowledge access, extension					
Credit availability					
Labor cost, availability		Not applicable			
Inputs cost, availability		Not applicable			
Land tenure		Not applicable			
Own					
Rent					
Share cropping					
Average yield		Not applicable			
Highest recorded yield					
Yield gap					
Significance of rice in household income					
Farm animals		Not applicable			
Off-farm employment					
Others (specify)					

Annex 4. Field observation & farmer survey sheet

Date: _____ Name of staff: _____ Area/region: _____

(The following page lists possible descriptors for observations)

Factor	Field 1	Field 2	Field 3	Field 4	Field 5	Field 6	Field 7
Crop stage							
Variety							
Crop stand							
Planting method							
Crop uniformity Height/Spatial Variety mix?							
Extent of irregular patches							
Extent of tillering							
Root health							
Leaf health Flag leaf (size/health)							
Panicle size & health							
Apparent cause							
Weeds: Extent Practice							
Insects: Extent Practice							
Diseases: Extent Practice							
Nutrition: Plant health Practice							
Water management Field condition Levelness of field							
Post-production observations							
Apparent primary problems							

Crop stages:

Vegetative: 0 = Germination; 1 = Seedling; 2 = Tillering; 3 = Stem elongation

Reproductive (35 days): 4 = Panicle initiation to Boot; 5 = Heading; 6 = Flowering

Ripening (30 days): 7 = Milk; 8 = Dough; 9 = Mature

Factor	Possible descriptors
Crop stage	0-9
Variety	
Crop stand	Good/bad or actual count
Planting method	Transplanted (TP), Wet Direct Seeded (WDS) or Dry direct Seeded (DDS)
Crop uniformity Height/Spatial Variety mix?	
Extent of irregular patches	Estimate in percent
Extent of tillering	Normal higher or lower than expected
Root health	Color and/or extent of rooting
Leaf health Flag leaf (size/health)	Good or problems
Panicle size & health	Good or poor
Apparent causes	
Weeds: Extent Practice	Obvious – expected to be a problem (Y/N)
Insects: Extent Practice	Obvious – expected to be a problem (Y/N)
Diseases: Extent Practice	Obvious – expected to be a problem (Y/N)
Nutrition: Plant health Practice	Good or poor – obvious problems?
Water management Field condition Levelness of field	 OK (Wet) or dry – water depth Obvious high or low spots?
Post-production observations	
Apparent primary problems	

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