WORKSHOP ON
'PROMOTING FARMER-LED INNOVATION FOR CLIMATE RESILIENT AGRICULTURE IN MYANMAR'S DRY ZONE'

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WORKSHOP HANDOUTS

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1. Section: Farmer/local innovation

FARMERS in this context is a collective term that refers to small-scale (smallholder) peasant/family farmers (crops and livestock), pastoralists, artisanal fishers, forest dwellers and others whose livelihoods are based on natural resources.

Farmer/local innovation (without an "s") is the process by which people develop **new and better ways of doing things** – using their own resources and **on their own initiative**. Local innovation often occurs in the face of new challenges or opportunities.

Such exploration takes place:

- out of curiosity
- to survive
- to respond and adapt to changes in the condition of natural resources
- due to (non)availability of assets, markets
- other socio-economic and institutional contexts brought about by higher-level policies
- due to external influences, including disasters, climate change and other challenges.

A ***local innovation is new in that specific locality***. It may already be practised elsewhere, but it is new in local terms. A farmer who has developed an innovation has not simply copied it from someone or somewhere else; s/he has come up with it on her/his own initiative.

Prolinnova is an NGO-initiated international multistakeholder platform/network to promote local innovation processes in ecologically oriented agriculture and natural resource management (NRM). Network members who are trying to identify local innovations have developed different guidelines for what is considered "new". Some say that something is "new" if it was developed within the past 20–25 years (i.e. within one generation); others might say it is "new" if it was developed within the working lifetime of the farmer (which could be in the last 60–70 years).

Traditional knowledge is a body of practices, expressions and know-how that are handed over from generation to generation and do not reflect an effort to find new and better ways of doing things. A farmer does something in the same way his/her father and grandfather did it.

Local innovation does take place, however, when farmers adapt traditional practices, e.g. replace a component or ingredient that has become scarce or unavailable. And it can also involve reviving and further developing traditional practices when an external input is no longer available, such as when fertilizer becomes too expensive and crop farmers revive the practice of inviting livestock-keepers to keep animals overnight on cropland to manure it before sowing, but the farmers start to pay the livestock-keepers in cash for this.

By definition, ***innovations*** are **new** whereas, by definition, ***traditional practices*** are **old**.

An invention is a technique/technology that is new in ***absolute terms***, i.e. it had never been "discovered" or developed anywhere else before.

Types of local innovation

Technological innovations relate to new techniques such as a new crop, way of growing crops, managing water etc.

Socio-organisational innovations relate to new forms of organising farming or resource management activities. These could also be new marketing arrangements or savings schemes.

Institutional innovations relate to new policy interventions or laws for governance at local level.

Rural innovation is about those innovations that take place in rural settings and communities.

Urban and peri-urban innovation refers to processes of innovation that happen in urban (cities and towns) and peri-urban settings. Often farmers and other rural people who migrate to cities and towns find new ways to earn a living based on their knowledge and experience from the villages but adapt it to fit the new conditions. For instance, farmers who have moved to towns often have limited space and begin to grow crops in sacks, pots and other vertical spaces.

INNOVATION HAPPENS EVERYWHERE AND ALL THE TIME. BUT ONE NEEDS TO SEE THINGS THROUGH DIFFERENT EYES TO RECOGNIZE AND VALUE THESE INNOVATIONS.

Innovation as a process and a product

Farmer/local innovation (without an "s") is the ***process*** by which people develop new and better ways of doing things – using their own resources and on their own initiative. Local innovation often occurs in the face of new challenges or opportunities. The process involves looking at aspects which answer the questions: Why? When? How? Where? For What?

Farmer/local innovations (with an "s") are the outcomes/products of these processes that have been developed and are understood and owned by local people.

A successful process of local innovation leads to products/outcomes (local innovations) that improve the lives of many people in the area and/or of particularly disadvantaged people such as the poor and marginalised – a segment of the local population that, in many societies, includes women.

Local innovation = ***process*** *of developing new and better ways of doing things*

Local innovations = *the* ***new ways of doing things*** *(in terms of technology or socio-economic organisational or institutional configuration) that result from the innovation process*

The process of local innovation often involves informal experimentation by the resource users. This has always been taking place all over the world since time immemorial, but is often ignored in research and development interventions. Initiatives like the PROLINNOVA network among others are now giving increased attention to identifying and documenting the local innovation processes and the innovations that result from them. This is aimed to increase awareness of the relevance of local innovativeness for meeting the needs of farming families and communities and to encourage development agents and scientists to interact and support this local innovativeness.

Importance of farmer innovation

Why recognize farmer innovation?

Most development workers, researchers, policymakers and others involved in agricultural research and development (ARD) are not aware of the many initiatives of farmers to solve their problems or to cope with their difficulties. They are often so occupied with offering advice to farmers or finding solutions for farmers that it hardly ever occurs to them to actually look around or to ask farmers what they themselves are doing. Thus, a very first step that development professionals may choose to take on the road to discovering the potential of farmers is identifying local innovators and their innovations.

How to identify local/farmer innovation?

Observation. Walk to the farmhouses and fields; new things that you see may be innovations.

Identification by key informants. Ask key informants (e.g. development agents, local leaders) in the area for the names of farmers whom they consider to be local experts, and interview those farmers whom they regard as most innovative.

