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## New Approaches to Evaluation

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### Abstract

The paper presents four approaches to evaluation for assessing situations and outcomes where simple linear cause and effect analysis is not useful or possible. Typically they address situations at the interface of human uses of agricultural and natural resources. The strengths and limitations of each for the evaluation of FFS are discussed. They are embedded in theories of systems learning and are oriented toward the facilitation of change through action-oriented discourse among those who have a stake in the change process. Potentially, nos. 3 and 4 are pivotal, in allowing information to be incorporated in a dialogic platform (social space) that could inform action at higher decision levels.

Evaluation Type	Primary Focus	By Whom	Methods (examples)
Self-evaluation (1)	Sustainable livelihoods analysis	Primary actors and facilitators	SLA framework
Self-evaluation (2)	Effects and impacts data recording and analysis	Primary actors and facilitators	Foto-reportage, self-reporting forms, diagrams
Social learning	Multi-scale (temporal, spatial) consequence analysis	Facilitators, researchers, primary actors	Satellite imaging + GIS + MAS + gaming
Evidence-based communication	Policy-making	Informed specialists (including primary actors).	Multi-actor synthesis of evidence/perspective

## I. Introduction: Evaluation as a Tool for Systems Management

All evaluation tools *reveal*; they also *conceal*. Conventional evaluation methods tend to reveal the things that those outside the activity of interest want to know yet fail to provide

feedback on the things of importance to those who are most intimately concerned with managing the activity (Becker and Vanclay, eds., 2002, in press).. The focus of this paper is on evaluation as a means by which the participants in an activity of interest can gain feedback on the effects of their actions, and make adjustments in the light of what is learned. When stakeholders collaboratively define the evaluation issues, collect and analyse the data they think are relevant to those issues, and take action as a result of what they learn through the process, then participatory evaluation can serve also the purpose of *empowerment*.

The concept of *feedback* is embedded in systems thinking. In a closed system, a regulator such as a temperature device on a hot water system, triggers action to maintain the water at the desired heat. In an open system, what is desired, the triggers for action, the actions that transform the state of the system, and the boundaries of the system, interact dynamically. In open systems managed by people, the dynamic interaction among the elements in the system is strongly shaped by the relationships among people, such that:

- The ‘purpose of the system’ (i.e. what is desired) must be negotiated, not assumed;
- The ‘boundaries of the system’ (i.e. what is included in the activity of interest) are usually contested; the decision to call something ‘a system’, and the boundaries that are drawn around the system through interactive negotiation, are social constructs, not givens;
- The triggers for action are often poorly perceived. While economists might wish to reduce all triggers for action to price signals, it is clear that (a) value changes that arise independent of market relations, as well as other normative triggers such as concepts of personal or ecosystem health; and (b), environmental triggers (such as perception of the death of pollinators as a result of toxic synthetic chemical use), can be as powerful as economic triggers;
- Part of the success in managing open dynamic systems toward desired ends rests on *making visible* the events or processes that should trigger action (for example, in the IPM case, making visible pest-predator relations, or the effects of toxic chemicals on human health, as triggers to stop using toxic chemicals and to manage cropping in another way);
- the transforming actions give rise to effects. By monitoring the effects, the participants in the activity of interest can assess if they should (a) adjust the purpose (the original

purpose might not any longer seem the sensible or only thing to be doing); (b) develop better understanding of the relationships (among people, between people and their environment) that should trigger actions; (c) adjust their actions;

- For (a), (b), and (c) above to be effective in purposive management, learning processes need to be supported. For learning to be effective at system scales, deliberate effort is needed to create *social spaces* in which stakeholders can discuss and share who should be learning, what should be observed, how what is observed might be measured, how to interpret the outcome, and what might be done (the options for action, by whom) as a result of the findings.

## II. Self-Evaluation (1)

The example given here is drawn from a study conducted by Seema Khot, a senior researcher working for the NGO, BAIF, in India, that was commissioned by the Mid-Term Review of the Global IPM Facility (Annex B9: 1-15 in FAO 2002). The purpose of the study was to assess the effects and impacts<sup>1</sup> of IPM FFS on farmers' livelihoods in the Soroti District of Uganda. The framework of 'sustainable livelihoods analysis' (SLA), and a participatory research process, were used. The aim was not simply to *elicit* stakeholder perceptions but to involve as researchers the stakeholders positioned at various levels of the system of interest.

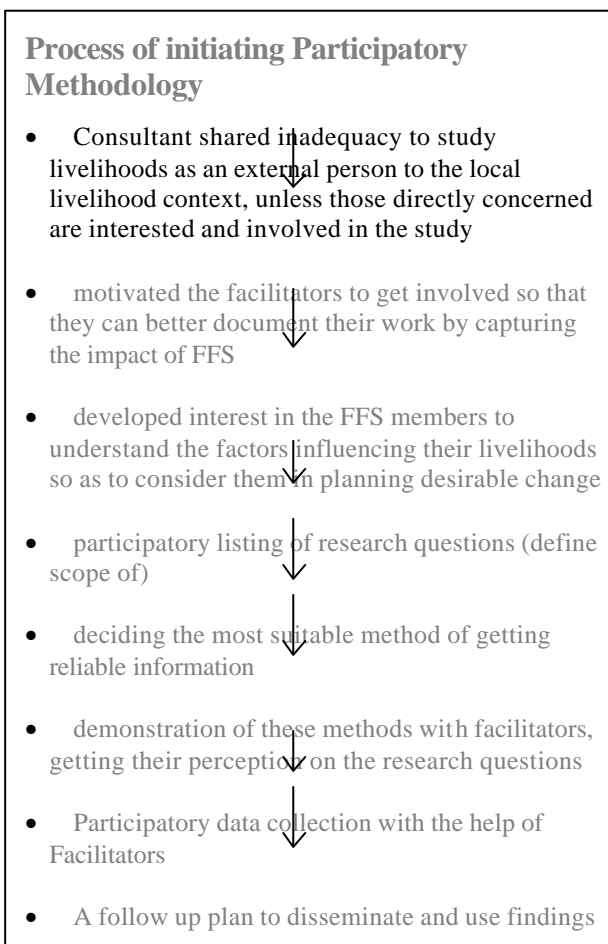
**Establishing ethical groundrules:** Seema Khot began by making family visits and holding small group meetings with the Project Staff, and farmer members and facilitators of FFS, to introduce herself and the purpose of her visit. To establish her credentials she shared information about the farmers' groups she works with in India, taking her audience into her own history and experience. She discussed openly whether they were interested or not in reviewing the effects of FFS on their lives, did not hide the fact that she had been asked to study the impact of FFS, and suggested that it was possible to design the study together and for them to use the findings for planning their own future. In brief, she positioned herself as 'an ethical researcher', a commitment that many consultants fail to honour.

