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FORMAL AND INFORMAL SYSTEMS IN SUPPORT OF FARMER MANAGEMENT OF AGRO-BIODIVERSITY: SOME POLICY CHALLENGES TO CONSOLIDATE LESSONS LEARNED

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ABSTRACT

The last decade has seen the emergence of a number of innovative community level initiatives in Asia, Africa and Latin America for agrobiodiversity development and conservation. Traditional knowledge systems form and integral part of many of these programs. However, there is still a considerable lack of awareness of the importance of traditional agrobiodiversity knowledge systems and of the successes of these new initiatives within formal science institutions. This paper will address a few issues that will need special attention if the successes of the new programs are to be consolidated and their developments shared in a broader perspective. The paper argues that further research is needed *inter alia* on: (a) approaches to encourage enable inter-cultural recognition and acceptance; (b) specific adjustments needed of national agricultural policy and national agricultural research systems to become supportive of local plant genetic resource management, and (c) different options for protection of traditional knowledge and of collective systems for conservation and development of biodiversity in a wider, non-IPR sense.

Keywords: genetic resources; traditional knowledge; IPR; biodiversity conservation; property rights; farmer's rights

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FORMAL AND INFORMAL SYSTEMS IN SUPPORT OF FARMER MANAGEMENT OF AGRO-BIODIVERSITY: SOME POLICY CHALLENGES TO CONSOLIDATE LESSONS LEARNED

Marie Byström[1]

1. INTRODUCTION

The last decade has seen the emergence of a number of innovative community level initiatives in Asia, Africa and Latin America for agrobiodiversity development and conservation. Several of these initiatives have led to measurable improvements in farmers and farming communities' food security, food sovereignty and family incomes on a large scale.

Traditional knowledge systems form an integral part of many of these programs. The knowledge residing with traditional farmers and seed custodians is crucial in guiding strategies to preserve and sustainably use domesticated, semi-domesticated and wild plant materials. Some of the new programs are working on enabling a dialogue and mutual recognition between traditional knowledge systems and scientific knowledge systems.

However, there is still a considerable lack of awareness within formal science institutions of the importance of traditional agrobiodiversity knowledge systems and of the successes of these new initiatives. Participatory plant breeding programs sometimes even meet with resistance from within formal scientific systems and institutions. Furthermore, in some cases, government agricultural policy appears to actively discourage farmers' local plant genetic resource management and use of local landraces. This seriously affects the capacity of local communities, and the groups working with

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them, to continue building sustainable livelihood systems based on local knowledge and local biodiversity.

This paper addresses some of the issues that will need special attention if the successes of the new programs are to be consolidated and their developments shared in a broader perspective.

2. RECENT DEVELOPMENTS IN PARTICIPATORY AGRO-BIODIVERSITY MANAGEMENT

Since the late 1980's, there has been significant development in the involvement and empowering of farming communities to preserve and increase biodiversity in and around their fields. Several programs clearly demonstrate that farmers are capable of co-planning and implementing sophisticated breeding programs that preserve and/or improve valuable, locally adapted materials; of managing highly functional seed supply systems; and of conserving semi- domesticated and non-domesticated biodiversity.

Below are some notable examples:

- MASIPAG, the Farmer- Scientist Partnership for Agricultural Development, has been working in the Philippines since 1987 with participatory plant breeding and diversified and integrated farming. The program involves farmer organizations and local communities representing more than 30 000 farmers in the Philippines. MASIPAG has significantly contributed to improved livelihoods of thousands of farmers (Yap 1999).
- IPGRI's project 'Strengthening the scientific basis of *in situ* conservation of agricultural biodiversity on-farm', in short 'the IPGRI *in situ* project', is a global project to enhance and support a framework of knowledge about farmers' decision-making processes that influence *in situ* conservation of agricultural biodiversity and to strengthen national capacity to plan and implement on-farm conservation programs. The project involves nine countries around the world and a wide group of actors and stakeholders, such as farmers, communities, NGOs, universities and other research centers. (IPGRI 2003)

- West African Rice Development Association (WARDA) initiated participatory variety selection (PVS) in Côte d'Ivoire in 1996 of interspecific varieties derived from crosses between the Asian rice *Oryza sativa* and the African rice *O. glaberrima*. The resulting rice varieties are called NERICAs (New Rice for Africa). By 2000 all 17 WARDA member countries had initiated PVS of NERICAs. (Gridley et al. 2002)