Chain or "snowball" interviews. After visiting farmers regarded by key informants as very creative and often trying out new things, and after talking with them about their innovations and informal experiments, ask these farmers for the names of other innovators/ experimenters they know and go and visit these people, and so on.

Reconstructing innovation. Ask a group of farmers to list one or more agricultural innovations that have been made in the last ten years and are relevant for most of the families in the area; ask them to identify the farmers who played an important role in introducing, adapting or developing these innovations, and go and talk with these farmers.

Surveys of local innovation. Use a survey checklist or questionnaire and interview community members (individuals and groups) and gather data related to innovations.

Research and development agents who start to identify local innovations and innovation processes learn to see farmers as pro-active, as creative sources of good ideas, as real partners in ARD. At the same time, the farmers see themselves in this way and are encouraged to innovate even more. As explained above, local innovations offer entry points into participatory ARD, combining local and external knowledge, with the aim of increasing capacities within the local innovation system to adapt quickly to changing conditions and thus to improve livelihoods. So, identifying local innovation is just a start – it is a means to an end.

2. Section: Introduction to Participatory Innovation Development (PID) /Farmer-led innovation development

What is participatory innovation development or farmer-led joint research?

This is a process in which men and women farmers, scientists, extensionists, development agents and other actors in agricultural research and development explore and improve local ideas in a way that encourages all partners to bring in their own knowledge and experience.

Farmer-led joint research is not the same as **farmers' research**, although it usually builds on this. It also differs from **on-farm trials** and other forms of **participatory research** that are initiated by formal research and extension services.

Farmers' (own) research. From its very nature, farming is a constant process of experimentation, adaptation and innovation to a greater or lesser extent – day by day and year by year. Long before there were formal research and extension services, men and women in rural areas were creating and testing possible ways of improving the way they farm. They have been carrying out their own investigations and experiments in order to accommodate changing situations or adjust to new environments. Farmers' informal research continues to this day, also where they have access to findings from formal research. Moreover, farmers are often exploring possibilities to improve their farming that are largely or completely ignored by formal research. ***Farmers' research is completely controlled by the farmers concerned: they decide what they want to explore, how they want to do it, what they want to observe and what is done with the findings. They cover the costs and they carry the risks themselves.*** Scientists and development agents play – at most – an indirect role, perhaps by providing new information or materials, which the farmers may use in quite different ways than the "outsiders" had originally intended.

On-farm trials. In the last couple of decades, many agricultural scientists have moved beyond the walls of their laboratories or research stations. On-farm trials and similar methods of participatory research are now more widely applied. In these activities, ***the initiative usually comes from scientists (other outsiders), who are interested in validating "their" technologies within the real farming world. The degree of participation of the farmers in planning, implementing and analysing the on-farm trials can vary greatly, but the final decision about what is being explored or tested is made by the scientist or – when on-farm trials are part of an extension approach – by development agents trying to introduce new technologies.*** Most often, the farmers are given free inputs and may even be paid for carrying out the work – which can be justified, as they are doing this work primarily for outsiders and not for themselves. It is seldom that on-farm trials are set up to explore ideas raised by farmers. However, this kind of interaction between farmers and scientists can contribute to increasing farmers' capacities to carry out their own research. Moreover, some farmers doubtless take up ideas from on-farm trials and explore them further in their own informal experimentation. By far the majority of on-farm trials involve technologies in crop production, less often technologies in livestock-keeping, tree management or food processing – largely the domain of women. On-farm trials do not lend themselves to exploring social or economic innovations, such as a new system for agricultural credit or for marketing.

Farmer-led joint research is ***conceived and controlled by farmers who carry out the research in collaboration with other (non-farmer) partners.*** Research that is led by farmers aims at exploring new possibilities – already recognised by the farmers – to solve local problems or capture new opportunities. The farmers are therefore driven by their

motivation to find out what will work better. The partners in the joint research need not be research scientists. They may be fieldworkers in governmental or non-governmental development organisations. They may be specialists or widely recognised experts – also farmer experts from other areas. They may be people from the private sector involved, for example, in agricultural input supply or marketing. The other partners in the joint research are often, like the farmers, driven by their curiosity whether and how new things work in the farming system, but they could also be motivated because their organisations encourage and reward their giving support to forms of research and development led by farmers. Partners from the private sector may be motivated by the possibility to expand their business or open up a new business, if the innovation works out. In joint research, at least two – sometimes more – different types of actors are involved in a combined effort to improve local innovations or to develop new ones. In this collaboration, ***farmers play a leading role or, at least, a role equal to the other (non-farmer) actors in planning and implementing the research and in evaluating the research process and results.*** The process starts with ***local innovations*** - what farmers are already trying out or ideas they already have about how to improve their farming. Over time, as the relationship between the partners develops, the exchange between them can stimulate still more ideas, new ideas may be brought in from outside sources or new partners may join, but the ***ultimate control over the process remains in the farmers' hands.***

Why should farmer-led joint research be encouraged?