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<sup>1</sup> An effect is here taken to mean the direct or immediate consequence of an action (as in 'cause and effect'); an impact is the longer term or diffuse consequence. Impacts are more difficult to attribute to an action, and typically carry contested meanings and value, depending on the position of the perceiver. Typically, so-called 'objective impact assessments' fail to ask of any impact the question: *from whose point of view (is this considered good or bad, better or worse) ?*, and often also fail to consider the range of impacts that actors in the system themselves would consider important, or, by drawing their *own* boundaries around 'the system', fail to include the full range of actors who in fact own the system or who carry out key transforming actions.

**Launching the process:** A series of questions were posed, such as: *what are your most common concerns?*, *what would you like to study about your livelihoods ?*, *what kind of information will help you understand and shape your FFS better ?*, *what is your vision of a better life ? do you see any role for FFS in realizing your vision ?*, *how might the FFS do this and, do you want to know how FFS function in other places ?* . The responses defined the research questions that determined the scope of the study. The following factors also favoured the involvement of all stakeholders in the process of participatory study design and later in actual information gathering and interpretation:

- A positive experience of FFS and visible impact of training on individual plantations and crop yields,
- Eagerness of FFS members and non-members to share their individual experiences;
- Facilitators keen on documenting success, and need to collate their experiences,
- Introduction of the consultant as someone with background in development sector and experience of working with farmer organisations (like FFS) in India, for promotion of Sustainable Livelihoods, and not as evaluator.
- Invitation to look at the study as an opportunity to review their own livelihood situation and its connection with FFS in order to improve / plan desirable impact. This future orientation for planning rather than analysis of the past helped to stimulate the farmers' curiosity.
- Orientation to the SLA framework through participatory techniques in the process of defining the Study, and listing aspects of livelihoods and their inter-relatedness, along with the farmers.



The following elements of the design of the evaluation were collectively determined at planning meetings and during preliminary field visits:

- the focus of the study, encapsulated in Research Questions
- the methods of data collection
- the sources of information
- the sampling frame (encompassing socio-economic, agro-ecosystem, and time since FFS was held, as selection criteria)

- the consent of FFS members, to share information and participate as researchers
- the availability of the Facilitators.

A classroom exercise followed, in which five National FFS facilitators plotted the livelihood assets they considered important, and related changes in the ‘state’ of these assets to IPM and the FFS programme. Their reactions to the exercise were as follows,

“*. this framework can help us understand the relevance of our work,* “

“*. we could see the positive results of FFS, but could not express those in concrete terms”*,

“*. this framework will help us document the impact better”*

“ *the pentagon of asset status before and after – is easy to understand even by illiterates”*

“ *we can use this pentagon for plotting vision and planning to achieve it, along with farmers’*

In the event, approximately 100 farmers (50 women and 40 men members of FFS and at least 10 non-members), 3 Farmer facilitators, and the 5 National facilitators, comprised the actual Research Team. Two district officers, the Project Coordinator, and Seema Khot facilitated the process. The Team decided the study should cover four main themes: Vulnerability Context; Livelihood Outcomes; Sustainability of Livelihoods (Asset Analysis); Stresses and Shocks. The whole exercise took only two and a half weeks. The most important limitation of the whole process was considered to be that the *report* of the study remains a report as “understood by the consultant” (compare with farmer-controlled reporting, presented in the next section on Self-Evaluation (2)).

In the next few pages, examples are given of the kinds of rich data and surprising insights that can emerge from participatory impact research., illustrated by the findings under the two theme headings of the Vulnerability Context, and Livelihood Outcomes. These two have been selected purposively here, to demonstrate how feedback on sensitive topics such as the trauma of civil conflict, and hunger, can be formalised in ways that stimulate shared learning, planning, and new cycles of action.

**Generating rich data, surprising insights:** The District Officer from the start of the research stressed the feelings of vulnerability that people in the district still experienced, and speculated that, in this context, the ‘opportunity to learn together’ in the FFS was having a profound and subtle effect that needed to be better understood. The Research Team thus

invited FFS members and non-members to define the context in terms of the five headings of SLA. The main points that surfaced were:

#### *Human Capital*

- The brutal killing of men, women and children, rape, destruction of common properties and theft of around a million cattle, arising from civil strife (1980s-90s), has become an important determinant of social psychology.
- Fear of being attacked if seen with cattle and better housing, has led to a fear of well being. *'If we have more we may be robbed'. 'Prosperity can cause victimization'. 'Better to remain invisible'*
- The central government's decentralization policy had led to retrenchment of local Extension staff (from 400 in 1991 to only 30 in 2000), and the devolution of agricultural development responsibility to Local Government.

#### *Social Capital*

- The insurgency has led to strict government control. A serious decentralization process has been in progress over the last 6 years, but the local communities have very high expectations of Government for protection, rehabilitation and resources. The initiatives for self-help are affected by this common attitude.

#### *Financial Capital*

- Due to fear of being attacked, the mobility of all, especially of women, is severely restricted. Many have not seen the next town or travelled to bigger markets. Difficulties in marketing produce, or gaining access to seeds etc. is seen as one reason for apathy toward increasing production. *"What is the use of growing if it can not be sold. Grow only as much as you need"*.
- Alienation from mainstream markets (due to restricted mobility and poor communication facilities), has affected their Financial Capital.
- Cattle herds used to be the main source of livelihood. Beef was an important source of protein and grazing helped sustain the grass lands. As the cattle were raided, the people were forced into cultivation. Beef production dropped practically to nil, and this disturbed dietary patterns. Agriculture did not come easily to local communities but became the major source of livelihood within one generation.

#### *Natural Capital*

- The weather conditions directly influence livelihoods. There are two rainy seasons and a moderate temperature range (5 to 30 degrees). This provides a wide scope for crop diversity. However, the onset of the rains is variable and drought (according to Soroti farmers) is a common feature in alternate years. Long dry spells mid-season often lead to partial (if not complete) loss of crops.
- Land development and long term crop planning is perceived as having too many "ifs" and "buts". Hardly any farmer undertakes perennial plantation. Development of the land, water, vegetation is neglected, as the efforts are feared to go waste in the face of the erratic rainfall.

