



**GFAR**

GLOBAL FORUM ON AGRICULTURAL RESEARCH  
FORUM MONDIAL DE LA RECHERCHE AGRICOLE  
FORO GLOBAL DE INVESTIGACION AGROPECUARIA

## **NRM/AGROECOLOGY IN THE GLOBAL FORUM FOR AGRICULTURAL RESEARCH<sup>1</sup>**

### **1. The Concept of Natural Resource Management/Agroecology**

In the GFAR, the identification of NRM with Agroecology has been accepted and consecrated, although there is still no formal definition of what this association means.

Agroecology is an integrating science which seeks to understand flows of energy, information and matter in agricultural ecosystems in order to optimise the outputs while minimising the use of external inputs and avoiding the mining and pollution of natural resources.

Agroecology goes beyond a one dimensional view of agroecosystems – their genetics, agronomy, edaphology, and so on – to embrace an understanding of ecological and social levels of co-evolution, structure and function. Instead of focusing on one particular component of the agroecosystems, agroecology emphasises the inter-relatedness of all agroecosystem components and the complex dynamics of ecological processes.

Agroecosystems are communities of plants and animals interacting with their physical and chemical environments that have been modified by people to produce food, fibre, fuel and other products for human consumption and processing. Agroecology is the holistic study of agroecosystems, including all environmental and human elements. It focuses on the form, dynamics and functions of their interrelationships and the processes in which they are involved. An area used for agricultural production, e.g. a field, is seen as a complex system in which ecological processes found under natural conditions also occur, e.g. nutrient cycling, predator/prey interactions, competition, symbiosis and successional changes.

Implicit in agroecological research is the idea that, by understanding these ecological relationships and processes, agroecosystems can be manipulated to improve production and to produce more sustainably, with fewer external inputs and lower negative environmental or social costs (Altieri 1995).

### **2. Approach: A two-way street between agroecology and participatory processes**

From the conceptual definition of agroecology derives the need to apply it in specific situations. In contrast to the conventional systems, with their ready-to-wear, homogeneous

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<sup>1</sup> Synthesis paper for presentation to the GFAR-2000 Conference, Dresden, Germany, May 21-23, 2000. Prepared by Jean-Marc von der Weid as resource person on “Natural Resources and Agro-ecology on GFAR.” This paper summarises the main aspects and issues that have emerged from an active exchange of opinions and ideas among stakeholders of agricultural research, through meetings and electronic consultations, particularly via intensive use of e-mail.

technological packages that simplify agroecosystems, the principles of agroecological systems must be applied creatively to each particular situation.

The high variability of ecological processes and their interactions with heterogeneous social, cultural, political, and economic factors generate local systems that are exceptionally unique. When we consider the particular features of family farmers and still more particularly the resource poor family farmers the inappropriateness of technological recipes or blueprints becomes obvious. The only way that the specificity of local systems – from regions to watersheds and all the way down to a farmer's field – can be taken into account is through site-specific NRM (Beets 1990). This does not mean however, that agroecological schemes adapted to specific conditions may not be applicable at ecologically and socially homologous larger scales. What it implies is the need to understand the principles that explain why such schemes work at the local level, and then to apply such principles at broader scales.

How can we produce specific answers for specific situations, as we try to apply the principles of agroecology to such an immense diversity of agroecosystems?

In addition to reforms in the curricula of agronomy courses, there must be a new approach to generating and disseminating knowledge. The fact is that, even if all researchers and extension agents were to turn to agroecology, there would never be enough of them to handle the peculiarities of each farmer and each farm field (supposing farmers would accept to have a researcher orienting their work).

The only way to identify specific solutions for specific problems faced by farmers is to promote processes in which farmers work together with technical advisers and scientists to generate and spread agroecological knowledge. Participatory processes must be an integral part of a research-and-development strategy for natural-resource management, from identifying the problems to be handled jointly to evaluating the results of the solutions that have been researched, tested and adapted. An agroecological development strategy means a merging of scientific and empirical knowledge.

### **3. Roles of the different actors**

Any proposal for agroecological research and development must focus first on the farmer and his/her productive system, expanding then to the farming communities and agroecosystems, to their eco-landscapes and finally to the broader ecosystems. Farmers and their organisations must participate intensively in the process of identifying and qualifying their problems, in the selection of possible solutions, in testing and adapting specific solutions and combinations of solutions and in evaluating the results. Ultimately, each producer is responsible for the new techniques he or she will use, and for how they will be used.