- The Community Biodiversity Development and Conservation Program (CBDC) is a global initiative developed by governmental and non-governmental organizations (GOs and NGOs) involved in agricultural initiatives in Africa, Asia and Latin America, in cooperation with Northern partners. CBDC's objective is to strengthen the ongoing work of farming communities in conserving and developing the agricultural biodiversity that is vital to their livelihood and food security. The CBDC Program includes 14 partner organizations in Canada, Colombia, Peru, Chile, Brazil, Norway, the Netherlands, Burkina Faso, Sierra Leone, Mali, Zimbabwe, Thailand, Vietnam and the Philippines. (CBDC 2003)

- The Biodiversity Use and Conservation in Asia Program (BUCAP) of the Southeast Asia Regional Initiatives for Community Empowerment (SEARICE) (which is a partner in the CBDC program) has developed a Farmers' Field School for Rice Plant Genetic Resources Conservation, Development and Use. This is now used in Vietnam, Laos, the Philippines, Thailand and Bhutan (SEARICE 2002).

- The Growing Diversity project of Bread for the World, Centro Internazionale Crocevia, Genetic Resources Action International, Swedish Society for Nature Conservation is aimed at sharing and increasing awareness on the central importance of biodiversity in rural livelihood systems and promote the incorporation of local biodiversity management systems in a broader spectrum of rural development approaches, programs and policies. 65 case studies have been documented in 37 countries in Asia, Africa and Latin America. Between September and November 2001, regional workshops were held in Colombia, Zimbabwe, Benin, Thailand and Algeria, to assess and evaluate the case studies. An international workshop on the local management of agricultural biodiversity with a wide range of interest groups was held in Rio Branco 2002 (GRAIN 2002).

The different programs use a wide range of participatory approaches that range from the involvement of local farmers in testing and selection of a limited number of modern plant varieties (participatory variety selection (PVS)) to broad agrobiodiversity programs that include conservation and management of wild, semi-domesticated and domesticated biodiversity, plant breeding, seed supply systems, awareness raising and contribution to international policy development. Recent studies indicate that the best

results are achieved when local farmers and communities are involved from the early stages of selecting strategies and objectives of any given program (deGrassi & Rosset 2003; Pimbert 2003). In this respect, the CBDC program has clearly defined principles (see Box 1).

Box 1. Principles from the CBDC Program Protocol:

The following principles link all partners in the program:

- agrobiodiversity is utilized for community development;
- on-farm conservation of PGR can only be accomplished if the needs and interests of the farmers and their communities are adopted as the guiding principle of all activities;
- decisions in the program are taken with the bottom-up approach and the authority on activities will rest as far as possible at the community level.

The approach of the partners is reflected in participatory work with farmers' communities in their local settings, and in collaboration between partners.

Partner organizations are diverse and operate in very different cultural, institutional and political environments. It is felt by the program partners that this should not limit or prohibit exchange and collaboration, but be used as a rich resource for experience. The CBDC Protocol contains a written testimony that respects equity among partners involved in the collaboration.

Contacts with organizations outside the program

The CBDC Program considers the improvement of relationships between organizations of informal and institutional sectors as instrumental to the fundamental development of the program. Such relationships should lead to an improved understanding of mutual approaches and methodologies, and contribute to further enhancement of local innovation systems. To reach those objectives, all CBDC partners agreed to publicize the results of the program widely and in various fora in order to promote interest for on-farm conservation. (*Source: www.CBDCprogram.org)*

3. THE COMPLEXITY OF LOCAL FARMING SYSTEMS – A CHALLENGE FOR FORMAL BREEDING PROGRAMS

Mainstream crop development research, as practiced by the IARCs, is still largely dependent on researchers evaluating the performance of new crops and technologies by using yield as the main criterion (deGrassi & Rosset 2003). Yield has obvious limitations as a yardstick to measure performance since it refers only to the output of a single crop measured in weight per hectare, for a single season, without regard to the inputs needed, the market price, the local agro-ecosystem conditions or the need to spread risks in the face of uncertain weather conditions. Moreover, yield does not say anything about quality, taste, or other culturally important traits.

