

Management of crop and animal genetic diversity at community level

Notes for discussion on opportunities for technical co-operation

Report Prepared for GTZ

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Table of Contents

[ABBREVIATIONS](#)

[Introduction](#)

[1.1 Scope of the paper](#)

[1.2 Summary](#)

[1.3 Justification](#)

[2. Differences between PGR and AnGR In-situ management](#)

[2.1 The different characteristics of PGR and AnGR](#)

[2.2 Different concept of in-situ conservation?](#)

[2.3 Importance of in-situ conservation](#)

[2.4 Limited information and attention for AnGR management](#)

[3 Maintaining and supporting livelihood systems](#)

[3.1 Genetic diversity in traditional livelihood systems](#)

[3.2 Common approaches in community-level management of PGR and AnGR](#)

[3.3 Implementation of support to community management](#)

[4. Constraints and opportunities](#)

[4.1 Lack of integration of PGR and AnGR management at the community level](#)

[4.2 Market development and awareness raising](#)

[4.3 Legislative issues](#)

[4.4 Impact](#)

[4.5 Need for institutional changes](#)

[5. Discussion and Conclusions](#)

[5.1 Target groups for technical co-operation](#)

[5.1.1 Communities](#)

[5.1.2 National researchers and policy makers](#)

[5.1.3 International research](#)

[5.1.4 NGOs](#)

[5.2 Type of support activities](#)

[5.2.1 Project activities at the community level](#)

[5.2.2 Institutional changes](#)

[5.2.3 Awareness raising](#)

[5.3 Lessons learnt](#)

[5.4 Opportunities for technical co-operation](#)

[6. References](#)

ABBREVIATIONS

[1. Introduction](#)

[1.1 Scope of the paper](#)

[1.2 Summary](#)

[1.3 Justification](#)

ABBREVIATIONS

AnGR	Animal Genetic Resources
CBD	Convention on Biological Diversity
COP	Conference of Parties
FAO	Food and Agricultural Organisation
GPA	Global Plan of Action
GR	Genetic Resources
GTZ	Deutsche Gesellschaft für Technische Zusammenarbeit
NARs	National Agricultural Research systems
NGOs	Non-Governmental Organisations
PGR	Plant Genetic Resources
UN	United Nations
WTO	World Trade Organisation

Introduction

1.1 Scope of the paper

The purpose of this report is to identify similarities and differences in PGR and AnGR management at the community level that are relevant for German technical co-operation. This paper is the synthesis of two reports, both addressing community management, one on Plant Genetic Resources (PGR) (Almekinders, 2000b), and the other on Animal Genetic Resources (AnGR) (Köhler-Rollefson, 2000). The objective of these two reports was to present a state-of-the-art of concepts, activities, and experiences in support to community management of PGR and AnGR, in the context of international technical co-operation. This report and the two earlier ones mainly deal with crop and domesticated animal genetic diversity. Wild plants, wild animals and ecosystem diversity are not specifically addressed.

1.2 Summary

Basically, the approaches in PGR and AnGR management at the community level are comparable; there are, however, important differences as well. For both, PGR and AnGR, the utilisation and maintenance of crop plants and domesticated animals by farmers and pastoralist is essential for *in-situ* conservation. In PGR management a wide range of initiatives exist (see Almekinders, 2000b). In general, recent initiated activities that aim to support PGR

management at the community level have participatory character. The experiences are still young for the definition of lessons learnt and impact achieved, but it is apparent that impact assessment, up-scaling and mainstreaming of new approaches are becoming important issues in PGR.

Initiatives related to AnGR management at the community level are less numerous, and discussion on concepts and approaches are lagging behind as compared to those in the field of PGR. The scarcity of systematic information on AnGR management at the community level affects the formulation and initiation of potentially supporting activities. The different reproductive character of PGR and AnGR is noted as a factor that influences attention for and definition of supporting activities in each of the areas. The different character of the livelihood systems in which many of the unique AnGR are utilised needs to be considered (pastoral, vs. agricultural/sedentary). The difference between PGR and AnGR can partly explain why the discussion on legislative issues is not as intensively debated in AnGR as in PGR.