Farmers also play a key role as animators in the collective processes of experimentation and dissemination of the knowledge and techniques that will allow each participant, individually, to have every chance to compare, learn and chose solutions for their problems.

Public and private extension agents play a supportive role for the farmers' social dynamic of experimentation, promoting and helping to socialise their knowledge, while introducing new concepts and practices for them to assess and to test. These agents are an important bridge between the people's knowledge and scientific knowledge, and must have access to both.

Researchers must be as close as possible to the public they must relate to, and for this reason the research centres must have an agroecological focus, rather than a regional or crop-by-crop approach. They must relate as much as possible to real development processes, in constant interaction with farmers and extension agents. Their role is to identify the relationship between agroecological principles and the specific agroecosystem where they are acting, offering options for farmers and extension agents to understand natural phenomena and the alternatives to present practices.

Another more basic and less applied level research has to do with the very principles that rule the ecosystems to be researched, providing support to the above-mentioned actors.

#### **4. Strategic issues for promoting research in NRM/Agroecology: partnerships, roles and research agenda priorities**

We clearly need to assure that a participatory approach involving partnerships among all these actors is applied to research and development in agroecology. This approach implies a need for methods and a pedagogy that can socialise and unify experiences in research and development.

In most cases, such partnerships will mean relations that are more between institutions than between people inside institutions. In managing any collaborative process, it is essential to identify what each party has to contribute, whether in technical, scientific knowledge or in terms of knowledge about the social processes and methods to mobilise them. Given the nature of agroecological research and development processes (as identified above), practice has shown that one must assure a leadership role for organisations able to deal with participatory processes and dynamise the social processes of experimentation and dissemination. Although, for the most part, farmers' organisations and NGOs have played this role to date, this is by no means a hard and steady rule.

Agroecological research and development processes tend to produce a mutual enrichment between the identification of practices and the study of methods and principles. The inter-linking of experience with principles and assumptions can be enriching when ecosystems and agroecosystems are similar and even when they are not. In practice, the more similarity there is between agroecosystems, the more practices can be shared, while the more they are different, then the more we can share methods and principles.

How do we identify and prioritise issues for partnerships in research and development? At the local level, the various players must promote participatory processes to assess agroecosystems, in order to set a research agenda. The priorities will arise from the demands that are identified, and from the various actors' capacity to offer responses.

At the regional, national and international levels, partnerships demand clear criteria for the setting of priorities, criteria which are not automatically derived from the impact of a given issue at local levels. Such issues must be combined with the potential that a given agroecological alternative has to offer responses in the different agroecosystems (with specific local adjustments, of course). Ultimately, we must realise that certain agroecological alternatives have multiple effects and should therefore be priorities, over those that have limited applications. For example, no-till planting combined with green manure has physical

and biological impacts on soil, as well as on the system's biodiversity, on water cycles, etc., while the use of nitrogen fixing bacteria has more limited effects.

## 5. Mechanisms for creating research partnerships

GFAR and NGOC have organised a meeting at Rambouillet (France), last December, to address this issue. It was followed by intensive electronic exchanges which finally produced a concept paper:

“New mechanisms for reinforcing partnerships in Agroecology/Natural Resources Management Research and Development”. An initial assessment indicated that in spite of a wealth of information on agricultural sciences are being fed into several databases this knowledge is difficult to apply directly to development practice.

To overcome this problem an information system was conceived which combines scientific and local knowledge about agroecology and natural resources management. It's called “INTERDEV” and is essentially an interactive development database.

Another assessment indicated that most documented knowledge comes from science but local innovation asks for a specific effort to be made available for the INTERDEV database. To address this problem and also to facilitate the access and employment of INTERDEV information by practitioners another program was created called “PROLINNOVA” – Promoting Local Innovation.

Studies of processes and conditions of generating and spreading improvements in NRM/AE should decision - makers at various policy levels - therefore a research network called “POLICYNET” is also being proposed.

