



# FarmSeedOpportunities

Opportunities for farm seed conservation, breeding and production

Project number: 044345

Specific Targeted Research project

Sixth Framework Programme

Thematic Priority 8.1

Specific Support to Policies

## ***Deliverable D2.4***

**Title: Innovative approaches in participatory research, on-farm conservation and the management of agricultural biodiversity in Europe**

**Due date of deliverable:** M36

**Actual submission date:** work version for the partners

**Start date of the project:** January 1<sup>st</sup>, 2007

**Duration:** 36 months

**Organisation name of lead contractor:** INRA

Project co-funded by the European Commission within the Sixth Framework Programme (2002-2006)	
Dissemination Level	
<b>PU</b> Public	<b>X</b>
<b>PP</b> Restricted to other programme participants (including the Commission Services)	
<b>RE</b> Restricted to a group specified by the consortium (including the Commission Services)	
<b>CO</b> Confidential, only for members of the consortium (including the Commission Services)	





**WP2 Leader: Isabelle Goldringer, INRA**

**Task2.3 Leader: Michel Pimbert, IIED**

Partners: IIED, INRA, DLO, RSP, LBI

**Authors**

Michel Pimbert

with comments incorporated from

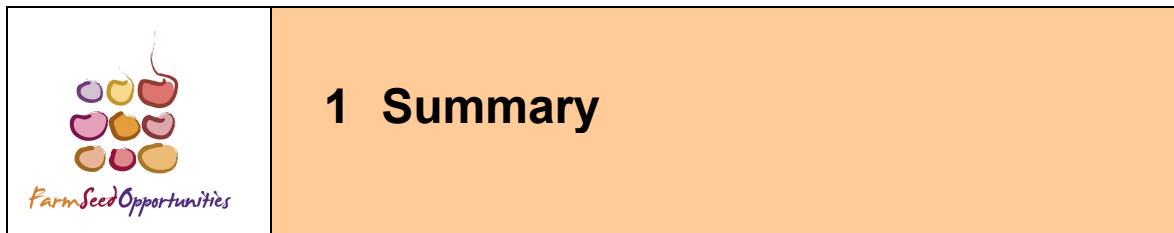
Julie Dawson, Isabelle Goldringer

Patrick de Kochko, Guy Kastler & RSP farmers

**20 April 2010**



<b>1</b>	<b>SUMMARY .....</b>	<b>4</b>
<b>2</b>	<b>INTRODUCTION .....</b>	<b>6</b>
<b>3</b>	<b>DEFINING PARTICIPATION: WHAT TYPE, WHERE, WHEN AND HOW? .....</b>	<b>7</b>
	• <i>3.1. Participatory methodologies .....</i>	<i>9</i>
	• <i>3.2. Spaces for participatory learning and action .....</i>	<i>12</i>
<b>4</b>	<b>CHALLENGES FOR PARTICIPATORY RESEARCH IN THE EUROPEAN UNION.....</b>	<b>13</b>
	• <i>4.1. Transforming research for the local adaptive management of agricultural biodiversity.....</i>	<i>13</i>
	• <i>4.2. Scaling up and institutional transformation .....</i>	<i>18</i>
	• <i>4.3. Managing agricultural biodiversity and participation in a globalising world.....</i>	<i>23</i>
<b>5</b>	<b>CONCLUDING REMARKS .....</b>	<b>26</b>
<b>6</b>	<b>REFERENCES.....</b>	<b>27</b>



# 1 Summary

European agriculture faces some serious challenges from climate change, environmental degradation and rural social decline. In this context, maintaining the diversity of the natural resource base and the multi-functionality of agriculture keeps options open for adapting successfully to changing conditions. This report explores how this can be achieved in the European Union (EU). It draws on experiences from the Farm Seed Opportunities project (FSO), a partnership which includes public-sector research institutes, peasant networks and organic farmers' associations from six European countries. The FSO seeks to develop innovative participatory approaches for managing agricultural biodiversity in Europe, and to identify appropriate regulatory frameworks for the on-farm conservation and sustainable use of seed diversity. The FSO highlights the need for a fundamental re-orientation of plant breeding so that it can build on both local and scientific knowledge in creating and maintaining a diversity of seed. Seed diversity ensures that farmers have the right plants to suit their specific climate, micro-environment and soil types—especially important for those farmers who maintain the environmental integrity of their farms by opting not to rely on chemical fertilisers and pesticides. However, the current seed breeding system is eroding this diversity and favouring far fewer, but more chemically-dependant, varieties.

The report first explores what participation means in the context of agro-biodiversity research and management. It then outlines three key challenges for participatory research and the on-farm conservation and management of agricultural biodiversity in the EU:

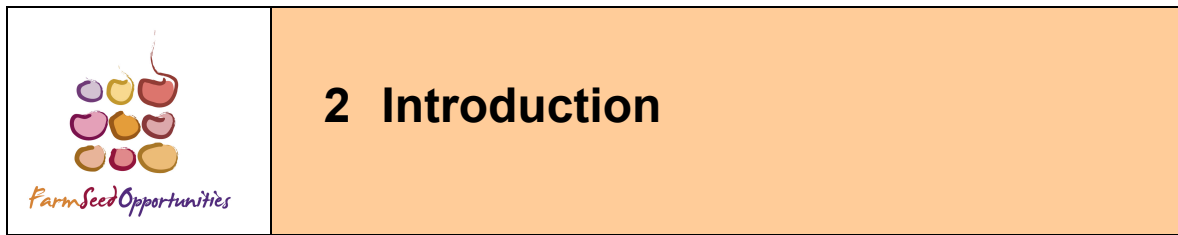
- i) Transforming knowledge and ways of knowing. Environmental dynamics and effects are usually long term and complex. This calls for more holistic and transdisciplinary ways of knowing than offered by the dominant narrow lens, universal and reductionist explanatory scientific models. Reductionist knowledge also favours corporate profits and control over labour and nature in simplified and standardised production systems. Such top-down, imposed natural resource management all too often has huge social and ecological costs in areas where rural people directly depend on biodiversity-rich farming systems for their livelihoods. In contrast, methods and approaches for participatory learning and action can potentially help reconnect farmers and citizens with the biodiversity that sustains their livelihoods and culture. However, the issue is not merely about 'using' participation to make research more 'effective' or 'efficient'. Instead, a transformative process is required which is much deeper in scope and intent.
- ii) Scaling up and institutionalising participatory research and innovation in plant breeding and varietal selection. The last 20 years have seen some interesting initiatives in participatory plant breeding (PPB) and participatory varietal selection (PVS). However, these have been limited to the local level. Now many large, public and private agencies in the EU are seeking to spread, scale up and mainstream participation in research and the management of agricultural biodiversity. This will require institutional reform and transformation, including significant changes in funding procedures and the organisation of research.
- iii) Managing the impacts of globalisation on the participatory management of agricultural biodiversity in Europe. In a globalising world, participatory approaches are not enough, however well-institutionalised. Inequitable rights of access, use and control over natural resources, macro economic policy or corporate interests mean that successful participation

depends on structural shifts towards more equitable people-centred processes and democracy. For example, EU legal frameworks currently limit the potential of participatory seed selection and on-farm conservation by restricting farmers' free access to diverse seeds. Strict demand for uniformity has reduced genetic diversity to such a degree that none but the most advanced varieties are allowed to be sold on the market. In addition, intellectual property laws significantly constrain participatory plant breeding as breeders and farmers have to pay licenses and royalties for the right to use patented genes and proprietary technologies that are mostly owned by large seed corporations.

The report concludes with some recommendations for implementing this approach in Europe:

- Be clear about the level of 'participation' involved in existing EU-funded research and development for on-farm conservation and management of agricultural biodiversity. Different degrees of participation are possible and it is also important to explore the options for participation in the whole research and development cycle.
- Build participatory agro-biodiversity research on the complementarity and uniqueness of the different evaluation criteria and indicators used by both farmers and scientists, as well as the needs of other resource users, such as women, the poor and the elderly.
- Transform the organisation of state bureaucracies, the EU Commissions and organisations that produce social, environmental, economic and technical knowledge (research institutes, universities, government, civil society organisations, etc.). This will include building the capacity of technical and scientific staff in the participatory skills, attitudes and behaviour needed to learn from citizens; including representatives of diverse citizen groups and farmers in the governance and the membership of budget allocation committees of public sector planning and research institutes; and reorganising management and incentive systems to reward experimentation and participatory initiatives.
- Transform existing seed regulations to allow for the continued existence of heterogeneous and highly diverse crop varieties needed for resilient food systems.
- Revise the IPR system to ensure that knowledge, genetic resources and innovations remain accessible to all.
- Promote non state-led forms of deliberative democracy and actions that make EU state institutions and corporations accountable to citizens.
- Help European farmers and other citizens to work together to strengthen their voices in setting research agendas and in framing policies and regulatory frameworks for the management of agricultural biodiversity, and to create processes in which expert knowledge and corporations are put under public scrutiny through appropriate methods for deliberation and social inclusion.





“Agriculture has a footprint on all of the big environmental issues, so as the world considers climate change, biodiversity, land degradation, water quality, etc. they must also consider agriculture which lies at the centre of these issues and poses some uncomfortable challenges that need to be faced. We’ve got to make sure the footprint of agriculture on climate change is lessened; we have to make sure that we don’t degrade our soil, we don’t degrade the water, and we don’t have adverse effects on biodiversity. There are some major challenges, but we believe that by combining local and traditional knowledge with formal knowledge these challenges can be met.” Professor Robert Watson (IAASTD, 2008) (my emphasis).

This report explores how participatory research can help to rise to the challenges facing European agriculture outlined by Professor Watson in the above quote, i.e. how local and traditional knowledge can be combined with formal knowledge, and why such an approach is important. The report draws partly on experiences from the Farm Seed Opportunities project (FSO), whose aim is to contribute to the on-farm conservation, improvement and management of agro-biodiversity in Europe. The FSO partnership includes public-sector research institutes, peasant networks and organic farmers’ associations from six European countries. It is funded by the European Union (EU). In addition to identifying appropriate regulatory frameworks for the on-farm conservation and sustainable use of seed diversity, the FSO also seeks to develop innovative participatory approaches for the management of agricultural biodiversity in Europe. Particular attention has been paid to how—and under what conditions—participatory plant breeding and seed production can be more widely encouraged in Europe.