There are several reasons why more efforts must be made to integrate farmer-led joint research (development) into mainstream approaches to ARD. Despite evidence over decades of small-scale farmers' ability to experiment and innovate, most agricultural scientists continue to do research on behalf of farmers rather than in ways that stimulate and strengthen the capacity of farmers – linked with other actors – to adapt to changing conditions. In many cases, small-scale farmers do not adopt technologies developed by scientists and disseminated through extension, because the technologies do not meet the farmers' needs or suit their conditions. This may be because the introduced technologies do not focus on farmers' top priorities, or because the results of formal research were assessed on the basis of criteria that are not relevant to the family members that were meant to adopt the technologies. This is especially the case when new technologies are introduced to men but the people who do the related work are the women and girls, such as in livestock care and feeding. Moreover, although funders and managers of agricultural research often talk at high-level meetings about the need to involve resource-poor farmers in defining the research agenda, there are few initiatives to capacitate the farmers – both men and women – to play this role. Promoting farmer-led joint research can make an important contribution to this. The situation is becoming even more critical now with climate change as farmers need to adapt and innovate quickly to deal with the challenges and threats to their livelihoods. In such situations, solutions have to be found and developed fast and improving on local initiative and innovations is crucial.

Multi-stakeholder partnerships in PID

What is a multi-stakeholder partnership (MSP)?

Multiple means more than one individual/party is involved.

Stakeholders are all those who have a stake (interest) in the activity.

Partnership denotes an agreement of at least two different entities to work together toward a common goal while sharing responsibilities, risks, costs and benefits.

In ***multi-stakeholder partnerships (MSPs)*** the partners have a ***shared understanding*** that they ***play different roles*** but that they can ***pursue collective goals*** through ***collaboration and common activities*** to achieve such goals. These partnerships are voluntary, with participation driven by the perceived benefits they may see emerging from the process.

MSPs are about partnerships that are ***greater than the sum of its parts*** and about ***creating lasting and meaningful impact at all levels*** of action. They are meant to promote a more holistic approach to development and better governance.

MSPs in PID are partnerships that involve ***several different groups of stakeholders***, such as government (research, extension) organisations, NGOs, research institutes, business groups, consumer groups and farmer groups/organisations.

MSPs in ARD can be built at several ***different levels***:

- Local, where decision-making and action are done by members of a group, community or set of communities with economic, social or other connections (Uphoff 2000);
- Subdistrict and/or district, where decision-making and action are done by different types of stakeholder organisations, such as a district platform for joint research and extension involving GOs (district government, Office of Agriculture, local agricultural college etc) and NGOs, including people from community-based organisations;
- Provincial/regional, similar to above but at a regional (sub-national) level;
- National, where decision-making and action are done by different types of stakeholder organisations within a country, such as a national platform on ARD;
- International, where different types of stakeholder organisations in different countries agree on action of mutual interest.

Why work in a multi-stakeholder partnership?

- To share and make the best use of expertise and resources (human and other)
- To share knowledge and learn together
- To create opportunities for lobby and advocacy
- To create platforms for coordination of initiatives
- To overcome differences and build on collective strengths

What are basic principles in a multi-stakeholder partnership?

- Shared ownership
- Culture of equality
- Matching individual stakeholder interests with the common agenda
- Openness and transparency

- Open nucleus
- Breaking down barriers of competition and territoriality

What are the challenges encountered in multi-stakeholder partnerships?

- Conflicts and resolution
- Clarification of roles and responsibilities
- Difference in pace of partners
- Preventing bureaucracy
- Ensuring quality facilitation
- Transparency about handling money and other benefits
- Handling non-performing partners
- Ensuring smooth engagement among different stakeholders who have not worked together before.

3. Section: Adapting to climate change through farmer innovation

Climate change mitigation

Climate change mitigation refers to efforts to reduce or prevent emission of greenhouse gases. Mitigation can mean using new technologies and renewable energies, making older equipment more energy efficient, or changing management practices or consumer behavior. It can be as complex as a plan for a new city, or as simple as improvements to a cook stove design.

Climate change adaptation

Climate change adaptation refers to efforts to lower the risks posed by the consequences of climate change. This includes large-scale infrastructure changes (eg. defences to protect sea level rise) as well as behavioural shifts (eg. using less water, collecting rain water etc.).

Climate-smart (or climate-resilient) agriculture

Climate-smart agriculture (CSA) is an integrative approach that addresses the challenges of food security and climate change through: sustainably increasing agricultural productivity, to support equitable increases in farm incomes, food security and development; adapting and building resilience of agricultural and food security systems to climate change at multiple levels; and reducing greenhouse gas emissions from agriculture (including crops, livestock and fisheries).

Adaptive capacity:

The ability of a system to adjust to climate change, including climate variability and extremes, to moderate potential damages, to take advantage of opportunities, or to cope with consequences (IPCC)

Resilience:

The ability of a system, community or society exposed to hazards to resist, absorb, accommodate, and recover from the effects of a hazard in a timely and efficient manner, including through the preservation and restoration of its essential basic services (UNISDR)