**InterDev.** In the test phase for this shared database, up to mid-2001, initially only seven organisations focus on three themes – agroecological farming systems, agroprocessing, and urban agriculture – each with interlinked database subsets on: methods and technologies, practical experiences, resource organisations and individuals, multimedia, and bibliographic references. Mechanisms for description, validation, classification and exchange are being developed so that the information can be downloaded and adapted for local use, at the same time as local experience enriches the global database. After the test phase has been completed, more themes related to NRM will be added.

**Prolinnova.** To scale up the promotion of local innovation in AE/NRM through farmer-NGO-researcher partnerships, four types of activities are planned:

- Identifying and documenting local biophysical and institutional innovations
- Joint stakeholder analysis of research approaches and methods to stimulate innovation, including analysis of the processes of a) investigating local innovation, b) joint action in further developing innovations, and c) jointly evaluating innovations and their impacts
- Training researchers in the new approaches and methods through various activities, including participation in multi-stakeholder learning groups
- Regional and global research networks on AE/NRM based on local innovation.

Particular attention will be given to institutional innovations involving collective management of natural resources, e.g. in soil and water conservation, community forestry, management of

common pasture and fishing grounds. Especially here, it is hardly possible to separate research and development. Interventions must take the form of action research, based on local institutions and initiatives, supporting the monitoring and evaluation of both process and impact, and linking with public policy, above all, addressing issues of rights of access to resources. Research is needed on, e.g. mechanisms of conflict management, stakeholder analysis and concerted action for change. Stories of successful institutional mechanisms in NRM need to be analysed and exchanged.

**PolicyNet.** The policy research network will study options to improve NRM-related policy at local, national and international level, and make results available to decision-makers. The collaboration is meant to strengthen the capacities of all partners to conduct policy research and thus to influence policy more effectively. The initial focus will be on institutional and political conditions that favour development and spread of local innovations in NRM.

**Scaling up initiative.** Prior to Rambouillet's the NGOC has promoted three workshops on Scaling Up NRM/AE local development processes in Tegucigalpa, Washington and Manila, the last two with GFAR's support. The latter have worked upon the findings of the former two and it's report, "Going to scale" can be consulted for further understanding of the issues.

Until quite recently many critics of NRM/AE development approaches indicated that this alternative could work well in small scale community level with intensive NGO support but could not be considered as a workable solution to agriculture in general. Many experiences have, nevertheless, shown that scaling up agroecological approaches is feasible depending only on adjusting methodologies, institutional development and public policies. Scaling up is, therefore, an essential component of the research and development of NRM/Agroecological strategies.

For scaling up one essential feature is the development context i.e. empowerment and social change. The operational definition of scaling up was defined in the Manila Workshop as "bringing more quality benefits to more people over a wider geographical area more quickly, more equitably and more lastingly".

Scaling up is a learning and participatory process; it's about people and relationship building. Because of the development and political contexts of going to scale, there is the potential tension between participation and scaling up. This tension is often manifested/felt in the relationship between governments and NGOs. This is because the former finds it difficult to go beyond the blueprint, top-down approach while the latter, because it has more flexibility, actively advocates for bottom-up approaches to development. Either way, there is the challenge of bringing development to a great many number particularly to the poorer segments of communities. The general notion is that this can happen by going to scale – and can be speeded up by planning the scaling up process instead of simply letting spontaneous diffusion to happen.

To be able to properly plan the scaling up process, it is important to be able to identify and recognise the "sparks" that led to the successful spread of certain innovations particularly those that started small scale. Whether they happened spontaneously or were planned, these sparks were always there to begin with.

Once the sparks are there the next major step is to initiate the scaling up process which normally involves the coming together of different stakeholder groups. The usual problem

here is how the various groups should be working together given that scaling up, aside from being multi-dimensional, involves a multiple of stakeholders with different perspectives.

After recognising the sparks and the scaling up process is initiated, the next major concern is how to manage and sustain the initiative and the benefits that come with that initiative. It is this concern that makes monitoring (along with a shared vision) very important to the scaling up process. The Manila Workshop participants committed themselves to post-workshop activities that they themselves identified. These are with respect to (i) Coordination and follow up of post-workshop activities/plans; (ii) Electronic discussions/sharing; (iii) Face-to-face exchanges and networking; (iv) Dissemination of workshop outputs/press releases on workshop; (v) Policy advocacy on scaling up for rural development; and (vi) Development of training courses in scaling up.