#### *Physical Capital*

- Remains under-developed in conditions of continuing insecurity.
- Land rights are customary, held in the name of lineages. Very few families have land titles and the legal procedures for securing those are reported to be tedious, time consuming (and often corrupt). This situation is perceived as affecting land based livelihoods in two ways: most of the land to which a family potentially has access (20 to 200 hectares) remains uncultivated; there are no incentives for land development and perennial plantation.
- Hand-tools (hoe) limit capacity to cultivate; reduced bullock power has resulted in decreased cultivation potential, and perpetuation of reliance on hoes.

A series of Focus Group Discussions on the impact of the FFS were conducted by the Research Team with the three main categories of stakeholders: farm families, the facilitators

and the District Officers. From the combined Focus Group results, the following five changes were identified as consistently perceived across all stakeholder categories as very significant: Increased food security; Improved agricultural practices; Diversified sources of livelihood; Better quality of life.

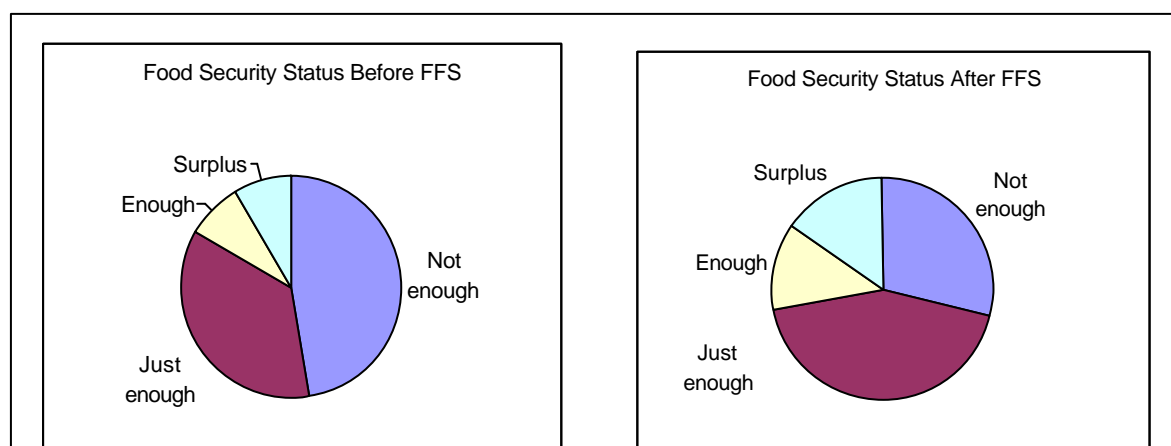
The discussions on the effects and impact of the FFS on food security provoked especial enthusiasm. The definition of food security and insecurity that became accepted by the Research Team was first made by an all-women FFS, “Madera United” (Table 1) .

Table 1: Food Security and Insecurity

<p><u>Definition of food insecurity</u></p> <ul style="list-style-type: none"> <li>• <i>Not having enough to eat for all family members throughout the year</i></li> <li>• <i>Having to go to bed without food</i></li> <li>• <i>Not being sure of tomorrow’s meal</i></li> <li>• <i>Eating less than required – even one family member</i></li> <li>• <i>Being hungry / hunger deaths</i></li> <li>• <i>Not having grains at the time of plantation of next crop</i></li> <li>• <i>Days in dry spell when food is not cooked , stove is not lit</i></li> </ul> <p><u>Definition of food security</u></p> <ul style="list-style-type: none"> <li>• <i>All family members getting breakfast, lunch and dinner</i></li> <li>• <i>having at least one bag of millets in store at all times</i></li> <li>• <i>some food left after everybody has eaten</i></li> <li>• <i>2 bag grains / per person/per annum</i></li> <li>• <i>last seasons grains in store until the next crop comes</i></li> </ul>
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Source: FGD with Madera United FFS, Facilitated by Charles Aben on 12/4/2001 & with 5 Facilitators from Kalaki, Kamuda, Kyere, Bugando, & Kagwara sub counties on 16/4/2001

The two figures below, on the ‘before and after’ changes, were contributed by Facilitators



Source: FGD with Facilitators from Kalaki, Kamuda, Kyere, Bugando, & Kagwara sub counties, on 16/4/2001

from 5 sub counties, (Kalaki, Kamuda, Kyere, Bugando, & Kagwara). Their assessment of the food availability situation of all the members from 5 FFS, before and after membership in an FFS, was plotted on graphs and pie charts (see figures above) by the Facilitators. FFS

members who had completed at least two years, were selected for deeper analysis. The Facilitators listed the families and noted the food security status of each family, as they perceived it:

- About 47% (by head count in 5 FFS) families were food insecure, four years ago, now this number is reduced 29%,
- Families having ‘just enough’ food were 35%, now they are 43%
- Number of families having surplus grains has increased from 8% to 15%,
- Frequency of eating meat has increased in 10% families,

In addition to quantitative improvements, improvement in the quality and variety of food had been observed by the women members from Madera United FFS . They described the “wished for” contents of the food plates of each of three categories: well off, poor and “just surviving” (poorest) families, and noted that there had been a clear upward trend toward achieving these standards. Their indicators included: increased availability of ground nut sauce in poor and ‘just surviving’ families; reduced consumption of dry potatoes and cassava without a sauce; .women in the house also getting enough food .

**Stimulating further shared learning:** Trend lines, tables, graphs and pie charts similarly were constructed for changes in land cultivation practices, crop yields, diversification of sources of livelihoods and income, asset status, and in quality of life, and differences were noted in the perspective, criteria, and scoring between men and women, young and old, FFS members and non-members, farmers and district staff, and communities in the various agro-ecosystems. The use of Pentagon Analysis (spider diagrams)<sup>2</sup> proved particularly stimulating: the Research Team saw that the shifts and comparisons could be made very visible. They became even more curious about what they were learning – for the first time, they felt they had a way of revealing to others the effects of their learning and their work, and the Team, together with the District staff, began planning how to incorporate Sustainable Livelihoods Analysis as a *routine* tool, to plan, monitor, and demonstrate impacts of FFS.