In this report we first clarify what ‘participation’ means and how it is used by different partners involved in the FSO project. We then discuss some of the key challenges for participatory research into the on-farm conservation and management of agricultural biodiversity in the European Union (EU). The three main challenges are: i) transforming knowledge and ways of knowing for the local adaptive management of agricultural biodiversity; ii) scaling up and institutionalising participatory research and innovation in plant breeding and varietal selection; and iii) managing the impacts of globalisation on participatory management of agricultural biodiversity in Europe. We explore these challenges and offer some recommendations for the European Union in meeting them. The analysis presented here is based on observations from the FSO project as well as other case studies and the wider literature.

The FSO experiments on-farm and at le Rheu based on four crop species allowed us to obtain an accurate characterization of variety evolution over time and space in response to drastic environmental changes and contrasted farmer practices on-farm. Overall, after only 2-3 years of on-farm growing and selection, there were significant changes for many traits assessed both on-farm and on-station. The significance and degree of evolution depended on the trait studied, the varieties, the farmers’ practices and farm environmental conditions. Although there were fewer traits showing significant changes this trend of on-farm evolution was also found for modern DUS varieties. Yet, all varieties remained distinct based on multivariate assessment.

### 3 Defining participation: what type, where, when and how?

What kind of knowledge, science and technology is needed to solve agriculture’s pressing social and environmental problems? After a three-year global study designed to answer this question, the recent International Assessment of Agriculture Science and Technology for Development (IAASTD)<sup>1</sup> concluded that “Business as usual is not an option” (IAASTD, 2008) and called for a fundamental re-orientation of agricultural research so that it can build on both local and scientific knowledge.

The authors of this massive study emphasised the multi-functionality of agriculture in providing not only food, fibre, raw materials and biomass, but also ecosystem services and functions, landscape and cultures. The IAASTD report also acknowledged the key role that the local knowledge of farmers, particularly women, and other small-scale food producers should play in the future in developing appropriate technologies and knowledge systems, as well as their central role in providing global food security. It emphasises that by increasing investments in agro-ecological farming and adopting an equitable international trading framework it is possible to establish more socially and ecologically resilient systems whilst maintaining current levels of productivity and improving the profitability of small-scale farmers. The IAASTD report says science must complement local knowledge and support sustainable farming to achieve the “best mix” of economic, social and environmental outcomes (IAASTD, 2008).

Over the last 20 years there have been several noteworthy initiatives in participatory plant breeding (PPB) and participatory varietal selection (PVS) in cereals, legumes and vegetable crops, in both tropical and temperate regions of the world. Many of these innovative initiatives have been well documented in the scientific and peer-reviewed literature (for example in Almekinders, 2007; Ceccarelli and Grando, 2007 and 2009; Dawson et al, 2008; Dorward et al., 2007; Pimbert, 1991; Sperling et al., 1993 and 2001; Sthapit et al., 1996; Vernooy, 2003; Weltzein and Christinck, 2008; Whitcomb et al., 1996 and 2005). But whilst all these PPB and PVS initiatives describe themselves as ‘participatory’, there is a need to carefully distinguish among the different kinds of participation involved in each case. For example, Table 1 shows seven different types of participation, ranging from passive to more active forms of participation. This typology is useful because it can help to better define and assess the ‘quality’ of participation in each PPB and PVS initiative— past, present and future. The typology shown in Table 1 can also help visualise and clarify the roles, rights and responsibilities of different actors (scientists, farmers...) involved in future programmes for on-farm conservation and management of agricultural biodiversity in Europe.

<sup>1</sup> The IAASTD was launched as an intergovernmental process guided by a multi-stakeholder, 60-person strong office, under the co-sponsorship of the UN Food and Agriculture Organization (FAO), Global Environment Facility (GEF), United Nations Development Program (UNDP), United Nations Environment Program (UNEP), UNESCO, the World Bank and the World Health Organization (WHO). Outcomes were summarised in 22 key findings presented in the final IAASTD report, which was approved by 58 governments in 2008.



**Table 1. A typology of participation**

Typology	Components of each type
1. <i>Passive participation</i>	People participate by being told what is going to happen or has already happened. It involves the unilateral announcement by an administration or project management without listening to people's responses. The information being shared belongs only to external professionals.
2. <i>Participation in information giving</i>	People participate by answering questions posed by extractive researchers and project managers using questionnaire surveys or similar approaches. People do not have the opportunity to influence proceedings, as the findings of the research or project design are neither shared nor checked for accuracy.
3. <i>Participation by consultation</i>	People participate by being consulted, and external agents listen to views. These external agents define both problems and solutions, and may modify these in the light of people's responses. Such a consultative process does not concede any share in decision-making and professionals are under no obligation to take on board people's views.
4. <i>Participation for material incentives</i>	People participate by providing resources, for example labour, in return for food, cash or other material incentives. Much <i>in-situ</i> research and bioprospecting falls into this category, as rural people provide the fields but are not involved in the experimentation or the process of learning. This is commonly called participation, yet people have no stake in prolonging activities when the incentives end.
5. <i>Functional participation</i>	People participate by forming groups to meet predetermined objectives related to the project, which can involve the development or promotion of externally initiated social organisation. Such involvement does not tend to be at the early stages of project cycles or planning, but rather after major decisions have been made. These institutions tend to be dependent on external initiators and facilitators, but may become self-dependent.
6. <i>Interactive participation</i>	People participate in joint analysis, which leads to action plans and the formation of new local groups or the strengthening of existing ones. It tends to involve interdisciplinary methodologies that seek multiple perspectives and make use of systematic and structured learning processes. These groups take control over local decisions, and so people have a stake in maintaining structures or practices.
7. <i>Self-mobilisation</i>	People participate by taking initiatives independent of external institutions to change systems. Such self-initiated mobilisation and collective action may or may not challenge existing inequitable distributions of wealth and power.

(Adapted from Pretty, 1994)

From the perspective of the European Union, an important implication of the typology in Table 1 is that the meaning of participation should be clearly spelt out in all EU-funded research and development for on-farm conservation and management of agricultural biodiversity.

When analysing the kind of participation in which different actors are engaged it is also important to look at the whole research and development cycle. Key moments or stages when participation can occur throughout the research and development cycle are during:

- i) evaluations of results and impacts of research, as well as risk assessments
- ii) scientific and technological research—the production and validation of knowledge
- iii) the choice of upstream strategic priorities for research and development (R&D)





iv) the framing of policies for agricultural development and the management of agricultural biodiversity.

For each of these stages (i to iv) different methods are available to directly involve scientists, farmers and other actors in the participatory process. We describe these next.

### 3.1. Participatory methodologies

In recent years there has been a rapid expansion of new participatory methods and approaches in the context of PPB/PVS and, more generally, in agricultural research and development. These have drawn on many long-established traditions that have put participation, action research and adult education at the forefront of attempts to emancipate disempowered people. To those involved in the wider body of development and conservation programmes, projects and initiatives, these approaches represent a significant departure from standard practice. Some of the changes underway are remarkable. In a growing number of government and non-government institutions, extractive research is being superseded by investigation and analysis by local people themselves. Methods are being used not just for local people to inform outsiders, but also for people to analyse their own conditions (Chambers, 1992 & 1993; Pimbert, 1991; Pretty and Chambers, 1993).

For both scientific and technological research, as well as the evaluations of PPB/PVS research products and impacts (Stages i and ii above), a suite of methods for participatory inquiry can be combined in different sequences<sup>2</sup>. Despite the different ways in which these approaches are used, there are important common principles uniting most of them (Pretty, 1994):

- A defined methodology and systemic learning process: the focus is on cumulative learning by all the participants and, given the nature of these approaches as systems of learning and action, their use has to be participative.
- Multiple perspectives: a central objective is to seek diversity, rather than characterise complexity in terms of average values. The assumption is that different individuals and groups make different evaluations of situations, which lead to different actions. All views of activity or purpose are heavy with interpretation, bias and prejudice, and this implies that there are multiple possible descriptions of any real-world activity.
- Group learning process: all involve the recognition that the complexity of the world will only be revealed through group learning. This implies three possible mixes of investigators: from different disciplines, from different sectors, and from outside (professionals) and inside (local people) the area.
- Context specific: the approaches are flexible enough to be adapted to suit each new set of conditions and actors, and so there are multiple variants.
- Facilitating experts and stakeholders: the approaches are concerned with transforming existing activities to try to bring about locally-accepted improvements. The role of the 'expert' is to help people carry out their own research within their own context and so make

<sup>2</sup> These systems of inquiry include agroecosystems analysis (AEA), beneficiary assessment, diagnosis and design (D & D), *diagnostico rural rapido* (DRR), farmer participatory research, *groupe de recherche et d'appui pour l'auto-promotion paysanne* (GRAAP), *méthode accélérée de recherche participative* (MARP), naturalistic inquiry, participatory analysis and learning methods (PALM), participatory action research (PAR), participatory research methodology (PRM), participatory rural appraisal (PRA), participatory rural appraisal and planning (PRAP), participatory technology development (PTD), participatory urban appraisal (PUA), planning for real, process documentation, rapid appraisal (RA), rapid assessment of agricultural knowledge systems (RAAKS), rapid assessment procedures (RAP), rapid assessment techniques (RAT), rapid catchment analysis (RCA), rapid ethnographic assessment (REA), rapid food security assessment (RFSA), rapid multi-perspective appraisal (RMA), rapid organisational assessment (ROA), RAPID RURAL APPRAISAL (RRA), *samuhik brahman* (joint trek), soft systems methodology (SSM), theatre for development, training for transformation, and visualisation in participatory programmes (VIPP).



improvements. These facilitating experts may be stakeholders themselves.

- Sustained action: the learning process leads to debate about change, including confronting others' constructions of reality. This debate changes actors' perceptions. Action is agreed through a process of negotiation. The changes that are implemented are therefore a compromise between various conflicting views. Sustained action includes local institution building or strengthening, thus increasing the capacity of people to initiate action on their own.