As you may see from this rather ultrasynthetic presentation, Scaling Up initiatives have a lot of linkages with Prolinnova, Interdev and Policynet.

## **6- Brief summaries of selected new innovative research and development partnerships:**

These proposals must be seen as illustrations of possible initiatives to be taken by GFAR. Several others have been received by the GFAR secretariat and have been distributed to participants.

### **6.1- DMC – Direct sowing, mulch-based systems and conservation tillage: finding common ground.**

This proposal is the result of a meeting held in CIRAD, Paris, last January and received several contributions from various stakeholders from all over the world.

#### **Goal, purpose, and objectives**

The proposed Global Program on direct sowing, mulch-based systems and conservation tillage (GP-DMC) has a broad developmental **goal**:

To help improve food security and alleviate poverty, while conserving natural resources and encouraging more durable forms of agriculture, by fostering broader use of sound agroecosystem management practices, especially those centered on direct sowing, mulch-based systems and conservation tillage.

In order to achieve this goal, the Global Program on DMC has the following **purpose**:

To strengthen the capacity of key stakeholders to develop suitable DMC systems, and to accelerate their widespread adoption.

The proposed Global Program seeks to meet this purpose by achieving specific **objectives**:

- Provide a framework for analyzing and comparing stakeholder experiences with DMC systems.
- Synthesize and systematize lessons learned from decentralized initiatives.
- Identify gaps in what is known about developing and fostering the use of DMC systems, and encourage stakeholders to fill these gaps.
- Provide support and feedback to decentralized stakeholder initiatives.

- Foster the multiplication of successful experiences.

### **Global Program activities**

The objectives of the proposed Global Program call for a global learning process. By analyzing and comparing experiences from decentralized initiatives, by synthesizing and systematizing lessons learned, and by identifying and filling gaps, stakeholders can be more effective. They can more swiftly develop suitable DMC systems, and more effectively encourage their widespread use. In doing so, they can draw on the keys to success, while avoiding known pitfalls.

*Select and characterize decentralized initiatives*

*Extract lessons from selected initiatives*

*Organize, manage and circulate information*

*Engage in networking*

### **Key issues**

As the Global Program on direct sowing, mulch-based systems and conservation tillage engages in the above activities, striving to accomplish its goals, purpose, and objectives, it will need to deal with a number of key issues. These issues are central to the success of DMC practices. Some relate to the plot or farm level, others to the watershed or region. Similarly, some pertain to technology design, others to its attractiveness to farmers, and still others to the consequences of technology adoption.

- *Mechanization /Integrated weed/ pest management /Substitution of herbicides /Role of mulching /Residue/ biomass management /Use of local (legume) species/Integration crop-livestock /Germplasm /Use of external inputs /Recuperation of soil fertility /Short- vs. long-term profitability /Constraints to adoption /Sociological factors /Policies/ Environmental impacts.*

### **Governance and the Global Program**

The proposed Global Program on direct sowing, mulch-based systems and conservation tillage aims to respect the general principles of GFAR: it will be specifically linked to GFAR; it will be open to all; it will be a framework for collaboration, not an institution in itself; it will require a voluntary action team to further develop and launch the proposal.

*Stakeholders wishing to join the proposed GP-DMC should contact one of the Executive Committee members noted below.*

- Henri Rouille d'Orfeuil for CIRAD, Larry Harrington for CIMMYT, and Jean Marc Von der Weid for ASPTA/ Brazil.

### **6.2- InterDev**

**Interdev-NRM** aims at developing a co-operative information system on Natural Resources Management with a common shared database in which various organizations (NGOs, research institutes, IARCs,...) themselves fill information, in order to share their practical experiences, lessons learned, success stories and failures on NRM. A large part of the database is made accessible through the Web to any organization working in the same domain. Emphasis put

on easy access, site specific, operational data and practical experiences useful for local sustainable NRM promoted by grassroots development support organizations.

Innovation relies on the content (which is action-oriented rather than research-oriented, although it provides an interactive basis for research on and for development), and also in the management system: The software application allows any participant to download the database on a personal computer and work on it off-line. This is of a particular interest for organizations in remote areas where easy access to the Web for long duration is still difficult.