An organizational assets analysis subsequently emerged out of an initiative taken by the Project Coordinator and the Facilitators themselves. Having learned the techniques of SLA, they ran a series of Focus Groups to elicit the list of indicators given in Table 2, and to plot

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<sup>2</sup> Clive Lightfoot and the ISG (International Support Group) have experimented with the use of spider diagrams in participatory evaluation of agro-ecosystems, bioresource flow modelling, and the management of complex organisational changes ( [www.ids.ac.uk/eldis/isg/isg.html](http://www.ids.ac.uk/eldis/isg/isg.html) ) .

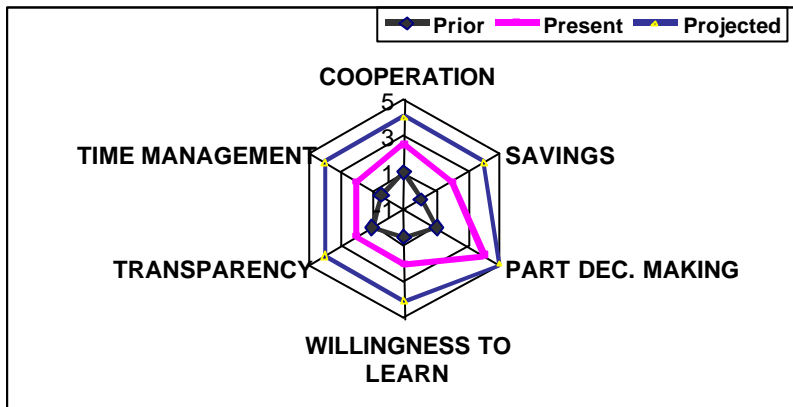
progress (past, present, future) in organisational development on a spider diagram (below). Organisational transformations are particularly hard to capture in conventional evaluation. The approach taken in Soroti, however, provided a rigorous analysis as well as a guideline for future action. It is worth noting that the guideline incorporates *values* that are *meaningful* to the stakeholders, precisely the qualities that are excluded from conventional measures.

Table 4: Indicators and scale for monitoring progress of FFS against Organizational Indicators

Characteristics	1	2	3	4	5
1. Participation	Presence in meetings	Sharing, questioning	Co-operation Following decisions	Initiative Take independent decisions	Responsibility sharing Adoption
2. Cohesiveness Common goal	Individual interests	At least one / two common interests			Common Vision /mission
3. Time Management	Never on time	Do it on the same day	As per schedule	Motivate others to keep time	Punctual
4. Plan to follow	No plan	Some short term decisions	Direction decided	Short term and long term plan	Monitoring as per plan
5. Gender sensitive	No cognizance of women	Allow women to attend	Inform women the decisions	Involve women in decision making	Give veto to women in certain decisions
6. Leadership	No leaders	One- up manship dominated by one	Scope for participation - decision centralized	Set example Shared decision making	Shared leadership
7. Technical Knowledge	No knowledge – follow unscientific practices (e.g. Broadcasting)	Know crop cycle and operation sequence	Knowledge of pests, organic manuring, importance of improved seeds	Effective Trouble shooting	Analyse the Eco system
8. Transparency	No decisions shared	Other than finance matters shared	Finance decisions announced	Accounts open for verification	Finance decisions participatory
9. Diversified Activities -	No collective activity	Collective 'commercial plantation'	Live stocks Cow to Bees	initiate off farm IGA	Trading Processing
10. FFS Funds	No funds	Funds saved from Grants	Member contribution	Revenue from collective IGA	Access to internal + external credit
11. Network	No knowledge of other FFS	Informally get to know about activities of other FFS	Occasionally attend / conduct joint meetings	Village level FFS meet regularly	Frequent interactions / thematic with other FFS

Characteristics	1	2	3	4	5
12. Linkages	No external linkage	Linked with ongoing district prog	Linked with NGO funding	Collaborative Projects	Independent network - registered

Source: Focus Group Discussion with Ambassador FFS, facilitated by Ms. Jennifer on 17/4/2001.



**And Transformational Actions:** The participatory evaluation further revealed the role of the FFS in transforming structural relations. At the time of the study, on average only 5% of the families in a village had been members of an FFS. However, members of at least 10% additional (non-FFS) families were attending meetings of common interest. When non-members were asked what motivated them to attend, they cited access to information and services as the main attraction. The FFS platform is now (2001) used for a number of allied activities; not merely agriculture-related topics. About 50% of the FFS function as savings and credit groups, and have accumulated their own small funds that they are willing to spend to help meet FFS costs. The innovation of the ‘production plot’ ,as one of the experiential learning plots used during FFS, with the harvested crop sold to provide income to the group, also is perceived as helping to build members’ confidence and their ability to steer their own development. From the Facilitators’ point of view, the establishment of a trustworthy financial record meant that they could link such groups to micro-finance and small enterprise development schemes. The District Officers for their part had begun to see the linked FFS as a *platform* for local development, and as key players in the development of the local plans that sub-counties and districts were now responsible for. Bottom-up planning, and even co-financing, were beginning to seem an achievable reality.

### III. Self-Evaluation (2)

This section draws first on the use of photographs, taken by participants themselves, to represent ('make visible') their own perceptions of effects and impacts, a method well established in the community development literature ([www.photovoice.com](http://www.photovoice.com)). The second example draws on the health surveillance techniques being developed in Asia to establish the 'social epidemiology' of the health risks of pesticide use. It draws on earlier work by feminist scholars and health professionals in the area of reproductive health (Zeidenstein 1979).

### **Photo-reportage**

The FIELD organisation (FIELD 2001), invited alumni of Farmer Study Groups to use photo-reportage to assess the effects and impacts of FFS on their livelihoods and poverty in the community. The evaluators then used their photos to assess critically what they had learned, and to plan further actions. As in the example presented under Self-Evaluation (1), the three steps – of study design, data collection and analysis, and use of the results for action planning – were experienced as an empowering process. However, in this case, no effort was made to extend the boundaries of the assessment to include higher level functionaries or public agencies. On the other hand, the reporting remained more firmly in their own hands.