Other kinds of participatory methods may be more appropriate for involving farmers and citizens in the upstream definition of research priorities and the framing of broad policies for agricultural research and development (Stages iii and iv above). When these methods and approaches are used well, they are part of a process in which professional knowledge, local knowledge, negotiation skills, research skills, and democratic values come together to create new knowledge and promoting social and ecological change.

These approaches include citizens' juries, scenario workshops, public hearings and visioning exercises (Box 1). These approaches and methods differ substantially in detail and have been applied to a wide range of issues and contexts. They all, however, seek to adopt to varying degrees the criteria of deliberation and inclusion listed in Box 2.

**Box 1. A selection of methods for participatory research on the management of agricultural biodiversity**

Many of the methods described below can be combined and used at different stages in the participatory research cycle on the management of biodiversity important for food and agriculture.

√ **Citizens' juries**

A citizens' jury is a group of citizens—selected as a fair representation of the local population—brought together to consider a particular issue set by the local authority. Citizens' juries receive evidence from expert witnesses and cross-questioning can occur. The process may last up to several days, at the end of which a report is drawn up setting out the views of the jury, including any differences in opinion. Juries' views are intended to inform government decision-making.

√ **Citizens' panels**

- *Research panel*

A research panel is a large sample of a local population used as a sounding board by a public sector organisation. It is a form of research which tracks changes in opinion and attitudes over time. In Germany for example, these panels consist of 500-3000 participants. Members are recruited either by mail or by telephone as a sample of a given population. Panels have a standing membership and a proportion of their members is replaced regularly. Participants are asked regularly about different issues over a period of time.

- *Interactive panels*

Other models also have a standing membership which may be replace over time, but they consist of small groups of people who meet regularly to deliberate on issues and make policy recommendations.

√ **Consensus conferences**

A panel of lay people who develop their understanding of technical or scientific issues in dialogue with experts. A panel of between 10-20 volunteers is recruited through advertisements. A steering committee is set up with members chosen by the sponsors. The panel's members attend two weekends where they are briefed on the subject and identify the questions they want to ask in the conference. The conference lasts for 3-4 days and gives the panel a chance to ask experts any outstanding questions. The conference is open to the public and the audience can also ask questions. The panel's members retire and independently of the steering committee prepare a report that sets out their views on the subject. Copies of the report are made available to the conference audience and panel members present key sections to the audience.



√ **Deliberative opinion poll**

This method measures informed opinion on an issue. A deliberative poll examines what the public at large thinks when it has had the occasion and information to consider the matter carefully and closely. A baseline survey of opinion and demography is carried out and the participants of the poll are then recruited to resemble the wider group both in terms of demography and attitude. Often briefing begins before the event by means of written or/and visual information. Then, over several days, the participants deliberate in smaller groups and compose questions to be put to experts and politicians in plenary group discussions. Their views on a given subject are measured before the poll begins and again once it has finished. Changes in opinion are measured and incorporated into a report. Deliberative polls are often held in conjunction with television companies.

√ **Visioning exercises and future search conferences**

A range of methods (including focus groups) may be used within a visioning exercise, the purpose of which is to establish the ‘vision’ participants have of the kind of the future they would like to create. Visioning may be used to inform broad strategy for a locality, or may have a more specific focus (e.g. environmental consultations for Local Agenda 21).

Future search conferences usually involve a two to four-day meeting where participants attempt to create a shared community vision of the future. The meeting brings together those with the power to make decisions with those affected by the decisions to try to agree on a plan of action. The process is managed by a steering group of local people representing key sections of the community. People who are recruited are asked to form several ‘stakeholder groups’ within the conference. During the process they move from reviewing the past to creating ideal future scenarios. Each of the stakeholder groups explains its vision and then a shared vision is explored. The conference ends with the development of action plans and policy recommendations. Self-selected action groups develop projects and commit themselves to action towards their vision.

√ **Innovative development**

Innovative development is a methodology consisting of four participatory steps. First, an ‘action map’ is formulated. This is a systematic vision for action of an attainable and desired future that reflects the consensus of participants. Second, participants estimate the distance from the current situation to the attainable future and list the capabilities that are available. Third, participants systematically identify and evaluate each of the prospective actions. The fourth step is to design the action steps. All methodological steps are carried out through the participation of relevant actors who are brought together by an appropriate and legitimate authority.

√ **Participatory rural appraisal (PRA)/participatory learning and action (PLA)**

A family of approaches, methods and behaviours to enable people to express and analyse the realities of their lives and conditions, and to plan, monitor and evaluate action that seems appropriate to them. In PRA/PLA, outsiders act as catalysts for local people to decide what to do with the information and analysis that they generate. PRA methods include participant observation, semi-structured interviews and visual techniques (maps, matrices, trend lines, diagrams).

√ **Issue forums**

These are ongoing bodies which involve regular meetings focusing on a particular issue (e.g., community safety or health promotion). They may have a set membership or operate on an open basis, and are often able to make recommendations to relevant council committees or to share in decision-making processes. In India, for example, issue forums or study circles in villages are spaces where villagers gather to discuss specific subjects of interest, e.g. the impact of hybrid varieties or genetically modified organisms. Sometimes they will call in outside experts to help. The understanding and information that they generate is then used in the village assembly decision-making processes.

√ **Multi-criteria mapping**

Multi-criteria mapping (MCM) attempts to combine the transparency of numerical approaches with the unconstrained framing of discursive deliberations. The technique involves a rather complex series of steps, including: deciding the subject area, defining the basic policy options, selecting the participants, conducting individual interviews (2-3 hour sessions where additional options are selected, evaluative criteria are defined, options are scored and relative weighting is given to criteria), having researchers carrying out quantitative and qualitative analyses, providing feedback on preliminary results to the participants, developing deliberations among participants and, after a



final analysis, producing a report and policy recommendations.

Sources: adapted from Chambers, 1992; Clark, 1998; ESRC, 1998; Holland and Blackburn, 1998; Lowndes and Stoker, 1998; Coote and Lenaghan, 1997; Stirling and Maher, 1999; del Valle, 1999<sup>3</sup>

### Box 2. Some features of deliberative and inclusive processes (DIPs)

- √ **Deliberation** is defined as “careful consideration” or “the discussion of reasons for and against”. Deliberation is a common, if not inherent, component of all decision-making in democratic societies.
- √ **Inclusion** is the action of involving others and an inclusive decision-making process is based on the active involvement of multiple social actors. It usually emphasises the participation of previously excluded citizens.
- √ **Social interaction**. This normally incorporates face-to-face meetings between those involved.
- √ There is a **dependence** on language through discussion and debate. This is usually in the form of verbal and visual constructions rather than written text.
- √ A deliberative process assumes that, at least initially, there are **different positions** held by the participants and that these views are all respected.
- √ DIPs are designed to enable participants to **evaluate and re-evaluate** their positions in the light of different perspectives and new evidence.
- √ The form of **negotiation** is often seen as containing value over and above the quality of the decisions that emerge. Participants share a commitment to the resolution of problems through public reasoning and dialogue aimed at mutual understanding, even if consensus is not being achieved or even sought.
- √ There is the recognition that, while the goal is usually to reach decisions, or at least positions upon which decisions can subsequently be taken, an **unhurried, reflective and reasonably open-ended discussion** is required for those decisions to be solidly grounded and owned.

Source: adapted from Holmes and Scoones, 2000 and references therein.

## 3.2. Spaces for participatory learning and action

Platforms that bring relevant actors together are key for mobilising capacity for social learning, negotiation and collective action for research into the management of agricultural biodiversity. Platforms range from farmer networks to farmer field schools (FFS) and the FSO partnership. Over time, reflections on participatory practice have led to more critical views on the nature of platforms (user groups, co-management bodies, FFS....) for local adaptive management. For example, platforms are not always welcoming spaces for women, nor inclusive of the weak and marginalised, nor free from manipulation and co-option by more powerful insiders and/or outsiders.

More generally, important differences exist between two radically different types of spaces for participation: invited spaces from above and popular or citizen spaces. Governments and donor-led efforts to set up co-management committees, resource user groups and research platforms like FSO are examples of invited spaces from above. In contrast, citizen or popular spaces are created by people who come together to create arenas over which they have more control, e.g. farmers’ platforms for negotiation and collective action; do-it-yourself citizens’

<sup>3</sup> For a description of other methods that could be used for participatory policy making see NEF, 1998.



juries that frame alternative policies, etc. Whilst there are notable exceptions, popular spaces are arenas within which, and from which, ordinary citizens can gain the confidence to use their voice, analyse, deliberate, frame alternatives and action, mobilise, build alliances and act (Pimbert and Wakeford, 2001). But it is noteworthy that such popular spaces may also reproduce subtle forms of exclusion in the absence of a conscious social commitment to a politics of freedom, equity and gender inclusion.

## 4 Challenges for participatory research in the European Union

### 4.1. Transforming research for the local adaptive management of agricultural biodiversity

A greater emphasis on participatory research and locally-driven innovation in the EU is essential to offset two dominant biases:

i) Reductionism and the neglect of dynamic complexity. The science of parts (reductionism), as opposed to knowledge and ways of knowing that integrate the parts, has largely failed to guide agro-ecosystem management. Narrow lens, universal and reductionist explanatory models have generated a crisis in natural resource management through their inability to come to terms with the dynamic complexity and variation within and among ecosystems (Gunderson et al., 1995; Berkes et al., 2003). Daily, seasonal and longer term changes in the spatial structure of ecosystems are apparent at the broad landscape level right down to small plots of cultivated land. Environmental dynamics and effects are usually long term and their complexity calls for more holistic and transdisciplinary ways of knowing. Moreover, new ecological knowledge systems need to work with the complexity of ecosystems in a constructivist approach to science so that innovation and learning becomes embedded in management. This emphasises the need for flexible individual and collective responses in which farmers and local resource users are central actors in analysis, planning, negotiations and action. Participatory learning and action is thus key for the local adaptive management of biodiversity and agro-ecosystems (Holling et al., 1998; Borrini-Feyerabend et al., 2007).

ii) Social marginalisation and exclusion. This manifests itself through the neglect of farmers and local people, their knowledge, priorities, management systems, institutions and social organisation, and the value to them of local assets (natural, social, cultural...). Within this dynamic of 'denying and undermining the other', powerful actors seek to control agricultural biodiversity management through discourse, law and coercion. Policies and practice, therefore, aim to exclude people and so discourage all forms of local participation in the management of agricultural biodiversity. Meanwhile, reductionist knowledge selectively favours corporate profits as well as control over labour and nature in simplified and standardised production systems. Such top-down, imposed natural resource management all too often results in huge social and ecological costs in areas where rural people directly depend on biodiversity-rich farming systems for their livelihoods. In contrast, methods and approaches for participatory learning and action offer an alternative to create spaces for 'voices from below' and potentially help re-connect farmers and citizens with the biodiversity that sustains their livelihoods and culture.