On the other hand, participatory plant breeding (PPB) programs usually report that the criteria for variety selection as practiced by local farmers are very complex. For example, in a PPB project in several rice ecosystems in eastern India, farmers were interested in a broad range and combination of traits (Paris et al. 2002). The selection criteria of farmers were determined *inter alia* by hydrological conditions (water depth) and land types followed by the adaptation of the variety to different user needs such as food, livestock, fodder, thatching and cash. Other factors determining preference were the compatibility of the variety in the cropping systems, competitiveness to weeds, ease of threshing and de-husking, and factors like aroma, taste and suitability for puffed rice. Men and women identified different traits as more important depending on their different roles in the farming systems. Other programs have reported similarly complex criteria for variety selection.

Truly participatory approaches that take into account the local context in terms of diverse ecological conditions, the multiple characteristics of varieties and the farmers' priorities can yield impressive results. This is shown in a study of bean breeding undertaken by the International Centre for Tropical Agriculture (CIAT) (Pimbert 2003). Here, the adoption rates of conventionally bred varieties were compared with those of varieties bred in participatory programs. In the latter, the farmers used the same original germplasm as formal sector breeders but performed their own selections according to their own needs. The farmer-led breeding gave dramatically accelerated adoption rates of the resulting new varieties, compared with the conventionally bred varieties.

The mainstream breeder focus on yield is clearly inadequate to suit local farmers' contexts, and researchers who have taken part in participatory breeding and selection programs have realized the necessity of interacting with local farmers and with socio-economists and anthropologists. However, the challenge lies in institutionalizing farmer participation as integral *also in the mainstream, formal breeding programs* of NARS and IARCS, and in scaling up PPB and PVS (Paris et al.,. 2002).

Multiple knowledge systems and the need for epistemological common ground

The difference between local farmers' and private sector motives for breeding is not only a question of different criteria for selection of traits. Whereas the main driving force in the private sector is the economic return of new, competitive high-yielding varieties, protected with Plant Breeders' Rights or patents, farmers - particularly in traditional cultures – look at cultivation and breeding in a fundamentally different way, where affection and sharing are among the most important guiding principles.

One of the important reasons for participation in the farmer-led breeding in the MASIPAG program is, according to the farmers, that the program has strengthened the culture and spirit of sharing. Other important reasons are the joy to create something new, and that the farmers rate their own breeding and production system as superior to the conventional high input systems (Zamora 1999).

A study of a participatory breeding program in Nicaragua reports a similar spirit of sharing:

> "Many farmers also wish to fortify the collaborative aspects, perhaps by working and selecting collectively in shared fields. There are thoughts on establishing an association between the many co-operatives and farmers involved in the project and to create a small seed company. Until now, it is viewed as a drawback not to be able to exchange seed freely as there is shortage of seed even for the research process." (Widengård 2003)

In the traditional Andean agriculture, seeds are seen as living and highly respected entities that cannot be owned. According to the Andean Project for Peasant Technologies (PRATEC): "No one (not even a community) would claim to be the inventor of a new strain or race. A new variety is the result of the conversation of humans with the deities and nature and it appears by itself. It is greeted as such with joy. It is not an experimental construction." (Ishizawa 1999). Andean agricultural genetic diversity is thus indivisible from Andean culture.

Farmers in the Mende area in Sierra Leone likewise see new or unusual genetic variability in rice as a blessing from the ancestors and deities (Richards 1996).

These differences between the local and scientific views on germplasm reflect fundamentally different worldviews or knowledge systems. The CBDC program has identified the need to develop an understanding between these different knowledge systems as an important part of its work (Moore and Worede 2003). An example of the

CBDC Program's work in this area is the development of a "Dialogue of Knowledge Systems" ("Dialogo de Saberes") concept as a basis for understanding interactions between formal and informal agrobiodiversity knowledge systems.

Also elsewhere there seems to be a growing recognition internationally of the need to create bridges between local and scientific knowledge systems. Newer initiatives include IIED's review of biodiversity assessment which focused on integrating global and local values (Vermeulen and Koziell 2002), and the Millennium Ecosystem Assessment's upcoming conference in 2004 'Bridging Scales and Epistemologies' which will focus on the same needs (Millennium Ecosystem Assessment 2003). The issue merits urgent recognition by the formal breeding systems at the highest level.