**The process:** Fifteen alumni of Farmer Study Groups, five from each village that was selected as a study site, formed three evaluation teams. The villages were drawn from each of three sub-districts of Ciamis District, West Java (Indonesia). The team members (four of whom were women), were assisted to develop the skills of 'photo-reportage'. This method was chosen as a way of reflecting back to the individuals, groups and communities the impact of Community IPM on poverty. The process of evaluation moved through three stages:

- A four-day workshop to establish the perceptual focus of the study among team members, review the IPM activities held in the selected communities, and to familiarise the team with the (fully automatic) cameras they were to use. They were given opportunity to operate the cameras and to print and critique the pictures they had taken.
- Each team returned to their village with a camera and spare battery. The cameras rotated among the team members. Every member also had a 36 exposure film and

could take as many pictures as he or she liked. The films were collected, developed, printed and returned to team members, along with the negatives.

- A second workshop, also for four days, allowed the teams to compare and contrast their photos and prepared IPM Impact Albums. Alongside each of their selected photos they wrote an explanation of what was in the picture and why it had been selected. The teams then worked together in small groups to analyse and discuss their results. Each group then presented their work, analysis and conclusions. On the third and fourth days, the teams developed action plans and the follow-up steps needed to support plan implementation.

**Generating Surprising and Subtle Data:** As in the Soroti case, the photo-reportage made visible a number of *surprises* – transforming actions had occurred that led to *emergence*, in ways that could not have been predicted from statistical description of the constituent elements. For example, the photos captured a farmer using botanicals on green beans at five and seven days post-planting, in order to control seed flies. This technique had not been ‘taught’ in the Field School. The farmer used his own creativity to apply the experimental skills he had learned to a new problem. Many other photos, and the interpretations attached to them, pointed to an increase in individual and community-wide *autonomy*, in the sense that farmers had become less dependent on the (biased) information of input salesmen and seed suppliers. At the same time, the photos showed an increase in *inter-dependence* among the villagers, as they began to produce their own quality seed, develop rice-fish ecologies, and control rats. In addition, a range of concrete *benefits* was made visible, at the individual farm enterprise level, but also for the villages as a whole. The former included numerous ways in which farmers were increasing yields and reducing costs; the latter included better management of drainage and irrigation water, development of open land for village fish ponds and other collective enterprises, and the construction of a formal entrance to one of the villages.

**Leading to analysis of sustainable livelihoods and poverty:** The evaluators applied the five elements of the Sustainable Livelihoods Analysis framework (presented on pp 6-7 of this paper) to analyse the photos and interpretative comments. They also developed a short list of conditions that arise when one is poor: limited opportunities for learning for both children and adults; limited access to a balanced diet; limited scope for work; reduced living conditions;

limited self-regard; and increased discrimination. These analyses enabled the alumni to design actions that would help to further eliminate these ‘poverty conditions’ and develop more sustainable livelihoods.

**And discovery of the power of metaphor:** Another of the ‘surprises’ that emerged was the extent to which the concept of sustainable livelihoods had been captured as *metaphor*. For example, a photo of the place where the IPM group met in one village, was described as a ‘nest’, the birthplace and nurturing environment for what SLA terms ‘social capital formation’. The use of metaphor in social impact assessment, and in the assessment of the interaction between a community and their surrounding environment, is a new trend and seems a very worthwhile area for further development (Powell and Jiggins, 2002, forthcoming).

### Health surveillance

A experiment comparable to photo-reportage in ‘making things visible’ is underway in Asia, as medical practitioners seek to reveal, assess, and document the hazards and extent of exposure to toxic chemical use in crop protection. Helen Murphy and her colleagues are exploring the potential of Farmer Self-Surveillance and Farmer-to-Farmer Health Studies<sup>3</sup>(Murphy 2003, forthcoming).

### Farmer self-surveillance on the incidence of pesticide poisoning

**Rationale:** A farmer self-surveillance system was created because reliable data on the incidence of mild to moderate occupationally related pesticide poisoning do not exist. Nor do health clinics and surveillance systems provide feedback to their client communities. Commonly

<sup>3</sup> Their work on School Children’s Health Studies are not reported

Name: \_\_\_\_\_ Male/Female (pregnant?) \_\_\_\_\_  
 Address: \_\_\_\_\_ Spray session #: \_\_\_\_\_  
 Date/Month: \_\_\_\_\_ Crop sprayed: \_\_\_\_\_

Fill out form after each spray session. Mark signs and symptoms if any experienced during or up to 24 hours after spraying

**Head and Neck:** Irritation (1), Red eyes (1), Runny nose (1), Excessive tearing (1), Runny nose (1), Early sore (1), Excessive salivation (1)

**Face:** Irritation (1), Loss of consciousness (1), Vomiting (2), Nose bleed (1), Cough (1), Chest pain/tightness/breathing (2)

**Neck:** Irritation (1), Stomach cramps (2), Nausea (1), Diarrhea (2)

**Upper Body:** Irritation (1), Skin rash (1) - redness, white rash, cracked/itchy, blisters, oozing

**Lower Body:** Irritation (1), Itchy skin (1), Stinging pain (1)

**Pesticide used:** \_\_\_\_\_  
 # sprays used = \_\_\_\_\_  
 Hours sprayed = \_\_\_\_\_  
 Other signs/symptoms: \_\_\_\_\_

**Number of:**  
 (1) Mild  
 (2) Moderate (at least one (2) marked)  
 (3) Severe (at least one (3) marked)

**Spray Session Illness Category:**  
 (0) No signs/symptoms  
 (1) Mild (only 1/3 marked)  
 (2) Moderate (at least one (2) marked)  
 (3) Severe (at least one (3) marked)

the data are seen as the domain of the health care system and upper level policy makers. Rather than being analysed and used at a local level, the data migrate only up to central government institutions. As a result, communities from which the data are derived are not aware of the magnitude of pesticide poisoning nor are they given the opportunity to take preventive action or develop community solutions. The Community IPM's system for farmer self-surveillance is based on self-reporting of the acute effects of pesticide poisoning not necessarily seen by the health care system. The data are kept within the community and are shared among farmer groups and with local health authorities.