Eliciting and making visible diverse local realities, priorities, categories and indicators through participatory research is very much needed today in the EU to challenge or



complement the top-down, ‘one size fits all’ science, policy and practice applied to on-farm conservation and the management of agricultural biodiversity. However, claims that one tradition of knowledge and practice (local, vernacular systems versus external science-based systems) is always better than the other may ultimately restrict possibilities. Instead, a key challenge for participatory learning and action lies in creating safe spaces where plural and complementary traditions of knowledge can be purposefully combined for the local adaptive management of agricultural biodiversity and their equitable use.

At heart, local adaptive management of agricultural biodiversity depends on platforms of local resource users and other citizens which provide safe spaces to deliberate, arbitrate, act on feedback from the environment and produce new knowledge for action. This implies a greater commitment to democratic pluralism and cross-cultural dialogue in the production and validation of knowledge. And in future, the framing and boundary conditions for participatory research, learning and action need to be kept as open and flexible as possible, and facilitators need to be comfortable with diversity, surprise and the ‘unusual’.

The FSO project illustrates how participatory research can enrich varietal assessments. In multi-location on-farm studies of the responses of different crop varieties grown in different environments, FSO scientists used well-established quantitative indicators to compare and contrast varietal performance within and between locations (Goldringer et al., 2010). The multi-location trials were done with farmers who participated in this study of the evolution of landraces and commercial varieties when displaced from their region of origin and seed multiplication environments<sup>4</sup>. In addition to quantitative measures, FSO partners also identified qualitative and experience-based indicators used by farmers to assess the performance of the crop varieties grown in their fields (Box 3).

### **Box 3. Seeing plant varieties through the eyes of farmers**

Farmers involved in the FSO project rely on their own criteria and indicators to assess crop varieties and their performance on the farm. Overall, farmers emphasise more qualitative criteria and experiential-based indicators than those used by scientists in the FSO project.

For example, in the early phases of participatory plant breeding work, farmers criticised researchers for using such terms as “genetic material”, “weeds” and “quantifiable selection criteria”. In contrast, when describing their relationship with their crops, farmers see them as *living* plants and companions, and they never view the plant as an *object*. They have a strong emotional attachment to plants and see them as a source of knowledge and inspiration, provided one has a friendly and empathetic relationship with them. *“If you know how to dialogue with her, really allow her to enter inside you and speak to you.....Because I do not know anything about wheat, it’s the wheat plants that teach me everything”* (J.F.Berthelot, a French farmer, pers comm.).

During the course of the FSO project it became more apparent that each participating farmer has his own intimate way of describing plants that do well, are healthy and show good qualities. For example, Jean Francois Berthelot talks of “wheat plants that are laughing” (*“un blé qui rigole”*). For Bernard Ronot, the wheat plants must radiate colour and energy (*“ça doit cracher”*) and for Florent Mercier “the straw of wheat plants can be tall but must be strong” (*“les pailles peuvent etre grandes mais doivent etre costaudes”*). Other farmers emphasise the energy radiance and the aura of the wheat plants as evidence for good health and performance in their fields. Farmers’ quality criteria

<sup>4</sup> The experimental protocol in FSO was designed to respond to a particular policy situation related to regulations on conservation varieties. One of the main goals was to measure objective criteria on landraces as they evolved in organic agriculture conditions, in order to provide information for the European commission related to the impacts of farmer exchange and cultivation of these landraces on diversity.



for crop varieties also include taste, smell, colour, as well as the ‘sound’ and ‘music’ generated when seeds of the same variety are poured out of a bag onto a firm surface. Seed varieties nurtured and grown by these FSO farmers are thus experienced in a deeply holistic and sensual way. Farmers’ assessments of crop varieties embrace both quantitative criteria (yield, disease resistance, etc.), as well as qualitative indicators that emerge from a sensual and emotional relationship with plants and the living environment.

This emotional bond with plants is seen as a key source of more holistic knowledge and action which recognises and builds on the highly dynamic nature of plant-environment interactions. For example, many FSO farmers fixate less on finished products (i.e. crop varieties), giving much more importance to the ongoing, open-ended process that generates crop variability and adaptation to highly diverse and ever changing conditions. *“We are not just asking for varieties. We want a permanent process, a way of working that allows us to do crop breeding and selection that can improve plant populations in each locality. Selection work should thus guide the evolution of plants, helping them to diversify and adaptively respond to unique local contexts and micro-environments”* (French farmers views presented at la Ferme du Moulon, 2010).

Sources: Observations and conversations with FSO farmers between 2007 and 2010; INRA (2010), Compte Rendu reunion Ferme du Moulon, 9-10 February 2010.

Given the FSO project objectives and emphasis on participatory research, farmers’ criteria and indicators are very important for two reasons. First, they represent and reflect farmers’ world view and ways of seeing and experiencing plants and the environments they live in. Second, these indicators help one to better understand the knowledge system which guides farmers’ varietal selection work and management of on-farm agricultural biodiversity. To be effective, participatory research on the management of agricultural biodiversity needs to build on the complementarity and uniqueness of the different evaluation criteria and indicators used by both farmers and scientists.

Thus, combining at least four types of indicators in a single process may help deal with increasingly uncertain change in both social and ecological processes:

- i) Experiential indicators used by farmers which reflect experience-based changes in environmental or socio-economic conditions. These are site specific and reflect the differentiated needs and expectations of community members.
- ii) Technical or scientific indicators that are universal, disciplinary and quantitative enough to allow for comparisons between locations and across time.
- iii) Indicators that can help relate scientific knowledge and methods to local peoples’ experiences.
- iv) Indicators that can help relate local people’s knowledge to scientific methods and knowledge.

Complementarities, - rather than opposition -, of scientist and farmer perspectives are key here. The FSO programme tried to combine both the scientific approach and analysis with farmers’ intuition and knowledge in a mutually beneficial way. Most breeders involved in the FSO project agree that selection is as much an art as a science, - and that an intuitive sense of the plant is essential to success. In the multi-location on farm studies mentioned above, the FSO scientists involved clearly valued the farmers’ knowledge of their farms and their plants as much as the quantitative data they collected and the analyses they did. An important objective for the FSO scientists was to provide the farmer’s network with as much information as a formal research program would have, - to complement their observations and to work with them in evaluating the variable responses of plants grown on their farms and



evaluating their selections. Instead of opposing scientific and farmer viewpoints, FSO partners thus actively looked for synergies between these forms of knowledge and how they might be combined to give a fuller understanding of complex systems. Acknowledging difference and this search for common ground were important in building mutual respect and a more collegial relationship between the farmers and scientists involved in the FSO multi-location on farm trials.

Learning to better ‘acknowledge difference’ is a key challenge for future EU projects. Different social actors may have different views of what constitutes a positive impact as well as different criteria of evaluation. Different indicators are likely to be utilised by women and men, the poor and rich, the young and old and between residents and migrants. For instance, indicators used to evaluate the performance and impacts of participatory plant breeding are likely to differ according to the individual’s degree of dependence on biodiversity. Thus, decision makers at different levels— e.g. an organic farmer and a national policy maker— use different kinds of information to guide their decisions. Participatory research on the management of agricultural biodiversity thus needs to sensitively explore and build upon such different perspectives of what is relevant and important. Last, - whilst this was not an objective of the FSO project -, the analysis of gender differences in the participatory management of agricultural biodiversity remains as much a challenge today as it was at the beginning of this decade (e.g. see Farnworth and Jiggins, 2003)

The process described here is all about bridging the local and global to generate the context-specific knowledge (social and ecological) needed to sustain livelihoods and agricultural landscapes in the face of dynamic complexity and uncertain change. The kind of knowledge that emerges from this decentralised process of social learning has been well described by James Scott in his book *Seeing Like a State* (1998). He speaks of “forms of knowledge embedded in local experience” (mêtis) and sharply contrasts them with “the more general, abstract knowledge displayed by the state and technical agencies”. Mêtis, says Scott, “is plastic, local and divergent...It is, in fact, the idiosyncrasies of mêtis, its contextualities, and its fragmentation that make it so permeable, so open to new ideas”. This kind of participatory, experiential understanding takes involvement with our surroundings seriously. Its criteria of validation and quality are much broader than those of the positivist social and natural sciences that still inform much of agro-biodiversity management today in Europe. As the experience of the French farmer seed networks suggests, this way of knowing can also generate radically new knowledge for the dynamic management of agro-biodiversity (Box 4).

**Box 4. Farmer networks transforming the theory and practice of plant breeding in France**

Farmers who grow crops in low external input systems or under organic farming conditions are keen to find seeds adapted to their specific cultivation practices. They complain that commercial varieties do not grow well in poor soils when no chemical fertilisers and pesticides are used. Moreover, farming with no or very few external inputs reveals the heterogeneity of their farming environment and the corresponding need for diversity in their crop varieties. And they have many different needs and uses for their crops: farmers rearing animals and crops in mixed farms need long stem cereals which provide more straw; farmers practising permaculture require early sowing or deep rooting crop varieties; and farmers who produce their own bread are especially interested in the taste, colour and nutritional quality of the bread they make from their own cereals. The standard, industrial farming varieties offered by public and private plant breeding programmes fail to meet the diverse needs of these farmers and their land.