4. PARTICIPATORY PLANT BREEDING AND PROTECTION OF KNOWLEDGE

During the same period as the emergence of participatory plant breeding programs, new treaties and international discussions have emerged on intellectual property rights over biodiversity and traditional knowledge. These discussions are still under way between the parties to the Convention on Biological Diversity (CBD), the World Trade Organization's Council for TRIPs, the International Union for the Protection of New Varieties of Plants (UPOV), the World Intellectual Property Organization (WIPO) and at the national level, where new Plant Breeders' Rights and patents legislation is under development or has been adopted as called for by TRIPs. It is important to note here that both CBD (which requests legislation to define terms and conditions for access to genetic resources) and TRIPs provide certain space for the design of national level legislation to suit local needs, and that the interpretation of this space is

focus for much national and international debate. The latest addition to the international treaties governing the access to genetic resources is the International Treaty of Plant Genetic Resources for Food and Agriculture (ITPGR/FA) that was signed in 2001 after seven years of negotiations. The Parties to the ITPGR/FA have agreed to establish a multilateral system to facilitate access to some 50 genera used for food plus a number of genera used for forage. The treaty also recognizes Farmers' Rights. The treaty does not preclude patenting of material in the multilateral system, if this material is modified. How the treaty is implemented will depend on its governing body.

Given the widely differing ways of relating to and sharing germplasm, the intellectual property rights conferred by patents or Plant Breeders' Rights according to UPOV are not designed to protect the rights of local communities to use and share the products of their local breeding work. Partners in the CBDC program for instance have realized that the protective mechanisms developed in the program are in fact in conflict with local seed and variety networks, which traditionally operate on the basis of free exchange (Moore and Worede 2003).

As GRAIN puts it: "'Protection' of intellectual property means enforcing private, exclusive economic rights to a specific creation in order to prevent others from using or reproducing it. 'Protection' of traditional knowledge on the other hand, necessarily implies protecting the whole social, economic, cultural and spiritual context of that knowledge so that it continues to be produced and reproduced." (GRAIN 2003) Defining traditional knowledge (including local plant breeding which incorporates traditional values) as intellectual property may in fact undermine and deny its inherent value and its central function in many societies (Byström, Einarsson & Axelsson Nycander 1999).

The definition of rights and terms of access to germplasm resulting from participatory breeding programs is not straightforward. Marie Widengård observes in her study of participatory plant breeding:

> "Nowadays farmers' contribution also brings questions of who decides upon whether protection should be applied for, of who would be responsible for the submission and costs of application and maintenance, and who would have control over decisions and be the collector of royalties if protection is applied for. It seems as if the participatory programs going on worldwide have either said no to intellectual protection on ethical grounds or they stand on the doorsteps evaluating pros and cons of Plant Breeders' Rights." (Widengård 2003).

Another, related problem is the design of national seed certification systems, by which a variety must meet defined criteria of distinctness, uniformity and stability (DUS) in order to be certified. As farmers' breeding criteria are broader than those of formal breeders, and as they often incorporate land races with a broader genetic base than modern varieties, farmer-bred varieties do not necessarily meet the national DUS criteria. Furthermore, a local community cannot necessarily afford the cost or time involved in application for certification. In Vietnam, farmers are today facing this problem and cannot distribute seeds outside the local community. Discussions have started on the option of a broader certification standard for farmer-bred varieties (Daño 2003, pers. comm.).

It has been suggested (Correa 1997) that communities' knowledge could be protected by a "misappropriation regime" which could be used to limit illegal appropriation and use of such knowledge. A misappropriation model would not necessarily be based on the concept of property. It would imply the revocation of patents and other intellectual property rights over traditional knowledge obtained without the

consent of the titleholders of that knowledge (IISD 2003). The issue of a mandatory disclosure of origin in patent applications, which would be an important component in a misappropriation regime, has been discussed in WIPO's Intergovernmental Committee on Intellectual Property and Genetic Resources, Traditional Knowledge and Folklore. No decisions have been made so far, since this is a contentious issue where private and public interests differ.

There is new genetic resources legislation in Italy that could perhaps serve as a model also for developing countries. Here, the region of Lazio has had legislation since 1999 that enables protection of "indigenous genetic resources of agricultural interest" (Regione Lazio 1999). The law establishes a voluntary register for local animal and plant varieties. Registration is free of charge, but subject to approval by a technical committee. Registration is not based on traditional DUS criteria but on population characteristics. Only the registered curators of the protected plant varieties are allowed to sell seed (limited amounts), but the rights to the varieties are collectively held by the local population, not by the individual (Byström, Einarsson & Axelsson Nycander 1999). Similar legislation has now (September 2003) been introduced in five other Italian regions, and others are about to follow (Antonio Onorati 2003, pers. comm.). Furthermore, the Italian seeds legislation (212/2001) provides space for exchange of local varieties outside the national seed certification system.