**Participants to the information system (network members)** are those (NGOs, extension services, NARIs, Universities, IARCs) who use and provide information within the system itself. They commonly share a real experience in supporting agricultural development on the field. They can manage the database at their decentralized level.

**End users** are these more and more numerous local organizations that are locally in charge of providing support to development processes: they may be NGOs or grassroots organizations, extension services... End users can also be research organizations that wish to analyze innovation cases and draw lessons from comparing experiences on a given topic at the world-wide scale. All end users have access to the database through the web or through a network member.

#### **InterDev will contain:**

"methodologies and technologies" database (toolbox),

"practical experiences" database,

"resource organizations and individuals" database,

“multimedia” database,

"bibliographic references" database.

The system is being tested while concentrating on three specific sub-issues particularly relevant to NRM:

Agroecological farming systems,

Generating economic value from natural products, agroprocessing and quality control,

Urban and periurban agriculture.

#### **Participation and governance**

So far, Interdev can be considered as a friendly society, a mutualistic network of organizations sharing reliable technical and methodological information among themselves, and offering free access to a large part of this information to other development support organizations.

The idea of such a service has been initially designed by the CGIAR NGOC and further assessed by a group of six European organizations (NGOs or GOs, all of them being development support oriented). The partnership is being enlarged to southern organizations, ARIs and IARCs that express their commitment to participate in such a system.



### **The Workpackage Agroecological Farming Systems is being launched by:**

*Agromisa-Wageningen (leading agency), ILEIA (NL), Gate-GTZ (De), ASPTA (Brazil), ITDG (UK), GRET (F), Cedac (Cambodia), IIRR (Philippines);*

The Interdev Steering Committee takes the opportunity of the Dresden GFAR General Assembly to launch a call for additional participation of various stakeholders, especially NGOs and NARIs from the South. It also calls for financial support to facilitate training of these organizations to the use of the database and to participate in the experimental phase itself.

**More information:** Interdev secretariat s/c GRET, 211-213 rue Lafayette – 75010 – Paris (France).

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### **6.3- PolicyNet**

This proposal is less developed than the others, relying mostly on discussions of the Rembouillet workshop and a draft from Reed Hertford “Policy Management and Institutional Management: suggested areas of opportunity for research”. No mechanisms are proposed, to this point, to promote this initiative and GFAR participants contribution will be even more important for further development.

The following table synthesizes suggested opportunities, and their rationale and expected outputs, for research partnership:

1 - Research to improve understandings of the strategic, multi-functional role of agriculture.

Rationale: The need to assuage the anti-rural policy bias

Output: Education and advocacy

2 - Research to assemble effective pro-rural policy mixes.

Rationale: If the anti-rural bias is to be assuaged, pro-rural best practices need to be illustrated.

Output: Policy improvement

3 - Research that can lead to better targeting poverty alleviation by agricultural research.

Rationale: Poverty alleviation efforts should follow opportunity for impact, not merely “the numbers”

Output: Policy improvement

4 - Research on rural institutional architectures most effectively empowering the poor.

Rationale: Agricultural research agendas steered by the poor are more likely to impact poor end-users and producers  
Output: Institutional development

5 - Research on a small panel of poor rural areas that permits tracing the NRM and GRM research impacts on end-users.

Rationale: The need to generate better information identifying the research-poverty linkage  
Output: Policy improvement and institutional development.

6 - Research on agriculture's competitiveness.

Rationale: Competitiveness critically guides decisions, but it is practically a conceptual and empirical "unknown".  
Output: Policy improvement

7 – Research which synthesizes and monitors NRM research results and related institutional changes of crosscutting importance, for example, for GRM and biotechnology work.

Rationale: Because it is an adept "cumulating and comparing" mechanism, GFAR has a comparative advantage in maximizing crosscutting synergies.  
Output: Policy improvement

8 – Survey research with the private commercial sector on obstacles to public-private partnerships for agricultural, policy, and institutional development

Rationale: Real partnerships with the private sector require building sturdy platforms of trust and understanding on something more than technology negotiations  
Output: Policy improvement and institutional development

9 - Research for ex-ante assessments of agricultural biotechnology research which expand the data and experience base available in start-up country situations

Rationale: Rational decision-making in start-up countries requires data/experience available from other settings  
Output: Institutional development/Improved local research capacities

10 - Research to generate and maintain an annotated information directory, especially for developing country research organizations.