In 2003, the *Réseau Semences Paysannes* (the Peasant Seeds Network) was created in France by the *Confédération Paysanne*, the National Coordination of Defenders of Farm Seeds, and several





organic farmers' associations. The *Réseau Semences Paysannes* is made up of 26 member organisations and builds on the earlier work of French seed savers, focusing not only on vegetables and fruit, but also on cereals, oilseeds and grapevines. Members of the *Réseau Semences Paysannes* (RSP) have initiated their own plant breeding based on traditional crop varieties.

Since 2003 the RSP has worked with a small group of plant breeders from INRA, the French National Agricultural Research Institute. Participatory plant breeding work has so far primarily focused on wheat, maize and crucifers. This process of co-inquiry between scientists and farmers has generated a number of tensions, as well as new opportunities for meaningful change:

- In sharp contrast with mainstream science, the RSP farmers clearly reject the reductionist, utilitarian and mechanistic view of the living world. Their concepts and categories of knowledge do not sit well within the quantifying-instrumental approach of conventional plant breeding. This has created tensions with well-meaning researchers from INRA, whose language—and its implicit assumptions—reflects and reinforces an instrumentalist view of nature. For example, as mentioned above, in the early phases of participatory plant breeding work, farmers criticised researchers for using such terms as “genetic material”, “weeds” and “quantifiable selection criteria”. In contrast, farmers’ emotional bond with plants is seen as a key source of knowledge and it clearly positions farmers outside the positivist scientific paradigm that values a cool “objective detachment” in the pursuit of knowledge.
- The RSP farmers reject the studies of heredity based on experimental analysis and instead value a more holistic and phenomenological approach to understanding their interactions with plants and the living environment. Phenomenology is a body of knowledge which relates empirical observations of phenomena to each other and tries to extract the essential features and the essence of what one experiences. The farmers’ ways of knowing are thus radically different from the epistemological norms of mainstream plant genetics and breeding, - as practiced by the vast majority of plant breeders in France.
- The scientists working with the RSP and, - more generally -, on PPB and PVS in France represent a very small percentage of the total number of researchers employed by INRA (8 out of a total of 8000!). Moreover, all the INRA scientists working with the RSP farmers are women. For this minority of scientists it is clear that an alternative research paradigm is urgently needed within INRA and the EU. They do believe that science can give us a greater appreciation and understanding of diversity, adaptation and evolution. But whilst they may use objective criteria and fairly reductionist measures, their declared goal is always to put this in context of the larger picture and work towards a more holistic understanding. Rather than seeing the quantification step as “objectifying” the plants, they argue that it can give us further insight into the intrinsic beauty of how nature works. To date, the RSP and FSO experience shows that this ‘*attitude of sensitive inquiry*’ by this minority of researchers is a potentially important source of epistemological convergence and meaningful dialogue between scientists and farmers.

As the process of co-inquiry with more open minded scientists unfolds, it is becoming more apparent that the farmers’ experiential knowledge and phenomenological understanding of the living world resonate with new insights from modern genetics and biology. This is true, for example, in the areas of fluid genomes and indeterminate relations between genes and the environment (Commoner, 2002; Ho, 2003); non-linear dynamics, plasticity and the emergence of new forms; epigenetic effects in which the environment modulates genetic expression and leads to heritable phenotypic changes; metamorphosis and process transformation in growth, development and evolution; emergent properties and the self-organisation of the living world (Pouteau, 2007a&b). Ultimately, new forms of plant breeding based on a more holistic science of dynamic complexity and participants’ engagement with the living world may grow out of these conversations between farmers and scientists as they generate plant varieties suited to a diversity of unique situations and needs. This would amount to nothing less than a paradigm revolution in genetics, plant breeding and modern biology.

Sources: Pimbert, 2010 and references therein; and [www.semencespaysannes.org](http://www.semencespaysannes.org).



All members of such networks of knowledge producers and users (Box 4) effectively act as an ‘extended peer community’. As active participants they introduce ‘facts’ and sources of knowledge which scientists working in standardised and idealised research conditions simply cannot factor in and/or assess. The subsequent cross-checking of opinions, joint analysis of information collected, citizen deliberations and peer to peer reviews are all involved in the in situ validation of useful knowledge. This ‘extended’ peer review is a formidable asset at a time when citizens and their communities are faced with the open-ended uncertainties of a fast changing world (environmental and climate change, spread of new diseases, unstable markets, political change....). These autonomous networks for learning and action contribute to the emergence of a “post-normal science”<sup>5</sup> (Funtowicz and Ravetz, 1994). Post-normal science is the sort of inquiry in which the facts are uncertain, values are often in dispute, stakes are high and decisions are urgent. Its core ideas include an extended peer community and the recognition of a plurality of legitimate perspectives on every issue.

The example of the Réseau Semences Paysannes and similar farmer networks in Europe and elsewhere (see Pimbert, 2010) emphasise that the issue is not merely about ‘using’ participation to make research more ‘effective’ or ‘efficient’. Instead, the transformative process envisaged here is much deeper in scope and intent. Participation is all about ensuring greater cognitive justice between fundamentally different knowledge systems and ways of knowing. As Visvanathan argues, cognitive justice is “the constitutional right of different systems of knowledge to exist as part of a dialogue and debate” (Visvanathan, 2005). Cognitive justice thus seeks to advance democratic practice by recognising the claims of communities, groups and networks in decisions that fundamentally affect people’s lives. Such demands do not represent an anti-science agenda, nor are they necessarily against modern technology. Instead, the idea of cognitive justice emphasises the right for different forms of knowledge—and their associated practices, livelihoods and ways of being—to coexist. “The opposition of expert and layperson disguises to a certain extent the opposition between science and alternative sciences. One needs instead a parliament of epistemic debates, but also the ecologies that would let these forms of knowledge survive and thrive not in a preservationist sense but as active practices” (Visvanathan, 2005).

Future participatory research on the management of agricultural biodiversity in the EU needs to actively explore these new frontiers by opening up new communicative spaces in which cognitive justice and democratic inquiry can take place.

#### ● 4.2. Scaling up and institutional transformation

With few exceptions, participatory learning and action for on-farm conservation and agrobiodiversity management had been limited to the local level for many years. More recently, the focus on the micro has given way to attempts to adopt and apply these participatory approaches on a wider scale. For example, many large, public and private agencies—including the government departments, development agencies, non-governmental and civil society organisations and research institutes in the European Union (EU)—are now seeking to spread, scale up and mainstream participation in research and the management of agricultural biodiversity. Embedding and situating peoples’ participation at the heart of policy decisions, organisational procedures and resource allocation has thus become a fundamental challenge for the EU member states. Such institutional transformation involves several interrelated

<sup>5</sup> Post-normal science reflects three key insights: i) these times are far from normal: uncertainty now rules political and environmental affairs; ii) normal puzzle solving science is now thoroughly inadequate as a method and a perspective for solving the great social and environmental issues of our times; iii) extended peer communities of citizens can no longer be relegated to second



levels of change (Box 5).

**Box 5. Institutionalising participatory approaches and people-centred processes**

The term ‘institutionalisation’ describes the process whereby social practices such as participation become regular and continuous enough to be called institutions. The dynamics of institutionalising participation and people-centred approaches imply long-term and sustained change, which in turn recognises the conflict between different sets of interests, values, agendas and coalitions of power. In practice, this process of institutionalising participatory approaches emphasises several interrelated levels of change:

- Spreading and scaling up change from the micro (e.g. project/local) to the macro (e.g. policy/national) level
- Scaling out from a single line department, sector or initiative to catalyse wider changes in organisations (e.g. government and donor agencies, non-governmental organisations, civil society groups and federations, private corporations), and in policy processes
- Changing attitudes, behaviour, norms, skills, procedures, management systems, organisational culture and structure, as well as policy change
- Including more people and places through lateral spread, from village to village, municipality to municipality, district to district and so on.

However, the dynamics of institutionalising participation are substantially different depending on whether they are primarily used to justify external decisions and control by powerful actors or whether they aim instead to devolve power and decision-making away from external agencies, thereby (re)building local assets and peoples’ sovereignty. Evidence from Europe and elsewhere<sup>6</sup> points to a continuum of practice in which issues of power, knowledge and learning for change are key (Table 2).

Institutionalisation as mere labelling	‘Participation’ used only as a label to make proposals and rhetoric attractive to donors, while actions continue to be extractive
Institutionalisation as use of participatory methods and approaches for staff training	Participatory methods primarily used for one-off training of staff members. No commitment to using methods for field action and policy making; no effective skills available. Lack of commitment and resources prevent the continuation of the approach for programme management and organisational development.
Institutionalisation as the use of participatory methods and approaches for project management and policy consultations	Participatory methods are used at the appraisal stage and to develop more effective policies and programmes but are not linked with institution development aspects. The use of methods and participation discourses are sustained as long as funding is available but taper off on withdrawal of resources and in the absence of effective local organisations
Institutionalisation in	Participatory approaches and methods are used effectively for policy

<sup>6</sup> See Pimbert, 2004a & 2004b and [www.iied.org/pubs/search.php?s=IP](http://www.iied.org/pubs/search.php?s=IP).



<p>which participatory approaches are used for local institutional and organisational development</p>	<p>processes, programme management and local institutional development, which shows short and long-term impact. The process, however, may not be accompanied by corresponding changes in policies and support organisations at larger scales (e.g. in policy reforms, learning environment, structures, funding and evaluation mechanisms).</p>
<p>Institutionalisation of participation as transformation for organisational change, lateral learning and inclusive governance</p>	<p>Participatory processes, approaches and methods used as part of a strategy of policy and organisational transformation as well as local institutional development. This dynamic of transformation involves deliberations, appraisal, planning, negotiation, bargaining and conflict resolution together with lateral expansion of local organisations through resource user to resource user, village to village mechanisms. Safe citizen spaces and federated networks (national and international) are key for decentralising governance and for re-localising/democratising ‘power’.</p>

*Adapted from Pimbert (2009)*

**i)** on efficiency) or by reorganising components, procedures and responsibilities (emphasis on effectiveness).

Change and learning are central issues for the individuals and organisations involved in this spectrum of practices. At its simplest level (e.g. towards the top end of Table 2), learning is a process through which new knowledge, values and skills are acquired. At a deeper level (e.g. towards the bottom of Table 2), learning involves “a movement of the mind” (Senge, 1990). Along this spectrum, different orders of change or learning are involved:

**ii)** No change—no learning. Denial, tokenism or ignorance. This is still widespread today, both in the South and the North. More often than not the rhetoric of participation is institutionalised, without corresponding changes in organisations, policies and practice.