There are thus possibilities to create laws and regulations that serve the needs of local communities. The crucial issue at the national level is whether there is political will and also whether the national government is pressured with threats of bi-lateral trade sanctions to adopt intellectual property rights which is more strictly suited to the needs of

private commercial interests (Byström and Einarsson 2001; Widengård 2003; Moore and Worede 2003). Today, restrictions in national plant variety protection legislation have begun to appear of farmers' rights to save, exchange, sell or reuse part of their harvest as seed. Such restrictions can e.g. be in the forms below (GRAIN 2003):

- prohibition to save seed of certain crops;
- only farmers who own land or have a certain land holding size enjoy the privilege;
- farmers have to pay royalty to the breeder for any seed they save on the farm;
- farmers may save but not exchange seed;
- farmers may save or exchange but not sell seed;
- farmers may save, exchange or sell seed but only without using the name of the variety.

5. THE NEED FOR REFORM OF RESEARCH INSTITUTIONS

Several studies and actors point towards the necessity to reform national agricultural research systems and international agricultural research centers in order to incorporate the lessons from the last two decades of successful participatory breeding programs. Walter de Boef wrote in his PhD thesis 2000:

> "a challenge to IPGRI and partners will be to translate and synthesize the multitude of lessons and experiences into scientifically and internationally recognized format that will contribute to bridging barriers that exist among actors operating at the global level of agrobiodiversity management and conservation."

Part of this challenge lies in ensuring that the information reaches and is received where it is needed. In the report from a workshop 2002 on agrobiotechnology and food security in South Central Africa, it is stated that "knowledge and research as well as farm

level experiences and best practices both local and regional were failing to reach those who could transform this information into practical results." (Minderhoed-Jones 2002)

Anecdotal evidence suggests that there is a dichotomy within the NARS and IARCS between social researchers and plant breeders. Whereas the former may be well informed on the recent developments in participatory plant breeding, they may not necessarily have supportive mechanisms within their centers by which their knowledge may inform the performance of the center as a whole.

One of the lessons learned from a study in participatory plant breeding in eastern India was that there was a lack of plant breeders at centers and NARS with experience on participatory approaches (Paris et al. 2002). In some centers, it was difficult for breeders to change their practices and incorporate a participatory approach into their formal breeding program. There appeared to be fears that farmer breeding will replace, rather than complement conventional breeding. The study concluded:

> "the skills in doing this kind of work, that involves multi-institutional participation, diverse socio-cultural settings and many stakeholders, were not well developed."

The evaluators of the CBDC program in 2003 reported:

> "There is serious resistance within formal scientific systems and institutions to many new approaches, not only those promoted by CBDC, and it is not always possible to move forward in a collaborative manner. Different approaches are required and different things are possible when dealing with institutions and/or individuals that are committed and positively inclined, vs. neutral but open, vs. neutral but indifferent, vs. mildly hostile to CBDC aims or methods, vs. extremely hostile to CBDC aims or methods. Furthermore, CBDC partners have encountered specific situations where no agreement regarding cooperation could be reached due to a formal science institution's unwillingness to guarantee it would not seek to patent or other forms of ownership over seed varieties and other products of CBDC programs. Not only did this make collaboration with these specific institutions impossible, since opposing such approaches is

> part of CBDC's mission, partners are now directly contesting them on this point."

These are serious problems to address, and experience with organizational reform suggests that they will need to be addressed at the highest management level.

In the conclusions of the international workshop on the local management of agricultural biodiversity in Rio Branco 2002, the participants agreed that "The current agricultural research institutions – national and international – should be radically restructured and reoriented to promote and support biodiversity based agriculture rather than undermining it. We see locally based and farmer led research – in partnership with scientists where needed – as the best way to carry out such research."

Michel Pimbert has put forward suggestions for the democratization of research, development and policy making related to management of agricultural biodiversity (Pimbert 2003). In short these are:

1. A wider representation of different actors in decision making bodies and governance structures within R AND D organizations, and greater transparency, equity and accountability in budget allocation and decisions on R AND D priorities in the life sciences.
2. Reorganization of conventional scientific and technological research to encourage participatory knowledge creation and technological developments that combine the strengths of farmers and scientists.
3. Ensuring that the genetic resources on which transgenic and other technologies are based remain accessible to all as a basic condition for economic democracy and the exercise of human rights.
4. Inclusion of full diversity of interests and values in technological risk assessments by running consensus conferences, citizen juries and referendums on a regular basis. These democratic procedures then need to be linked into the formal policy process to ensure that the latter reflect broader social interests.