Rationale: Especially the new agricultural science requires high quality data/information, and knowing where/how to access it.  
Output: Improved local research capacities

11 – Research that can guide "second generation rural institutional changes" in developing countries and show industrialized countries the win-win benefits of agricultural research investments overseas, thereby impacting positively public resources for agricultural research worldwide.

Rationale: Reduced public investment in agricultural research has, on net, been prejudicial to growth, economic development, and the poor.  
Output: Improved policy

12 - Research and development relating to one or more continuing education/graduate training facilities.

Rationale: The new science needs new blood, and there are few sources of real relevance to tropical agriculture.

Output: Institutional development/Improved local research capacities.

#### **6.4-Scaling up, and scaling further up: proposals for a 10-fold expansion of a family-farmer agroecological program in Brazil.**

The Manila Workshop has defined a Scaling up strategy that may be illustrated by the presentation of a specific proposal. It cannot cover all the possible aspects related with scaling up for it deals with an “horizontal” process, extending a successful development process from a 5000 family-farmers public to a 50 000 one. “Vertical” scaling up, implying in major changes in public policies are not present in this case. More information can be found on this case in a paper produced by the Brazilian NGO AS-PTA.

**Background information:** in 5 years AS-PTA’s program in southern Brazil has succeeded in scaling up an agroecological local development process from 3 to 160 communities and from 160 to 5000 family farmers. With just 2 and sometimes 3 technicians staff (an agronomist, a communicator and a methodologist) and average US\$ 50 per beneficiary per year budget AS-PTA has helped farmers to increase yields by 50% for corn and 400% for beans and raise incomes by a 60% average.

#### **What will be scaled up?**

Intensive social participation and collective dynamics in agroecological experimentation and dissemination where the core of the success in the program. It’s this process that will be the essential feature for further scaling up.

A varied array of technical solution have been experimented including genetic resources improvement, agroecological soil management, IPM and agroforestry which the farmers have adapted and combined creatively to each specific condition.

Social organization has been and will be an important feature as the program is related to solidly established community associations (900 for the larger public) which are coordinated by a Regional Development Farmer Organizations Forum.

#### **Conditions for scaling up:**

Accelerating the rate of conversion of farmer fields to agroecological systems asks for financial resources. Even if proposals are not expansive, widespread poverty hinders the rate of adoption of the identified agroecological alternatives. Public credit is out of reach for family farmers either because of bureaucratic demands, high costs and risks or technical impositions (i.e. use of agrochemicals). It was calculated that with US\$ 400 an average farmer will finance the agroecological conversion of his/her property.

Breaking the oligopsonies is the second major condition to stimulate farmers to invest in their farms and convert them to agroecology. This asks also for credit to enlarge infrastructures of local small cooperatives and to equip them to assume at least part of the harvest’s processing. Direct access to big cities supermarkets is being negotiated, including

eventual premium prices for organic black beans. It's calculated that with a 20 000 farmers participation in this venture a US\$ 100 credit per farmer will be enough to hold 1/3 of the 100 000 tons regional beans processing and marketing.

The third condition is financing the extension of the social participation process and AS-PTA's capacity to support it. This cannot be assumed by the farmers themselves and will cost an average of US\$35 per farmer per year during 5 years.

### **Lessons to be learned:**

If the further scaling up works as well as the first stage a great deal can be learned by policy makers. First of all, this process has and may guarantee efficiency in local development programs not attained in Brazil either by government or NGOs. The second lesson relates to public credit profile and conditions for access. Some US\$2,3 billion or offered each year without much success in assuring local development for family farmers. This experience may show how to adapt the credit system to family farmers and agroecological development. The third lesson is about the cost of research and extension which are both very much criticized in Brazil for not being able to respond to family farmer demands. Rough calculations indicate that the public extension services costs US\$ 250 per assisted farmer per year, more than 7 times AS-PTA's costs.

Participatory approaches and agroecology combined with market opportunities can show the way for a new agricultural development strategy for Brazil if demonstrated on a scale big enough to become "visible". This is the bet behind AS-PTA's experience in southern Paraná state.