Building resilience by strengthening local adaptive capacity

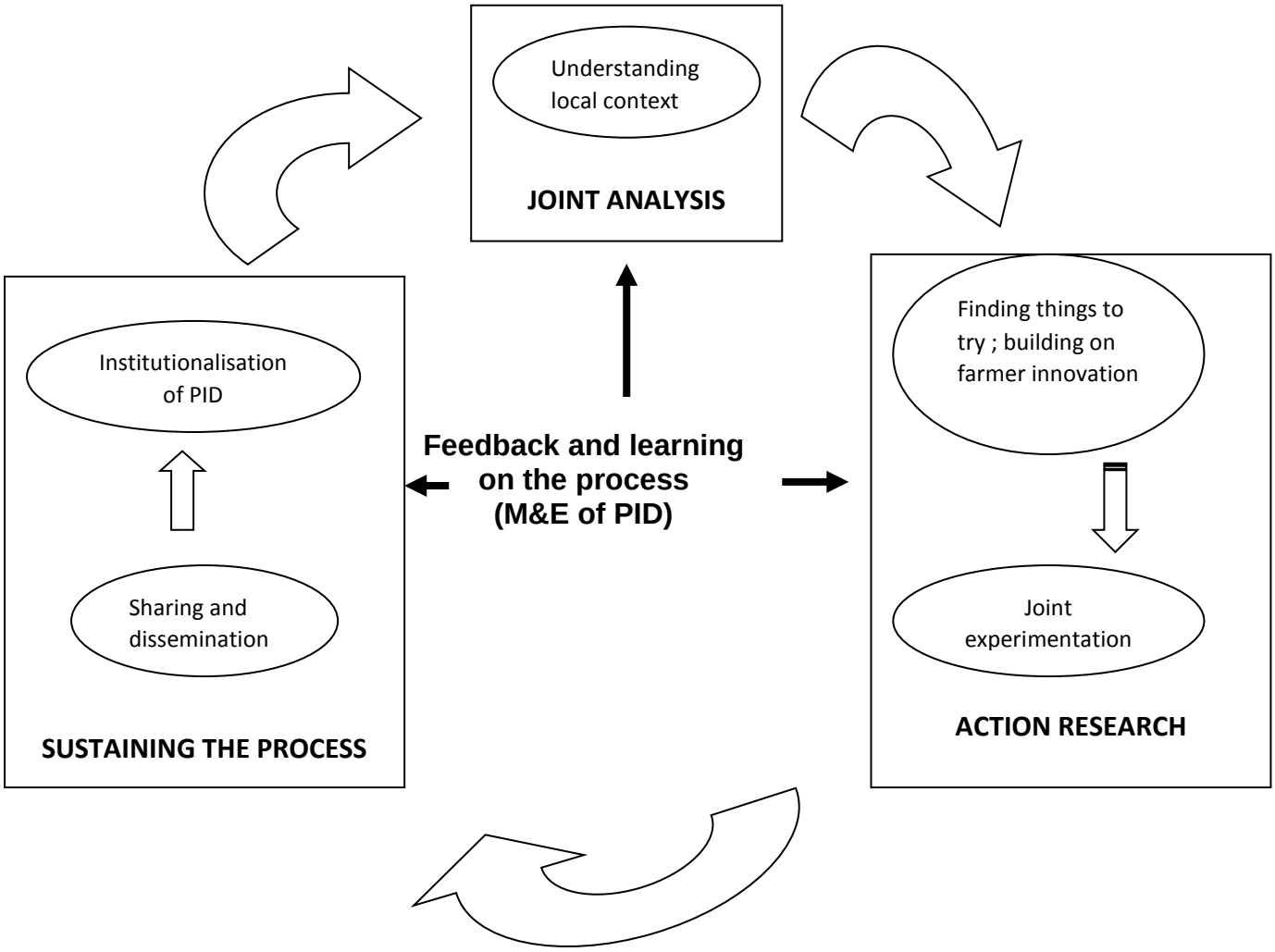
- Recognise and respect local adaptation and innovation efforts
- Assist smallholders to improve and/or validate local innovations / adaptations
- Spread successful locally developed adaptations
- Introduce new ideas / practices / formal science into farmer-led processes of joint innovation
- Create direct local access to resources for experimentation and adaptation funds

4. Section: Key features of PID

Levels of farmer participation

***Contractual participation*:** Farmers are contracted to provide land or undertake services
Consultative participation: Farmers are consulted for their problems, provide information before outsiders develop solutions; staff talks, questions, acts, farmers gives answers, contribute
Collaborative **–** *interactive* - ***participation***: farmers are full partners in the development and research process; staff and farmers jointly act and decide
Collegiate participation– *towards farmer self-management*: Outsiders support and strengthen farmers own research and innovation activities; farmer questions, acts; staff supports

Iterative process of PID



Differences between farmers' and scientists/ researchers' experiments

Formal researchers experiments/ research	Farmers' experiments/ research
Longer-term perspective	Shorter term perspective
Focused on insight generation	Focused on problem solving
Use of capital intensive equipment	Little use of equipment in experiments
Complicated design and analysis	Limited design analysis; trial and error
Standard procedures	Procedures often ad hoc
Often single commodities	Often integrated systems
Controlled variables	Multi-variables and criteria
Statistics based assessment	Holistic assessment
Artificial situation	Real-life situation
Small numbers of scientists	Large number of farmer innovators

Improving farmers' experiments/ research

Some limiting factors in farmers' experimentation

Undirected experimentation: farmers, in their enthusiasm to experiment with a new technology, for instance, think up their own personal variants. Other technology variations occur by chance, without the farmers being aware that they were doing something different from their neighbours.

Lack of analytical approach: Often a lack of analytical capacity in evaluation gives rise to false conclusions. They do not always understand the underlying reasons for a good or poor yield and attribute the success or failure to factors that did not play a role.