**ii)** Accommodation—first order learning and adaptation but maintenance of the status quo. Much of the focus of first order change is on making adjustments to the existing system, doing more of the same, but doing it better (emphasis

**iii)** Reformation—second order learning, critically-reflective adaptation. The organisational culture and facilitation continuously encourage the questioning of existing practices, rules, procedures and regulations. They seek to expand collective knowledge and understanding by learning about the assumptions and goals behind existing routines, practices, theories and policies.

**iv)** Transformation—third order learning, creative re-visioning and re-design of the whole system. This involves seeing things differently, ‘doing better things’ and re-thinking whole systems on a participative basis. As such, it involves a shift in consciousness and a transformative level of learning. Individuals and organisations see the need to transform in order to be transformative.

Most farmers and researchers involved in the EU-funded FSO project would agree that institutional reform and transformation are the key challenges for the future. Significant changes in funding procedures and the organisation of research are seen as necessary in this context. For example, the 2009 International Conference on Farm Seed Opportunities (FSO) identified some of the changes in EU procedures that are needed to support future participatory research in Europe (Box 6).

**Box 6. Reforms needed in EU project management and funding procedures to make**



### **participatory research work in Europe**

FSO partners identified the following as key enabling factors for participatory research in EU projects:

- Research funded by the EU should begin with an initial exploratory phase during which partners can more sharply define and re-shape the agenda for research on the basis of their shared analysis, discussion and initial scoping study. EU funding needs to allow for this flexibility and adaptive management of the research process, rather than ‘locking’ partners into a fixed framework of activities listed in the original project proposal.
- Adequate funds need to be earmarked for developing agreements on respectful and fair ways of working with partners, such as for on-farm research involving dialogue and the free prior informed consent of farmers and other local partners. EU funds should favour projects that adopt clear codes of research ethics.
- Adequate provision should be made to train scientists in the use of participatory research methods and processes of co-inquiry with farmers. The EU has an opportunity and responsibility to create more enabling conditions for participatory research through professional training and re-orientation of scientific research institutes and their staff.
- When research partners need to use several European languages, adequate funds need to be made available for translation and inter-cultural communication.
- EU projects that seek to promote participatory research need to shift from a blueprint and logical framework model to a more open-ended, learning process approach. Research needs to be designed so that it can adapt to the uncertainties, surprises, changes, and trade-offs inherent in processes of co-inquiry involving both scientists and farmers—especially given that in addition to research, these farmers also engage in other farming and income generating activities.
- The EU has an opportunity to encourage more widespread participation in R&D on agricultural biodiversity by publicly recognising and rewarding the pioneering scientists and farmers doing cutting edge work in PPB and PVS in Europe. Today very few scientists and farmers in Europe engage in PPB and PV, or in other aspects of participatory on farm conservation and management of agricultural biodiversity.

Source: Participant discussions in the Farmer Forum held during the *International Conference on Farm Seed Opportunities* (FSO), 14-15<sup>th</sup> October 2009, Marseilles, France.

Experience to date reveals that the following are key for creating the enabling conditions and drivers necessary for the level of change required (Pimbert, 2004):

- i) Actors with emancipatory values, attitudes and behaviours. The history of participatory natural resource management shows that innovative, charismatic and/or dynamic people have championed changes in policies, field practices, training and organisations. Field observations also highlight the central importance of professional attitudes and behaviour in enabling the scaling up of people-centred innovations.
- ii) People-centred learning and critical education which promotes ecological knowledge for sustainability, both among local agricultural biodiversity users and those who work with them.
- iii) Enabling organisations which emphasise resource users’ abilities, promote organisational learning and which are flexible in their structure and procedures.
- iv) Safe spaces where farmers and other citizens can get together, share problems and decide on action. Linking together these safe spaces and local groups into broader federations has helped farmers capture some power back from centralised, top down agencies and corporations.



v) Policy spaces above and below. Supportive national policy decisions are complemented by farmer-led attempts to contest and shape policies from below.

vi) A context in which biodiversity resource users have some control over funding decisions and allocations made by local, national or international funding bodies.

At the EU level, institutionalising the kind of participatory research needed for on-farm conservation and the management of agricultural biodiversity depends on bringing about change in two key areas:

- Organisational transformation within state bureaucracies and the EU Commissions
- Professional re-orientation and re-skilling of scientists and research institutes.

If the objective of on-farm conservation research is to achieve the sustainable and effective management of biological resources, then nothing less than functional participation will suffice (see Table 1). This implies the use of participatory methodologies by staff of research institutes and government agencies. For example, participatory rural appraisal (PRA, see Box 1 and Pretty et al., 1994) and methods for deliberative and inclusive processes (DIPs; Box 2)<sup>7</sup> are a growing family of methods and ways of working that enable local people and outsiders to share, enhance and analyse their knowledge of life and conditions, in order to plan and to act. These approaches involve self-critical awareness of one's own attitudes and behaviour towards farmers and local people.

The adoption of participatory methodologies calls for a greater emphasis on training in communication rather than technical skills. Scientists and other professionals must learn to work closely with colleagues from different disciplines or sectors, as well as with rural people themselves, including women. Good judgement and interpersonal skills should be cultivated through the adoption and use of participatory methods. This may imply a significant shift in technique for conventional trainers, since training for participation must itself be participatory and action-based (Chambers, 1992; 1996). Nurturing the attitudes and behaviour needed for respectful engagement in participatory processes is also key for change. One practical implication is that research institutes and government agencies need to set aside time for field experiential learning for their professional staff, so that they can see, hear and understand for themselves local people's reality, and then work to make it count.

However, the adoption of a participatory culture and changes in professional attitudes and behaviour are unlikely to automatically follow the adoption of new methods. Training agency personnel in participatory principles, concepts and methods must be viewed as part of a broader process of reorienting institutional policies, procedures, financial management practices, reporting systems, supervisory methods, reward systems and norms (Thompson, 1995; Absalom et al., 1995; Pimbert et al, 2000). In both government departments and research institutes, the challenge for top and middle management is to design appropriate institutional mechanisms and rewards to encourage the spread of participatory methods within the organisation. Without this support from the top, it is unlikely that participatory approaches which enhance local capacities and innovation will become core professional activities. They will remain isolated and marginalised within government departments and research institutes responsible for on farm conservation and agro-biodiversity management programmes. Throughout the European Union—and at all levels—the central challenge for directors and board members of public administrations and research institutes is to radically restructure procedures and working relationships within their organisations (Box 7).

**Box 7. Organisational transformation for participation in knowledge production**

<sup>7</sup> See Pimbert and Wakeford, 2001 and references therein.



The following are key actions for those seeking to make organisations that produce social, environmental, economic and technical knowledge (research institutes, universities, government, civil society organisations, etc.) more participatory:

- Include representatives of diverse citizen groups and farmers normally excluded from decision making in the governance and the membership of budget allocation committees of public sector planning and research institutes.
- Establish procedures to ensure transparency, equity and two-way accountability in the allocation of funds and dissemination of new knowledge.
- Encourage shifts from hierarchical and rigidly bureaucratic structures to ‘flat’, flexible and responsive organisations.
- Build the capacity of technical and scientific staff in the participatory skills, attitudes and behaviour needed to learn from citizens (mutual listening, respect, gender sensitivity as well as methods for participatory learning and action).
- Provide capacity-building and experiential learning for staff/people to develop their ecological literacy and skills in agro-ecology and ecological design.
- Ensure that senior and middle management positions are occupied by competent facilitators of organisational change with the vision, commitment and ability to reverse gender and other discriminatory biases in the organisations’ ideologies, disciplines and practices.
- Promote and reward management that is consultative and participatory rather than hierarchical and efficiency-led. Establish incentive and accountability systems that are equitable for women and men.
- Provide incentives and high rewards for staff who experiment, take initiatives and engage in participatory work, and acknowledge errors as a way of learning-by-doing and engaging with the diverse local realities of citizen’s livelihoods in urban and rural contexts.
- Redesign practical arrangements and the use of space and time within the workplace to meet the diverse needs of women, men and older staff and to help them fulfil their new professional obligations to work more closely with citizens and other actors (timetables, career paths, working hours, provision of paternity and maternity leave, childcare provisions, mini sabbaticals, promotion criteria...).
- Encourage and reward the use of gender-disaggregated and socially-differentiated local indicators and criteria in monitoring and evaluation as well as in guiding subsequent technical support, policy changes and allocation of scarce resources.

Source: adapted from Pimbert, 2009.

Institutionalising and operationalising participatory approaches in research institutes and government bureaucracies will be an arduous task based on trial and error, self-critical reflection and further experimentation and innovation. But this EU-wide transformation is all the more necessary now given that many remediation, mitigation and adaptation responses to climate change in Europe depend on supporting innovative participatory research to re-introduce biodiversity at the farm and landscape levels.

### ○ 4.3. Managing agricultural biodiversity and participation in a globalising world

Participation and participatory research have sometimes been seen as a panacea or a technical fix for on-farm conservation and the management of agricultural biodiversity. But all too often participatory approaches have failed because of inequitable rights of access, use and control over natural resources, macro economic policy or corporate interests. Many FSO partners have thus increasingly learnt to see participation as part of—and dependent on—wider structural changes towards more equitable people-centred processes and democracy.

However, the effectiveness of such changes at any given level is usually limited when there is



no corresponding change in other levels or in the processes that influence or govern them. In this regard, newly emerging global trends are deeply problematic for the EU as a whole (Box 8). If unchecked, these trends could largely inhibit direct participation in civic affairs and freedom outside the market and commodity relations.