6. THE NEED FOR REFORM OF NATIONAL GOVERNMENT POLICIES

Closely linked to the call for reform of research and development systems is the concern with inadequate national agricultural policies. The report from the workshop 2002 on agrobiotechnology and food security in South Central Africa concluded "At the political level there was a general absence of coherent agricultural policy and a fragmented and often haphazard approach to agricultural research, donor funded projects and the use of local resources. This had undermined many promising local initiatives and rendered innovative technical and scientific interventions at farm level ineffective" (Minderhoed-Jones M 2002). Petit, Fowler, Collins, Correa and Thornström came to a similar conclusion in their analysis of decision-making at the national level in respect of plant genetic resources (Petit et al. 2001). They studied the situation in four developed and four developing countries. The situation in the eight countries was rather similar: "In the process of reaching for [a common policy] framework at the national level, short term visions often preclude long-term visions. The resulting policy decisions are often disconnected and fragmented and even sometimes conflicting within a single country". They further observed: "As the international stalemate continues, and indeed deteriorates, more restrictions on access to plant genetic resources for food and agriculture are being contemplated without a clear vision of the future impact of, and often in response to, external driving factors such as the increasing number of patents being granted with wider and wider scope of protection." Indeed they found the governments' lack of policy coherence so alarming that the report of the study was titled 'Why governments can't make policy'.

In the evaluation of the CBDC program, Moore and Worede noted that agricultural policy in the Southern Africa sub-region appears to actively discourage farmers' local plant genetic resource management and use of local landraces (Moore & Worede 2003). Their conclusion is that many governments are increasingly reshaping polices in response to international trade pressures, with potentially disastrous implications for locally controlled rights and food security. This seriously affects the capacity of local communities to continue building sustainable livelihood systems based on biodiversity. Similar observations are made in Latin America (Widengård 2003) and Southeast Asia (Daño 2003, pers. comm.).

The discouragement of local agrobiodiversity management takes a number of different forms. It includes economic policies such as subsidizing prices of modern varieties of seed and corresponding inputs and tying agricultural credits to purchase of commercial seed, fertilizer and pesticide package (GRAIN 2002; Daño 2003, pers. comm.) As discussed above, it also includes plant variety protection legislation and seed certification systems that recognize commercial seeds at the expense of local varieties.

These discouraging developments are certainly not carved in stone. The successes of local and participatory agrobiodiversity management are fairly recent, and the lessons learnt from these have not yet sufficiently reached national government representatives and policy makers. Perhaps we can learn from history. Berg et al., (1991) say in their chapter on the feasibility of integrated plant breeding: "The American experiment with "grass-roots breeding" had been a tremendous success, but fell victim to a political desire to privatize the seed industry. The modern methods of plant breeding coming out of the new science of genetics appeared simultaneously with the American conflicts over the

privatization of the plant breeding. This new science could have been used to support both systems. …. The decision to go the way of the private seed industry was basically politics, not genetics. … In third world countries such a choice has not yet been made. It is still possible to include traditional breeding in development strategies and decide that it has to be protected and encouraged."

The participants' declaration from the international workshop on the local management of agricultural biodiversity in Rio Branco 2002, states that:

> "Our governments have the central responsibility to develop and implement policies, legislation and research to achieve this goal. For this to happen, current policies have to be redirected towards a holistic approach to development, the promotion of local control over resources and the active participation of local communities in decision making." (GRAIN 2002)

In this redirection of agricultural policies, national and international R and D centers will need to play an active role. They are in a unique position to give information and guidance to national governments.

7. CONCLUSIONS

Research, policy reform and institutional and management reform is needed on a large scale locally, nationally and internationally to enable the lessons learnt from the multitude of successful participatory and farmer-led agro-biodiversity management initiatives world wide to inform also formal, mainstream conservation and breeding programs and agricultural policies. Such research and reforms will need to embrace:

- approaches to enable and encourage inter-cultural recognition and acceptance;
- adjustments of national agricultural policy and national and international agricultural research institutes to become supportive of local plant genetic resource management based on local farmers' realities, and

- options for protection of traditional knowledge and of collective systems for conservation and development of biodiversity that do not restrict the farmers' privilege to save, exchange, sell or reuse part of their harvest as a new batch of seed.

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