Poor experimental design: Sometimes the farmers do not design comparable units. For instance, they try out a new technique and compare the yield to the previous season or to crops in a nearby field. This leads to false conclusions.

Learning about farmers' experimentation

Justification: why do they decide to experiment? Are women's reasons different to men's? Are they reacting to actions by other farmers? Are they genuinely trying to find a solution to a problem?

Planning: How do they plan their experiments? To what extent are these systematic? How are tasks and responsibilities shared within the family, according to gender? How many experiments are they undertaking simultaneously – individually, with the family or as a community?

Hypotheses: how are research questions formulated? How do these research questions reflect their thinking about nature, farming and innovation, community, culture etc.?

Variables and levels: How many variables and treatment levels are included? If complexity is high, how do they monitor and assess the contribution of the various components and results?

Control: With what do farmers compare the new practice or technology? Do they use "control plots" or "Control animals"? If not, how do they take external influences into account?

Layout and timing: How do they locate trials? How big are the experimental plots? What is the timing for the beginning and the end of a trial? For how many years do they repeat the trial before drawing definitive conclusions? Does this vary with the type of experiment concerned? How is the experimental design influenced by the gender and age distribution of tasks and responsibilities within the family?

Data collection: How do farmers gather data during and at the end of the experiment? What does the farmer observe and measure? When and how are these observations made? How do farmers keep track of what was done and what resulted? What type of measurement and which type of "records" do they use?

Analysis: What criteria do farmers use when assessing the results? What methods or tools do they use? What is the connection of these results to what they do (eg. food production, processing, marketing etc.)? Do men and women exchange views and information between themselves?

Improving design of farmers' experimentation

- Suitable location
- Limited experimental plot size
- Good demarcation and separation of plots
- Elimination of border effects
- Several replications
- Allowing for a control
- Limiting the experiment to only one issue or variable
- Systematic monitoring

5. Section: Preparation for farm visit

Listening and probing:

Six helpers: Why? What? When? Where? Who? How?

RESTATE what the farmer just said**: "*So, this plant resists the drought*"**

REPEAT a remark that the farmer makes in the form of a question: ***"It resists the drought?"*** **(invites farmer to expand)**

Ask farmer to **CLARIFY: *"Could you tell me a bit more about this?"***

Be **EMPATHIC: *"I can understand how difficult it is"***

SUMMARISE in your own words what you understand the farmer to have said and ask**: *"Do I understand correctly?"***

Be prepared to admit **UNCERTAINTY** by saying**: "*I am not sure I understand correctly, but is this want you mean?"***

Keep **eye contact, shake head, agree: *I see, I understand etc.* -** encourages farmer to continue speaking

Avoid asking leading questions

Such questions ask farmers to **agree with your own view point**.

- *I suppose this maize variety is good because it matures fast?*
- *Don't you think it is better to grow bananas than coffee?*
- *Because the market is not good, right?*
- *By difficult you mean it is too much work. Is it not?*

Ask open-ended questions

They give farmers the **opportunity to explain their point of view**.

- *How did you measure the harvest?*
- *Why do you think the tomatoes grew better this time?*
- *When did you sell the crop? Did you make a profit?*
- *How did the crop get damaged?*

6. Section: Giving attention to gender in farmer innovation and PID

To be able to take a balanced approach in recognising and enhancing the capacities of both women and men in agricultural innovation, one needs to understand gender roles and responsibilities particularly in terms of: division of labour; access to resources and benefits; decision-making (social and political influence) within the household and the community. There are various methods and tools of gender analysis that can be used to identify the roles, relations, needs and interests of men and women at different stages in their lives – as children, youths, adults and elderly people. For example, the following can be used to increase awareness of gender issues in agriculture and NRM:

Rapid differentiated surveys of men's and women's (young and old) concerns in agriculture, e.g. using PRA (Participatory Rural Appraisal) tools such as:

- *Activity profile*: exploring tasks and time inputs by gender and age, differentiating according to work related to reproductive roles (childcare, cooking, fetching fuel and water etc), productive roles (cropping, livestock-keeping, food processing, marketing etc) and community management roles (committee meetings, conflict resolution etc)

- *Daily timelines* (who does what when over the day)

- *Matrix of access and control over resources*

Group interviews with farm women (without any inhibiting presence of husbands or other male authority figures in the village or group) to discuss their activities, problems and aspirations related to agriculture and NRM

Case studies of women's, men's, girls' and boys' activities in households selected according to sex of household head, family size, stage in family life cycle and access to resources (e.g. without livestock and/or with little land; with livestock and/or more land)

Community "portraits" to compare and contrast farming and NRM practices and gender division of labour, resources and responsibilities across villages or groups, to use as a basis for discussion within villages/groups about gender roles, how they differ, how they could be changed, and how this would affect family and community life. In such discussions, both men and women, young and old should be involved.

GIVING ATTENTION TO GENDER:

In identifying and documenting local innovation:

- Seek local innovation in activities in which women play important roles or have priority concerns? (For example, in many areas, these may include keeping small ruminants and poultry, gardening, marketing agricultural products.)
- Look for local innovators, how did you ensure that both men and women innovators were included in your search? If you did not, why not?
- Involve both men and women in looking for local innovators?
- What socio-cultural aspects did you encounter that favoured or inhibited innovation by men or women?