**Box 8. Globalisation and participatory management of agricultural biodiversity: emerging constraints**

- Globalisation challenges the state from above—for example by transnational corporations—and from below—by citizens and communities. In this emerging context, the state seeks to keep control over at least one of three stages of decision-making for the management of biodiversity: policy making, operations, or ownership of the resource. Under pressure from above and below, the state uses a very particular strategy of separating policy making over the use of resources from both the operational activities and the ownership of these resources. As in the past, the state thus continues to strengthen its own development interests today by removing decisions over the management of biodiversity and other natural resources from farmers, local users and communities (Finger and Finger, 2003).
- Decentralisation policies are also a reaction to the diminishing financial capacity of the state. Diminishing state subsidies and relatively weak local capacities lead to situations in which private corporate sector involvement is increasingly seen as necessary for the provision of previously public services and free ecosystem services such as open pollinated crop varieties and farmers’ seed exchange practices. This trend is reinforced by higher environmental standards that require investments and technologies that overwhelm the capacities and resources of farmers and local governments.
- In the context of globalisation and increasing competition, public administrations everywhere tend to see citizens as clients or consumers, and consequently ask for their financial participation. States also allow corporations to commodify and privatise nature on an unprecedented scale. For example, under new trade agreements as well as stronger intellectual property laws and seed regulations, the secular rights of farmers to participate in saving, multiplying and selecting seeds on-farm is being denied as farmers have to pay for seeds and other genetic resources over which corporations hold exclusive patent rights.

The European legal frameworks which dictate what seeds can be sold on the market and who owns them are of paramount importance here. These legal frameworks currently limit the potential of participatory research into seed selection and on-farm conservation by restricting farmers’ free access to diverse seeds:

- **The DUS test.** To be registered on a national seed list and certified for sale, a variety must be ‘distinct, uniform and stable’—this is known as the DUS test. If a variety does not pass the DUS test it cannot figure on an official list and be legally sold. In the EU, the strict demand for uniformity has reduced genetic diversity to such a degree that none but the most advanced varieties are allowed to be sold on the market. This legally-induced genetic uniformity has also reduced the number of different seed varieties available to farmers and consumers. This reduced access to diverse seeds has constrained on-farm participatory plant breeding and varietal selection in Europe. Future participatory research on the management of agricultural biodiversity depends on changing seed regulation and certification laws to make it possible to grow, exchange and sell plant varieties that currently do not meet the DUS test. The FSO project has identified several categories of plants that require different seed regulatory frameworks in the EU (Box 9). Several recommendations have been made by FSO partners to ensure





the continued access of diverse seeds to farmers engaged in participatory plant breeding and selection programmes in Europe (see FSO, 2010).

**Box 9. New seed regulations for the conservation and sustainable use of agricultural biodiversity in Europe**

The European programme on Farm Seed Opportunities (FSO) was designed to support the implementation of seed regulations and propose several regulations scenarios that can help conserve agricultural biodiversity and promote on-farm and participatory plant breeding (PPB). The FSO project has identified several types of varieties still cultivated by farmers in Europe and has analysed their ability to meet current EU criteria for distinctness, uniformity and stability (DUS criteria). Many crop varieties still grown across Europe do not fit the DUS criteria:

- Local or old varieties that fit the definition of conservation varieties, still maintained by either small-scale seed companies or breeders or farmers, with local or regional diffusion.
- Population varieties, heterogeneous participatory plant breeding (PPB) varieties, and local and old varieties that are distinct, but for which the criteria of uniformity and stability can be only verified for a few characters. Many crop varieties in this category are particularly useful for organic and low-input agriculture, with a large potential diffusion and resilience to climate change.
- Other varieties developed by farmer, professional and amateur breeding activities that will continue to evolve and which possess a variable level of homogeneity.

Given the threats of climate change in Europe it is imperative that existing seed regulations be transformed to allow for the continued existence of heterogeneous and highly diverse crop varieties needed for the design of resilient food systems.

Source: [www.farmseed.net](http://www.farmseed.net)

- **Intellectual property rights.** The second set of legal instruments that need to be reconsidered are intellectual property rights (IPR)—the rules and rights that determine who owns genetic material. With the signing of the UPOV convention in 1961<sup>8</sup>, a special form of intellectual property right was created to reward and remunerate the work of professional plant breeders: plant breeders’ rights (PBRs). Initially, varieties which were temporarily protected by PBRs could be freely used by breeders to develop new varieties—the so-called breeders’ exemption. Farmers also had the right to use their harvest from protected crops as new seed, a secular right that has misleadingly been called the ‘farmers’ privilege’. However, in March 1991 the UPOV convention was revised and PBRs strengthened to look more like a patent right. The farmers’ privilege and breeders’ exemption have been drastically limited. If European farmers want to use protected seed now they have to pay additional royalties on them. The current drive to further extend industrial patents to seeds will only further restrict the availability and exchange of plant genetic diversity. This trend will significantly constrain participatory plant breeding as breeders and farmers have to pay licenses and royalties for the right to use patented genes and proprietary technologies that are mostly owned by large seed corporations.<sup>9</sup> Such IPR laws are counterproductive and work against the public good at a time of increasingly rapid climate change in Europe. Indeed, local adaptation to climate change now depends

<sup>8</sup> UPOV is the International Union for the Protection of New Varieties of Plants.

<sup>9</sup> The top 10 seed companies account for 67% of the global proprietary seed market, with the world’s largest seed company alone accounting for 23% of that market, and the top three companies accounting for 47% of the market (ETC, 2008)



on supporting participatory research on the on-farm conservation and management of agricultural biodiversity. For this to happen on a significant scale, the EU must ensure that knowledge, genetic resources and innovations remain accessible to all. This is a basic condition for economic democracy and the exercise of human rights, including the right to food and participation in Europe.

Reversing such structural constraints to participation in the management of agricultural biodiversity will require a strong commitment to non state-led forms of deliberative democracy and actions that make EU state institutions and corporations accountable to citizens (see Rahman, 2004). To bring about this kind of transformation, it is likely that European citizens will have to take the lead. European farmers and other citizens will thus need to simultaneously engage in a series of bold innovations, including:

- Strengthening the voices of farmers and those hitherto excluded from decision making in setting research agendas and in framing policies and regulatory frameworks for the management of agricultural biodiversity.
- Creating safe spaces and participatory processes in which expert knowledge and corporations are put under public scrutiny through appropriate methods for deliberation and social inclusion (e.g. citizens' juries, scenario workshops, citizen panels, multi-criteria mapping...see Box 1) and transparent oversight (e.g. citizen advisory councils<sup>10</sup>).
- Linking formal decision-making bodies and processes with spaces in which expert knowledge and corporations are put under public scrutiny, by engaging relevant social actors and coalitions of interest. A key challenge lies in creating new forms of accountability based on the concept of extended peer review—a more inclusive and plural process in which farmers, local resource users, food workers, and food consumers/citizens have as much say as scientific specialists, planners and other professionals in validating knowledge and policies.
- Facilitating the interlinking and federation of farmer/citizen spaces as a way of decentralising and democratising the governance and management of agricultural biodiversity, in both rural and urban contexts.
- Supporting the emergence of transnational communities of inquiry and coalitions for change committed to equity, democratisation, diversity and dynamic local level adaptation in food, farming and land use.

## 5 Concluding remarks

Drawing on the FSO experience and the wider literature, this paper has offered some critical reflections on how—and under what conditions—the EU might support the development of innovative participatory approaches for the management of agricultural biodiversity in Europe. Recommendations for the European Union are offered on how to address three challenges in particular: i) transforming knowledge and ways of knowing for the local adaptive management of agricultural biodiversity and resilience in the face of climate change and uncertainty; ii) scaling up and institutionalising participatory research and innovation in plant breeding, varietal selection, and on-farm conservation of agricultural biodiversity; and iii) the impacts of globalisation on participatory management of agricultural biodiversity in Europe.

<sup>10</sup> For examples and methodological details on citizen advisory councils see Steiner, 2003.



All the above are difficult challenges for the EU and its citizens because they imply significant changes in dominant policy and practice. For example, the development of more effective, interdisciplinary, and participatory research based on cognitive justice, mutual respect and democracy will involve clear shifts in power relations in setting upstream strategic research priorities and in framing policies for food and agricultural science and technology. New professional values, participatory methodologies and behaviour will also need to be widely encouraged and rewarded in scientific research institutes and within relevant EU Commissions.

There are no easy options for the on-farm conservation and management of agricultural biodiversity in the EU. We know from experience that bringing about such transformative change is usually messy and chaotic—once a process has been catalysed, many different dynamics can unfold. But this EU-wide transformation is all the more necessary now given that many remediation, mitigation and adaptation responses to climate change directly depend on supporting innovative participatory approaches for managing agricultural biodiversity at the farm and landscape levels.

## 6 References

- Absalom, E., R. Chambers, S. Francis, B. Guèye, I. Guijt, S. Joseph, D. Johnson, C. Kabutha, M. Rahman Khan, R. Leurs, J. Mascarenhas, P. Norrish, M. P. Pimbert, J. N. Pretty, M. Samaranayake, I. Scoones, M. Kaul Shah, P. Shah, D. Tamang, J. Thompson, G. Tym and A. Welbourn. 1995, “Sharing our concerns— looking into the future”, PLA Notes, 22:5-10, International Institute for Environment and Development, London.
- Almekinders, C.J.M., G. Thiele and D.L. Danial. 2007. “Can cultivars from participatory plant breeding improve seed provision to small-scale farmers?” *Euphytica*, 153(3).
- Berkes, F. and C. Folke, 1998. *Linking Social and Ecological Systems*. Cambridge University Press, Cambridge.
- Berkes, F., J. Colding and C. Folke (eds.), 2003. *Navigating Social-ecological Systems. Building resilience for complexity and change*, Cambridge University Press, Cambridge, United Kingdom.
- Borrini-Feyerabend, G., M.P. Pimbert, T.M. Farvar, A. Kothari and Y. Renard. 2007. *Sharing Power: Learning by doing in co-management of natural resources throughout the world*. IIED-IUCN and Earthscan, London.
- Ceccarelli, S. and Grando, S. 2007. “Decentralized-participatory plant breeding: an example of demand driven research.” *Euphytica*, 155 (3).
- Ceccarelli, S. and Grando, S. 2009. “Participatory plant breeding in cereals”. In: M.J. Carena (ed.). *Cereals, Handbook on Plant Breeding*. Vol 3. Springer, New York.
- Chambers, R. 1992. “Rural appraisal: rapid, relaxed and participatory”. IDS Discussion Paper 311, Institute of Development Studies, Brighton.
- Chambers, R. 1993. *Challenging the Professions. Frontiers for rural development*, Intermediate Technology Publications, London.