**Description of the surveillance system:** After each spray session, the farmer fills out a single-sheet form that is primarily pictorial. (See Fig.1). He or she circles the sign or symptom experienced during or up to 24 hours after spraying. Other written information includes identifiers such as name, address, date, gender, pregnancy status if female, number of tanks used, crops, and pesticides used. Any other symptoms experienced but not on the picture can be added. The numbers of mild, moderate and severe signs or symptoms (S&S) are totalled as well as the illness category - a mild, moderate, severe or non- illness event. The forms are collected weekly and tabulated. The data are summarized every month and graphed for community inspection and discussion. The local doctor adds the number of pesticide poisoning cases seen that month as well. The following parameters are tracked monthly:

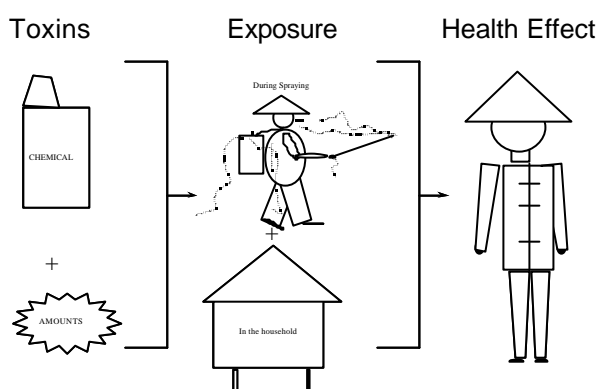
- Average spray events per farmer
- Average number mild, moderate, severe S&S per spray
- Number or percent of spray events associated to no illness, mild, moderate, or severe illness
- Number of cases seen in the local health facility

The reporting system has an automatic impact evaluation built into the design. By looking at the spray frequency trends and the choice of pesticides used, Community IPM coordinators, as well as researchers, will know if monthly reporting on acute effects changes farmers' behaviour. Control samples of farmers matched by crops are interviewed weekly on spray frequency and pesticide choices to rule out other crop related reasons to change the parameters.

### Farmer-to-Farmer health studies

In the spirit of IPM experiential learning, epidemiological health study methods were put into the hands of farmers for more instantaneous community application. In Java and Sumatra the study design was broken up into 5 distinct community surveys that farmer groups could conduct among themselves. The risk factors demonstrated in an earlier Javanese study are presented graphically to the farmers as follows:

The toxicity of the product (Ia, Ib, II) + spraying frequently + oral, respiratory, and especially skin exposure + unsafe household storage and disposal of pesticides =  
a high probability of pesticide poisoning.

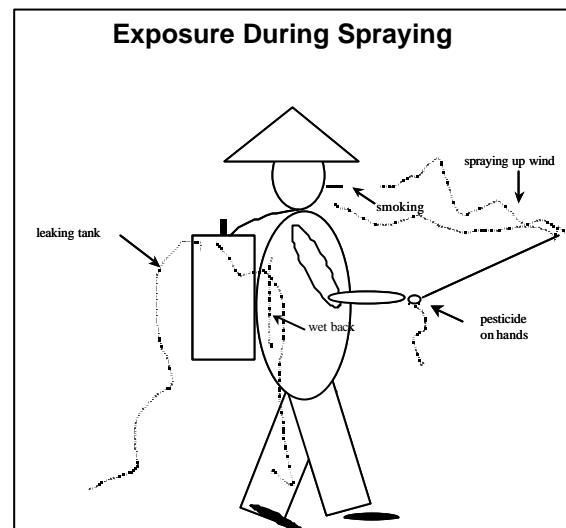


These components make up the 5 surveys that farmers conduct among themselves or within their communities. They are as follows:














1. Pesticides used during spray sessions (and during household surveys or in local pesticide shops) are classified by brand and common name, hazard level, and chemical family.
2. Quantification of yearly spray frequency, total litres of pesticide solution exposure, and numbers of pesticides used per tank are calculated.
3. Farmers are observed during spray sessions to identify routes of pesticide exposure and personal protective equipment (PPE) used during a real spray session.
4. Farmer households are observed to identify hazardous child, food, water, and live stock pesticide storage and disposal practices.

5. Farmers interview and examine each other before, after and 24 hours after a spray session using a panel of 32 signs and symptoms of pesticide poisoning on a body map form.

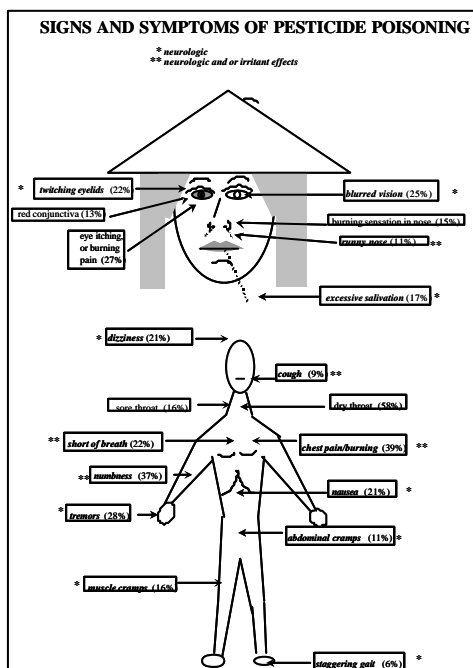
Once the participating farmers collect the data, they analyse and present the results back to those that they interviewed and the rest of the community, using the following educational format:



1. Pesticides. Pesticide classification by hazard level groups is presented to the community so they can understand which products are most harmful to their health. Pesticide classification by the major chemical families is also presented. This is used to teach farmers how different pesticides affect their bodies, e.g. the organophosphates/ carbamates affect the peripheral nervous system, organochlorines the central nervous system, and pyrethroids have local effects at usual doses.
2. Amounts Used: The amounts of pesticide solution used per year are presented as an average per farmer. These figures are then compared to the reduced amounts that would be used if the community and/or individual farmers adopted IPM methods. The health and economic savings are discussed.
3. Exposure During Spraying: Pesticide contamination of the various body parts is coloured in red. The pictures demonstrate spraying up wind, leaking tanks, wet clothing, smoking and other routes of exposure. The Health Component team emphasize the importance of skin as the most critical exposure surface, especially during mixing and through wet clothing. Groups identify what types of personal protective equipment (PPE) they observe in use. Discussions on why so little is used consistently reveal that PPE is too hot, too cumbersome, unavailable and too expensive. It thus became clear to the participants that safe practices through the use of PPE is not a practical way to prevent pesticide poisoning in Asia.
4. Household Storage and Disposal: A picture of a typical house is drawn showing the safe and unsafe storage and disposal methods found during the survey. The surveyed households are then analysed by child, food, water and livestock safety, as demonstrated below.