In designing and implementing experiments / research together with farmers:

- Engage roughly equal numbers of men and women in the discussions about the farmer-led PID: which innovations to explore, what questions to answer, how to design the research, what information to collect and how, etc.
- Involve male and female youths involved in planning and implementing the PID
- Analyse whether female or male farmers are more eager to be involved in joint experimentation. What causes these differences? How does this affect the process and outcome of the PID?
- Consider the differences between male farmers' and female farmers' research questions and how their criteria for assessing research results differ (women and men may have different aims and therefore different criteria for assessing innovations in crop / tree growing and livestock-keeping. Often, women seek reliability and stability of yield, availability of food in the hunger season, useable byproducts, and ease of harvesting, processing and storing). Were both women's and men's aims considered when formulating research questions and assessment criteria?
- Take into account the differences between innovations, interests and constraints of women in male- versus female-headed households taken into account when considering innovations to explore further (For example, female heads of household may have access to less land, equipment and livestock for ploughing).
- Clarify who is normally responsible for which tasks (including post-harvest activities such as threshing, winnowing, seed selection, storage, processing and marketing) and how rigid or flexible the division of labour is. Take into account the implications of this for PID.
- Engage women in all aspects of planning, implementation, monitoring and evaluation. Keep track of who actually does the work.

Implications of different patterns of gender responsibility in farming for PID

Patterns of gender responsibility	***Implications for PID***
Separate enterprises within the farm (e.g. men keep cattle, women goats; men grow cereals, women spices)	Seek local innovations and support PID in both men's and women's enterprises
Separate fields or grazing areas (e.g. men's irrigated and women's rainfed plots)	Seek local innovations and support PID in both men's and women's fields / livestock-grazing areas
Separate tasks (e.g. men plough, women sow, men weed, women spread manure)	Is the innovation to be explored likely to increase men's or women's tasks or require a change in their timing? Will the increase in labour correspond with the benefit to be gained by the person who exerts the labour?
Shared tasks (e.g. both men and women are involved in harvesting)	Does the innovation make this a separate task and, if so, what will this mean for relative influence of men and women within the household?
Women-managed farms	Do these women develop different types of innovations than do male farmer managers? Do they have the resources and time to be involved in PID? If not, how can others in the community assist so that these women can be involved?

"Who" questions in planning PID

Who …	***Questions for planning PID***
makes decisions?	Is the innovation being explored oriented to only their goals and not the goals of others in the household/ community?
does the actual work?	Will the innovation increase or decrease their workload?
controls the land and capital resources?	Who pays for what? Will the PID require the use of these resources? Can other options be explored that require less of these resources?
uses the products?	Will the uses made by different household / community members change as a result of the innovation?
controls the output?	Who decides on sales? Who controls the money? Does this person also pay for the inputs?

Participatory monitoring and evaluation (PM&E):

During assessment of the PID results, the following questions could be considered, e.g. in both separate and mixed groups of men and women farmers, together with PID facilitators:

- How were the products and byproducts coming out of the experiments used and by whom in the household / community? Who controlled the income from them? Were all these household / community members involved in doing the assessment?
- How did men and women, younger and older, differ in their assessment of the PID process and results?
- What impact did the innovation have on demand for and return to labour of different household / community members? Is this innovation resulting in a shift in gender roles? If so, what do the men and women think about it?
- Have there been changes in the nature, amount and timing of availability of products (including byproducts and residues) as a result of the innovation, and what consequences do these changes have for which family / community members?
- Are the inputs and services needed for scaling up the innovation normally available to both women and men? If not, what changes are needed to make equal availability possible?
- Since starting the PID, has there been any difference in the extent to which women and men, younger and older, express themselves in public about ARD, both within the community and to "outsiders", e.g. researchers, extension staff, NGO staff, policymakers at different levels?

7. Section: Some examples of local innovation and farmer-led research for climate-resilient agriculture (from the Prolinnova network)

Air drying potato seed to improve germination in wet soil

Smallholder farmers in the mountains of Uttarakhand in India grow potatoes as a food and cash crop. Traditionally, potatoes are sown, once a year, in the drier months of September and October. Potatoes are cut into small pieces retaining the eye buds. Immediately after cutting, these pieces are sown, randomly, in flat fields prepared for cultivation. In recent years, the rainfall patterns have been changing due to climate change. Monsoon rains extending into the potato sowing time has meant that the soil stays wet and causes the seed potato to rot. Farmers have been grappling with crop losses due to this problem.

Pratap Singh, an innovative farmer from Jaintha village, found a simple yet effective way to improve germination of potato seed in these increasingly wet soils. He made two changes to the traditional sowing method used by most farmers in the area. Firstly, he cut the potatoes into pieces with eye buds for use as seed and left these pieces to dry in the shade for one to two days before sowing. Secondly, instead of sowing the seed potato randomly in flat fields, he prepared soil ridges on which he planted the seed potato in lines. These changes allowed for better air flow in the soil and faster removal of soil moisture leading to germination rates of nearly 100 percent. Pratap Singh is delighted – not only because he can continue getting a good crop of potato, but also because other farmers can benefit from this simple innovation.