- Chambers, R. 1996. *Whose Reality Counts?* Intermediate Technology Publications, London.
- Clark, R. 1998. “Community issues groups”, *UKCEED Bulletin*, 55:19.
- Commoner, B., 2002. “Unraveling the DNA myth. The spurious foundation of genetic engineering.” *Harpers Magazine*, February 2002.
- Coote, A. and Lenaghan, J. 1997. *Citizens Juries: Theory into practice*, Institute for Public Policy Research (IPPR), London.
- Dawson, J.C., K. M. Murphy and S. S. Jones, 2008. Decentralized selection and participatory approaches in plant breeding for low-input systems. *Euphytica*, Vol. 160 (2): 143-154.
- Dorward, P., Craufurd, P., Marfo, K., Dogbe, W.; Bam, R. 2007. “Improving participatory varietal selection processes: participatory varietal selection and the role of informal seed diffusion mechanisms for upland rice in Ghana”. *Euphytica*, 155 (3): 315-327.
- ESRC. (1998). *Strengthening Decision-making for Sustainable Development*. Report of a workshop held at Eynsham Hall, 15-16 June 1998, Economic and Social Research Council, Oxford.
- ETC Group. 2008. *Who Owns Nature? Corporate Power and the Final Frontier in the Commodification of Life*. ETC Group, Ottawa.
- Farnworth, C.R. and J. Jiggins, 2003. *Participatory plant breeding and gender analysis*. CGIAR System Wide initiative. CIAT, Columbia.
- Finger A. and M. Finger. 2003. “State versus participation. Natural resource management in Europe”. IIED–IDS Institutionalising Participation Series. International Institute for Environment and Development, London
- FSO. 2010. *Policy Recommendations: Opportunities for farm seed conservation, breeding and production*. Final report to the EU, Farm Seed Opportunities, Paris, France. [www.farmseed.net](http://www.farmseed.net).
- Funtowicz, S. and J.R. Ravetz, 1994. “Emergent complex systems”. *Futures*, 26(6): 568-582.
- Goldringer, I. Dawson J.C., Serpolay E., Schermann N., Giuliano S., Chable V., Lammerts van Bueren E., Osman A., Pino S., Bocci R., Pimbert M., Levillain T., 2010. Report on the Analysis of the bottlenecks and challenges identified for on-farm maintenance and breeding in European agricultural conditions. *FarmSeedOpportunities*, Final report to the EU, Deliverable 2.3 pp 16.
- Gunderson, L., Holling, C.S. and Light, S. 1995. *Barriers and Bridges to the Renewal of Ecosystems and Institutions*. Columbia University Press, New York.
- Ho, M-W, 2003. *Living with the Fluid Genome*. The Institute of Science in Society, London.
- Holland, J. and J. Blackburn. 1998. *Whose Voice? Participatory research and policy change*, Intermediate Technology Publications, London.
- Holling, C.S, F. Berkes and C. Folke, 1998. “Science, sustainability and resource management.” In: Berkes and Folke (eds.). *Linking Social and Ecological Systems: Management Practices and Social Mechanisms for Building Resilience*. Cambridge University Press, New York.



- Holmes, T. and I. Scoones, 2000. Participatory Environmental Policy Processes. Experiences from North and South, IDS Working Paper 133, Institute of Development Studies, Brighton, United Kingdom.
- IAASTD. 2008. International Assessment of Agricultural Knowledge, Science and Technology for Development. Editors: McIntyre, BD., Herren, HR., Wakhungu, J. and R.T Watson. Island Press, Washington DC.
- INRA. 2010. Compte rendu de la reunion sur le projet Croisements du Roc, 2010. Ferme du Moulon, 9th-10th February 2010, INRA, France.
- Lowndes, V. and G. Stoker. 1998. Guidance on Enhancing Public Participation in Local Government: A research report to the Department of Environment, Transport and Regions. Department of Environment, Transport and Regions, London.
- NEF. 1998. Participation Works! 21 techniques of community participation for the 21st century, New Economics Foundation, London.
- Pimbert, M. 2010. Towards Food Sovereignty. Reclaiming autonomous food systems. IIED multimedia on line book, International Institute for Environment and Development, London. Available at: [www.iied.org/natural-resources/key-issues/food-and-agriculture/multimedia-publication-towards-food-sovereignty-reclaiming-autonomous-food-sys](http://www.iied.org/natural-resources/key-issues/food-and-agriculture/multimedia-publication-towards-food-sovereignty-reclaiming-autonomous-food-sys)
- Pimbert, M.P, Bainbridge, V., Foerster, S., Pasteur, K., Pratt, G. and I.Y. Arroyo. 2000. Transforming Bureaucracies. Institutionalising participation in natural resource management: an annotated bibliography. International Institute for Environment and Development, London and Institute for Development Studies, Brighton.
- Pimbert, M.P. 1991. Participatory Research with Women Farmers. International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) and TVE (30 mn video film), Hyderabad and London.
- Pimbert, M.P. 2004a. “Institutionalising participation and people-centered processes in natural resource management. Research and publication highlights.” IIED-IDS Institutionalising Participation Series, International Institute for Environment and Development, London.
- Pimbert, M.P. 2004b. “Natural resources, people and participation”, PLA Notes, 50, special anniversary issue, International Institute for Environment and Development, London.
- Pimbert, M.P. and T. Wakeford (eds.), 2001. “Deliberative democracy and citizen empowerment”, PLA Notes, 40, International Institute for Environment and Development, London.
- Pouteau, S. 2007a. Génétiquement indéterminé - Le vivant auto-organisé. Quae, Versailles, France.
- Pouteau, S. 2007b. “Emergence and auto-organisation: revising our concepts of growth, development and evolution toward a science of sustainability”. In: Zollitsch, W., Winckler, C., Waiblinger, S. and Haslberger, A. (eds). Sustainable Food Production and Ethics. Wageningen Academic Publishers, Wageningen, The Netherlands.
- Pretty, J.N. 1994. “Alternative systems of inquiry for sustainable agriculture”. IDS Bulletin 25(2): 37-48, Institute of Development Studies, University of Sussex, Brighton.



- Pretty, J.N. and R. Chambers. 1993a. "Towards a learning paradigm: new professionalism and institutions for sustainable agriculture". IDS Discussion Paper DP 334, Institute of Development Studies, University of Sussex, Brighton.
- Pretty, J.N., I. Guijt, I. Scoones and J. Thompson. 1994. "A trainer's guide to participatory learning and action". IIED Training Materials Series No. 2, International Institute for Environment and Development, London.
- Rahman, A. 2004. "Globalisation. The emerging ideology in the popular protests and grassroots action research". *Action Research* 2(1): 9-23.
- Ravetz, J.R. and S. Funtowicz. 2008. "Post-normal science". In: Cleveland, CJ (ed.) *Encyclopedia of Earth*. Environmental Information Coalition, National Council for Science and the Environment, Washington, DC.
- Scott, J. 1998. *Seeing Like a State*. How certain schemes to improve the human condition have failed. Yale University Press, New Haven.
- Senge, P. 1990. *The Fifth Discipline*. Doubleday, New York.
- Sperling L., J.A. Ashby, M.E. Smith, E. Weltzien and S. McGuire. 2001. "A framework for analyzing participatory plant breeding approaches and results. *Euphytica*, Vol. 122 (3).
- Sperling, L., M.E. Loevinsohn and B. Ntabomvura. 1993. "Rethinking the farmer's role in plant breeding: local bean experts and on-station selection in Rwanda." *Experimental Agriculture*, 29: 509-519.
- Steiner, R.G. 2003. "Models of public oversight of government and industry". In: Tsali, S. (Ed). *Caspian Oil Windfalls. Who will benefit?* Caspian Revenue Watch, Open Society Institute, New York.
- Sthapit, B.R., K.D. Joshi and J.R. Witcombe. 1996. "Farmer Participatory Crop Improvement. III. Participatory Plant Breeding, a Case Study for Rice in Nepal." *Experimental Agriculture* 32:479-496.
- Stirling, A. and S. Maher. 1999. *Rethinking Risk*. A pilot multi-criteria mapping of a genetically modified crop in agricultural systems in the UK. Science Policy Research Unit, Brighton.
- Thompson, J. 1995. Participatory approaches in government bureaucracies: facilitating the process of institutional change. *World Development* 23(9):1521-1554.
- Valle, del, A. 1999. "Managing complexity through methodical participation: the case of air quality in Santiago de Chile". *Systemic Practice and Action Research*, 12(4):367-380.
- Vernooy, R. 2003. *Seeds that Give: Participatory plant breeding*. International Development Research Centre, IDRC. Canada.
- Visvanathan, S. 2005. "Knowledge, justice and democracy". In: Leach M., Scoones, I. and B. Wynne (eds). *Science and Citizens: Globalisation and the challenges of engagement*. Zed Books, London.
- Weltzein, E. and A. Christinck, 2008. Participatory plant breeding: Developing improved and relevant crop varieties with farmers. In: Snapp, S.S. and B. Pound (Eds). *Agricultural systems: agroecology and rural innovation for development*. Pp. 212-252.



- Witcombe, J.R., A. Joshi, K.D. Joshi and B.R. Sthapit 1996. “Farmer participatory crop improvement. I. Varietal selection and breeding methods and their impact on biodiversity”. *Experimental Agriculture*, 32: 445-460.
- Witcombe, J.R., K.D. Joshi, S. Gyawali, A.M. Musa, C. Johansen, D.Virk and B.R. Sthapit. 2005. “Participatory plant breeding is better described as highly client-oriented plant breeding. I. Four indicators of client orientation in plant breeding”. *Experimental Agriculture*, 41: 299-319.