Unsafe = 	Storage	Disposal
Child 		
Food 		
Water 		
Animal 		

5. Signs and Symptoms: are usually displayed on a body map drawn by the farmer data collectors. The Health Component team highlight the signs and symptoms that are a product of nervous system toxicity, with reference back to the table on pesticides by chemical family. Farmers are warned that if they notice any of these effects they should stop spraying immediately and take a full bath with soap.



**Use of Studies:** These farmer-to-farmer studies are designed for integration into Farmer Field Schools or as a follow-up activity.

- Both Indonesia and Vietnam IPM graduates conduct health studies as a means to motivate new farmers to join Farmer Field Schools.
- The Vietnamese studies will be used as a means to measure the impact of community IPM where it has been implemented. A follow-up survey with the same sample is planned for 2003.
- When farmers join Farmer Field Schools in

Cambodia they do a self-assessment in the classroom, looking at their previous season's pesticide use, acute effects, spray practices and household storage and disposal practices of pesticides. Then as homework, they evaluate one neighbour. This serves as a rationale to start their farmer field school training and to sustain non-chemical crop management practices.

## IV. Evaluation of Social Learning

IPM FFS encompasses shared learning as a matter of principle and process, at various scales: the FFS group; the IPM community; the District Research Facility; and in some cases (e.g. Indonesia) also at national scales, through IPM farmers' organisations. In Nepal, the development of an association of IPM FFS facilitators (from government, NGOs, CBOs, and donor-assisted projects), adds a further dimension. When interactive learning around a common activity of interest begins to occur at multiple scales, it is possible to speak of 'social learning'. The potential impacts of social learning are changes in:

A. *the Normative System* (i.e defining the purposes and actions consistent with desired outcomes)

- the procedures e.g. those governing pesticide regulation (sale, etc.) and crop protection;
- the transforming actions (e.g. IPM in place of calendar-based spraying with synthetic pesticides);

B. *Institutional Relations* (i.e the rules constraining behaviours)

- the relationships among relevant public agencies, and between public agencies and farmers;
- the public spaces in which social learning takes place.

In the examples presented under Self-Evaluation (1) and (2) we see how transforming actions can be documented and evaluated. In the Soroti case, and in section V below, we see how changes in Institutional Relations can be documented and evaluated. Yet we lack adequate methods to document and evaluate *cross-scale* interactions, such as (1) across the *hierarchical levels* of a bureaucracy; this is especially regrettable because it is in these interactions that procedural changes are made possible (2) among the elements in *spatial mosaics* made up of different agro-ecosystems, and (3) among processes that operate at different *temporal* scales (e.g. pesticide impacts on human health and on groundwater). The availability and increasingly affordable cost of new technologies are allowing the creative development of

new approaches that address these challenges. Four such approaches are outlined briefly below.

1. Landsat images and other remote sensing images, including aerial photos, have been used for some years in participatory resource mapping and management. The images can be transposed into land use classifications and natural resource classifications in GIS (Geographic Information System) formats. Remote imaging is now sufficiently powerful and accurate to make visible differences in crop variety planted (demonstrated for two varieties of soya bean). Even illiterate populations seem to have little difficulty in spotting their own location within such images. The images can be a powerful tool for the stimulation of dialogue among different stakeholders, and for comparing and contrasting outcomes at various landscape scales. The approach would seem valuable for IPM farmers and public agencies who might wish to identify the effects and impacts on agriculture and ecological management of, for example, District Research Facilities, or alternatively, the impacts on human health and river systems of the widespread use of toxic pesticides (especially, perhaps, where these are used in irrigation systems).
2. The marriage of GIS and Multi-Agent Modelling. Multi-Agent Modelling is a computer-assisted way of revealing the *outcomes of interactions*, repeated over a time series, among autonomous 'agents' assigned a given purpose and attributes, operating within a specified environment. The transposition of GIS data into Multi Agent Modelling software is now possible, so that the spatial images generated through GIS become the surface over which the agents interact. The consequences for the environment of action over sequential time periods can then be transposed back into GIS format, so that the consequences are apparent in a 'real' landscape. These techniques could be used, for example, to compare and contrast 'with' and 'without' IPM scenarios and outcomes.
3. The development of the Multi-Agent Modelling of rules of behaviour and context boundaries, can be carried out together with those whose context/behaviour/rules are modelled. Rhodora Gonzalez ([RGON2@GO.com](mailto:RGON2@GO.com)) is using these techniques with fisher communities, municipalities and mayors, in the shrimp fisheries/mangrove coasts in the Philippines. This is proving a particularly powerful way to engage

stakeholders in social learning at system-wide scale, because of its power to reveal effects and outcomes in simulations of 'real' landscapes, using stakeholders' own perceptions of 'real' behaviours, norms. and procedures and, by changing the modelled rule base, to examine 'what if ?' questions in order to identify what would need to happen to avoid undesired impacts and move the 'whole system' of interactions toward desired outcomes.

4. Other researchers, such as Stanislas Boissau ( [sboissau@fpt.vn](mailto:sboissau@fpt.vn); [sboissau@hotmail.com](mailto:sboissau@hotmail.com)), who is working with these tools in Vietnam, are using the techniques of GIS and MA modelling in a complementary way, by the introduction of a 'gaming' element. The landscape modelled in the multi-agent programme can be represented on the surface of wooden blocks. The 'actors' in the MA system can become real players in a simulation game that involves the re-ordering of the blocks, based on decisions about the family livelihoods, assets, credit options etc. at the game players' disposal. As the game progresses through sequential decision time periods, the blocks are re-arranged to show the impacts of their decisions on land use, natural resources, and communities. The decisions made are taken to be the 'rules' that actually govern behaviour. The rules are then fed back into the MA system, and extrapolated over more seasons to reveal the consequences over time, and over larger areas.

The techniques briefly described in 1-4 above allow cross-scale analysis of: (a) the present situation; (b) what will happen if 'business as usual' occurs (the extrapolation of current rules, procedures, norms, behaviours etc. over time and space). In both capacities, they are powerful aides to participatory evaluation. The record of the decisions and changes made at each iteration of the modelling can be interpreted as a record of the *social learning process*. However, they do not allow for the emergence of institutions and rules that might lead to other outcomes, although they do allow a platform for dialogue to be constructed among stakeholders in which such changes can be negotiated. By providing *dynamic* feedback, they uniquely inform a learning process that encourages 'emergence' (i.e. change in normative system and institutional relations). However, it should be noted also that they do not represent changes in the biological dynamic that presumably would be stimulated by the interactions and consequences that are simulated .