Growing vegetables on elevated beds to prevent flood damage

Many smallholder farmers in Cambodia, especially women, grow vegetables as a means of generating household income. Most of them have small plots which are located around or close to their homes. Generally vegetables are grown in the dry season and the crops are hand watered. As the climate changes, many farmers face the challenge of unexpected heavy rainfall in the dry season. For vegetable growers, this often means flooding of their plots and loss of crops and income. One of the ways in which farmers have adapted to this situation is by growing their vegetables on elevated beds. Elevating the beds has helped to prevent the crops from being submerged in water. This is an innovation that was identified by extension workers of CEDAC and PROLINNOVA Cambodia partners who supported the farmers to further improve it through a process of joint experimentation. They spread the word among other vegetable growers and quickly many more farmers were trying out and adapting this method. In the process, many modifications have been made to the way in which the beds are constructed. Farmers started by using bamboo and wood for the structures but have now moved on to more durable cement molds. The heights of the structures and the depth of the soil in the beds has been adjusted through experimentation. Some farmers have installed temporary covers from cheap material that can be drawn over the vegetable beds to prevent heavy rain or the scorching sun from damaging sensitive crops such as salads. Yet others have tried out different varieties of vegetables to select those that perform the best on these beds. The farmer sharing workshops and events

organised by PROLINNOVA partners have helped to spread the news quickly and more and more farmers are taking up this method of growing vegetables.

Bagging pomegranate fruits to ward off fruit flies

Pomegranate is a drought tolerant plant that is valued for its fruit in Nepal. Ramechhap, a mid-hill district in Nepal, is categorised as one of the most vulnerable to climate change in the country. Here, the droughts are becoming longer and more severe, resulting in diminishing water resources. Smallholder farmers are turning to crops that are drought tolerant such as pomegranate. Heera Lal Acharaya is one such farmer who pioneered pomegranate growing in Ramechhap. But he and other pomegranate farmers have been battling with the pomegranate fly that causes extensive damage to the fruit. Thus, Heera Lal was determined to find a way to combat the fruit fly. Initially, he approached agricultural professionals who advised him to cover the trees with a mosquito net. He did accordingly but was not happy with the result. The flies managed to get through the net. Then, he used his own creativity to find other ways of dealing with the pest. He tried covering the fruits in small jute bags. This was successful but costly as he had to buy the jute bags. He then used polythene bags to cover the fruits. This restricted the flies from getting to and laying their eggs in the fruit. But the quality of the fruit was not good. He then resorted to bagging the fruits using local newspaper which was cheap and freely available. And this was successful – the flies were kept off, the fruits developed and ripened well. He also noticed that newspaper bags kept other insects and birds away. The innovator has been using this method successfully for several years which has prevented crop losses and given him a steady income. Currently, he is running his own nursery producing 3000-5000 pomegranate saplings a year. Heera Lal has been sharing his experiences in pomegranate growing with many farmers and development agents within and beyond the district. Through the support of LI-BIRD, a partner of PROLINNOVA Nepal, Heera Lal's innovation has been broadcast through radio and reached an even wider audience. Nearly 200 farmers in Ramechhap and 300 farmers in other districts have started growing pomegranate and are seeking Heera Lal's advice, which has led him to set up a National Pomegranate Association.

Setting up a low-cost method to drip irrigate fields

Ramechhap district in Nepal is becoming increasingly drought prone. Limited water for irrigation has increased uncertainty in crop production. In coping with these changes, Amrit Shrestha, a farmer from Rampur village, developed a low-cost system to cultivate vegetables using less water. He had first seen a modern drip irrigation system at the District Agricultural Centre. He found it a smart way to irrigate his crops using less water, but the costs were too high. So he began to think of cheaper ways to get the same effect. He bought a cheap drum and several lengths of pipe. He placed the drum in an elevated place, connected the pipes to the drum, made holes along the pipes and laid out the pipes across his vegetable garden. He used a simple filter to remove particles of dirt entering the drum and clogging the holes and pipes. The experiment was a success. He and his wife could water the vegetable garden using less water, saving time and labour. This is because the system uses the pipes to deliver small quantities of water directly to the plant root, reducing wastage due to run off and evaporation. Most importantly, they have been able to continue vegetable cultivation which supplies the family with food and income. At least 25 households have learnt from Shrestha and are experimenting with the method on their farms. This method appears to have great appeal among women farmers as it reduces labour for hauling water and allows them to continue vegetable growing even in very dry conditions. LI-BIRD and its local partners are sharing these experiences with farming households within

and outside the district. Moreover, they are stimulating farmers to continue adapting the method to suit their specific needs.

Using bioslurry, compost and biochar to retain soil moisture

Longer dry seasons with increased temperatures is a key climate-related change that is noted by smallholder farmers in Cambodia. For smallholder farmers who grow rice and vegetables, this means more irrigation and more labour inputs to prevent the soil and the crops from drying out. Thus, they have begun to find creative ways to condition the soil and increase its capacity to retain moisture. Farmers, independently from each other, have been trying out various soil additives to condition the soil. These different innovations have been brought together by CEDAC and PROLINNOVA partners who are supporting farmers to experiment with various proportions of bioslurry, compost and biochar in order to find the best mix for their crops. Several interesting social innovations have arisen during this process. For instance, farmers who do not have bioslurry are giving their rice straw to neighbours and getting bioslurry in exchange. Similarly, farmers who have larger quantities of biochar are exchanging it with others for compost. In short, farmers are finding creative means of finding the material they need to create a good mix to improve their soils. With the support of extension agents, farmers are improving their experiments and are able to ascertain which mix brings the best results in terms of costs and benefits. This information is being shared with many other farmers, through various exchange events and meetings. CEDAC has also published case studies in its monthly farmer magazine and prepared a video for further dissemination. Currently, more than 200 farmers in the project villages are involved in experiments related to soil conditioning and are finding that their soils are able to stay moist longer even in the scorching sun.