## V. Evidence-based Communication

So far, the paper has focussed on participatory methods of evaluation, for reasons given in the Introduction. In this section, the role of ‘objective’ evaluation data is re-considered as a *strategic device*, of use to actors who seek to bring about system-wide change. The case considered is not focussed on IPM as such but on the management of the quantity and quality of surface and ground water in the Benelux Middle Region in Europe<sup>4</sup>. Indirectly, however, it concerns management of crop protection because, on the one hand, of the increasing concern among water companies about their exposure to the financial and legal risks and liabilities caused by pesticide pollution and, on the other, by the anxieties of farmers who are concerned about their image among society at large as environmental despoilers and about the adjustments they must make to conform to the increasingly stringent EU-wide regulation of pesticide use. As potable water looks set to become throughout the world over the next decades *the* scarce resource, as water supply and management become privatised functions, and as pesticide standards for export crops become tighter, the lessons drawn here seem likely to find application elsewhere also.

The project described involved nine partners, including numerous water boards, two farmers’ organisations, and four provinces (two in the Netherlands and two in Belgium), and covered an area of some 140,000 ha. The partners from the outset chose to base activities in the framework of social learning. They were seeking system-wide change in order to halt the draw down of ground water, a particular problem in this sandy soil area of intensive farming, where farmers conventionally managed mid-season drought by the use of overhead sprinkler irrigation. The partners also sought to improve the management of soil water profiles in ways that would reconcile the needs of farming and nature management.

The choice of core activities was guided by the principles of: *take small steps, seek visible effects, and involve stakeholders in doing*. The main actions focussed on restoring to farmers the responsibility for on farm water management,, and improving the efficiency of water use.

The main actions involved farmers in experimenting with one or more of five physical

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<sup>4</sup> This section is based on project documentation, on-going stakeholder interviews conducted by J. Jiggins, and importantly, a presentation given by Rob Schrauwen, Project Coordinator, ZLTO (one of the nine partners), on

measures, such as the placement of small weirs in farm ditches to regulate water retention.

Table 2 sketches the *social fora* and the *project fora* that formed the social spaces in which social learning occurred.

Table 2: Spaces for Social Learning

<b>Social Fora</b>	<b>Main participants</b>	<b>Project Fora</b>	<b>Main participants</b>
Local working groups	Farmers	Steering group	Partners; their ToR stressed that their role was NOT to steer the project but to interact as individual professionals learning from project outputs
Study & Test Groups	Farmers, including cross-border group interactions	Project group	Stakeholders, sitting as 'responsible persons', NOT as representatives, with ToR that stressed their role in facilitation of project progress. No substitutes were allowed.
Field demonstrations	Farmers & professionals	Working groups ( x 4)	Professionals and scientists
Kitchen Table meetings	Farmers, Farmer organisations, water boards, Nature management	Sounding Board group	Scientists, Project Coordinator, Researchers
Tent meetings	Public authorities, Press, Farmers, Public		
Test groups	Farmers, specialists, water boards		
Instruction meetings	Specialists (water conservation Decision Support system)		
Symposia	Professionals, Farmers (1); Public & all stakeholders (1)		
Open Space	Key stakeholders: future visioning		
Field excursions	Farmers, including cross-border visits		

Now that the framework has been described, the role of monitoring and evaluation can be positioned. In particular, the role of independent, objective M & E data in this context is instructive. Three types of data proved powerful:

1. In the Netherlands, the provinces have the responsibility to continuously monitor groundwater levels. Their records showed that after three years, farmers who had adopted one or more of the physical measures were using 32 % less ground water than other farmers.

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13.09.02. in Wageningen, at a workshop of the EU-funded project: Social Learning for Integrated Management and the Sustainable Use of Water at Catchment Scale.

2. A technical study by a specialist institute established a data bank on optimal water use at the farm enterprise level. The researchers established (by ditch tests, field research, sample surveys and other means), how much water was being ‘saved’ through improved water use efficiency at the enterprise level.
3. A social study, conducted partly through action researching and partly through a sample survey, showed that farmers themselves identified two categories of participants: “image farmers” (25 %), who were concerned to improve the image of farming in the eyes of the public, and “data collection” farmers (75 %) who were motivated to learn how to manage their farm as an interdependent element in the larger mosaic of land and water use.

The outputs of these evaluation studies have been powerful in stimulating system-wide changes *because the project already had created the social spaces (outlined in Table 2), in which the findings could be peer reviewed, disputed, and incorporated as shared learning among the stakeholders.* If procedural change is one of the goals, then evidence-based communication within deliberately structured social spaces that include all key stakeholders, appears essential. It should be noted, however, that in this case the key stakeholders in public agencies do consciously perceive procedural and policy change to be a matter of *adaptive management*, informed by evaluation of *transforming actions* that are regarded as *experiments*.

## **VI. Conclusions**

What do the examples presented here have in common ?

- Rely heavily on visual technique, both as an aid to communication but also as a platform that combines richly layered data;
- Deliberately seek to enrich data with stakeholders’ values and meanings;
- focus on change and the transforming actions that are perceived to bring change about;
- attempt to empower;
- emphasise feedback to system managers;
- do not shun quantification but also do not make a fetish out of statistical approaches as the only guarantor of rigour;
- place evaluation outcomes in the social spaces in which shared learning can take place and further action decided.

The examples further suggest that Sustainable Livelihoods and Poverty Analysis can be adequately carried out by communities themselves and that such analyses greatly assist IPMers to control their own future development.

The challenge was presented of evaluating *cross-scale* interactions, such as (1) across the *hierarchical levels* of a bureaucracy; this is especially necessary because it is in these interactions that procedural changes are made possible (2) among the elements in *spatial mosaics* made up of different agro-ecosystems, and (3) among processes that operate at different *temporal* scales. The examples suggest the adoption of ‘standard good practices’ that could strengthen enormously the ability of IPM FFS to address these challenges:

1. invitation to farmers, facilitators and the staff of district level public agencies (health, education, agriculture, water, environment) to enrol as co-researchers, co-evaluators.
2. incorporation of ‘high tech’ visualisation and simulation capacity into participatory, multi-stakeholder evaluation processes.
3. scaling out of farmer-controlled surveillance (monitoring) and impact assessment of health and environmental risks, to involve more FFS, in more countries.

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