Using akarkara to control white grub damage in vegetables

In recent years, smallholder farmers in Uttarakhand, report increasing occurrence of the white grub – a major pest of field crops - which they attribute to the changing climate. White grub causes extensive damage to vegetable crops, directly affecting farm yields and household income. Dharam Pal Singh, a curious farmer from Basora village, observed that akarkara, a weed with medicinal properties, repelled the white grub. He found no white grub damage on vegetables that were located close to akarkara weeds. Thus, he began planting akarkara around his vegetable plots to control the white grub. Laxmi Devi, from Naugaon Beria village, heard about this innovation from Pal Singh, when they met at a training workshop organised by INHERE. They discussed the challenges posed by climate change on their farming and ways of dealing with them. On her return home, she started her own experimentation with akarkara, supported by the field staff of INHERE. She selected several fields damaged by white grub attacks. In one plot, she planted akarkara along the borders. In another, she used it as an intercrop, planting alternating lines of cabbage and akarkara. She compared these plots with similar plots without the treatment. She found that white grub damage was less in the plot with akarkara planted on the borders and almost negligent in the plot with akarkara as an intercrop. Laxmi Devi says that akarkara has not only kept the white grub away but also termites and ants. She is now using akarkara more extensively to control crop pests. She is also raising akarkara seedlings and sharing seeds and seedlings with other farmers. Seeing these positive results, 20 farmers in her own village and 12 farmers from neighbouring villages have started using and adapting the technique to suit their needs. Altogether, through INHERE's interventions, nearly 80 farmers in eight villages

have been experimenting with this innovative white grub control method. INHERE staff have shared these experiences with the scientists at the Agricultural Research Station in Almora who have been engaged in research for many years to find ways to combat the white grub.

Collection and fermenting of cow urine

Uttarakhand in India is being seriously affected by climate change. As in most mountainous regions this change is most apparent in changing and unreliable rainfall patterns. Rain does not come on time, is often erratic or comes as heavy downpours. In this area where rain-fed agriculture is important, these changing and unreliable patterns have strong negative effects on agriculture. External ARD service providers in this region have taken various initiatives that support farmers to adapt to climate change and decrease livelihood risk and insecurity. One such initiative was introduced by INHERE, now a PROLINNOVA partner, and encompassed the method of collecting cow urine and fermenting it with leaves that grow on their farms. The fermented produce in turn was used for plant protection or as a liquid manure, depending on the type of leaves used in the process. When farmers use it as a liquid manure it can also be applied during dry periods if the fermented product is diluted with water. On the contrary, inorganic fertilizers tend to burn the crops in the absence of abundant water, are not so easy to apply and their nutrients not so readily available to plants. The fermented urine instead can be applied even when little soil moisture is available and does not cause burning of the crops. Although this is a method introduced from outside it is interesting to note that farmers have developed several innovations around this method. The chief innovation was putting cows on a slope with a drain for the night to collect the urine produced that night. Additionally farmers started experimenting with the fermentation of different leaves and testing these applications. The innovation of collecting the cow urine greatly eased the collection of the urine and made the application of the method more easy and feasible. The external initiative, together with the local innovations of farmers around this method led to a technique that supported farmers in their adaptation to climate change. Due to climate change dry spells are on the increase. With the described method farmers can fertilize crops at very low cost even under relatively dry conditions. Additionally, due to increased droughts and heavy rains, pest patterns and occurrence are also changing. With the introduced method and the different types of fermentations developed, farmers are able to keep a number of pests in check.

Donkeys as marriage gifts in Niger (West Africa)

The drying up of water sources and lowering of the water table have made it more difficult for women to fetch water. Women travel by donkey or on foot for several kilometres to fetch water for the household. Because of the work involved, young women are refusing to marry young men in villages with frequent water shortages. Older women in one such village therefore introduced an innovation into the marriage arrangements. They started to buy donkeys as marriage gifts for their daughters. Donkeys ease the work of drawing water from the wells and carrying the water to the family home. In some cases, the husband uses the wife's donkey for transporting merchandise to market. The donkeys thus not only secure water availability but also play a social role in consolidating marriage ties within the communities.

Cut-and-carry feeding system in Ethiopia

Several decades ago, the Awash National Park in Afar Region took over large areas of prime grazing land and waterpoints formerly used by Afar pastoralists. These people did not benefit from tourism incomes, and their herds have no official access to the park during dry seasons and droughts. This caused frequent violent conflicts between Afar pastoralists and park (State) authorities. Recently, however, with increasing droughts, some Afar have developed their own system of cutting forage from the park and transporting it on the head or in carts drawn by horses or donkeys. Community groups rent carts using money contributed by group members, and then distribute the forage within the community. This innovative way of managing forage resources has several benefits: a) it reduces conflict between the pastoralists and the State; b) it reduces the risk of disease transmission between livestock and wildlife; c) the pastoralists now regard the park as a reserve pasture area; and d) they have developed a collective financial management mechanism that could serve as a basis also for other economic activities.