In general, there is a limited amount of information that serves further-reaching analysis of differences between management of PGR and AnGR at the community level. The first priority in relation to such an analysis would be the systematic collection of information on the use of AnGR in traditional systems and the factors influencing them. More initiatives in the area of AnGR would compensate for the relative lack of attention to these resources. They would also contribute to an increased understanding of the importance of community management of GR in general, and AnGR in particular. There is a need for more integration of work on PGR and AnGR, particular in mixed production systems where both valuable crop and animal genetic diversity are used.

1.3 Justification

The lack of understanding and recognition of the *value of traditional PGR and AnGR* still prevails in many research and development institutions in developing countries. The importance for farmers to have access to *diversity of PGR and AnGR* is generally underestimated as well. In the past decades, new crop varieties and animal breeds were introduced without proper consideration of the agro-ecological and socio-economical context. Particularly in the marginal environments these introductions have not been very successful. Local varieties often performed better under local conditions and fitted better the farmers' needs and priorities. Local breeds are usually more adapted to the harsh pastoral conditions with lower feed quality and higher pressure of diseases than the modern breeders. Especially when subsidies on seeds, fertilisers, feed concentrates, medicines and chemicals were eliminated, the use of modern plant varieties and animal breeds became uneconomical for farmers. In the more favourable and uniform agro-ecological areas, modern varieties and animal breeds have to a large extent replaced the local varieties and breeds. This replacement meant the loss of many local varieties and animal breeds, and their unique genes and gene combinations. It has also resulted in a general reduction of genetic diversity in farmers' fields – which is considered a serious threat to the 'resilience' of agricultural systems, i.e. their capacity to resist and adapt to unexpected environmental disturbances.

The global concern about the loss of valuable genetic resources asks for approaches that combine *in-situ* maintenance of PGR and AnGR diversity with agricultural development. This concern is expressed in many international fora and underscribed by national governments in the Convention of Biological Diversity (CBD, 1992) and Global Plan of Action (GPA, 1996). Germany also committed itself to these two agreements. Supporting communities in local GR management through technical co-operation is one way to operationalise these commitments.

[2. Differences between PGR and AnGR In-situ management](#)

[2.1 The different characteristics of PGR and AnGR](#)

[2.2 Different concept of in-situ conservation?](#)

[2.3 Importance of in-situ conservation](#)

[2.4 Limited information and attention for AnGR management](#)

2. Differences between PGR and AnGR In-situ management

2.1 The different characteristics of PGR and AnGR

The difference in multiplication rates (PGR: 8-100, AnGR: 1-12, depending the species) and length of reproduction cycles (PGR: 3-6 months, AnGR: 3 months-4 years, depending the species) implies that population dynamics of PGR and AnGR are quite different. In fact, AnGR are in this respect comparable with perennial PGR (shrubs and trees, such as for example cacao or mango). Opportunities for support to community management for GR with long reproduction cycles have hardly been discussed developed. The opportunities for application of modern biotechnologies in AnGR are also reduced as compared to PGR. For example, in AnGR, 'hybridisation' and 'fixing' the genotype are practically impossible. Because of lower multiplication rates and longer reproduction cycles, the use of (and the investment in) marker technologies for animal improvement is less attractive than in PGR. These differences in reproduction between PGR and AnGR probably contribute to the relative limited attention and operationalisation of support to community management of AnGR. It would be interesting to analyse how these differences are influencing the threat of losing PGR or AnGR diversity in rural communities.

2.2 Different concept of in-situ conservation?

Different from PGR diversity, *in-situ* conservation of animal genetic diversity seems to give little space for genetic improvement. In the PGR, the incorporation of improved genes in local varieties is considered a strategy to support the utilisation of local varieties by farmers. For instance, by incorporating disease or insect resistance, the performance of the local varieties may be enhanced. Since this makes local varieties more competitive in comparison with improved varieties, it increases likeness that farmers continue to plant local materials, thus maintaining *in situ* the particular (genetic) characteristics of local materials for which farmers value them. In contrast, the crosses of local AnGR with exotic breeds have not been very successful in generating adapted livestock breeds (see Köhler-Rollefson, 2000). This has a relation with the slow multiplication of animals as compared to plants: working several cycles with large numbers of individuals can easily be done with seeds over a couple of seasons. With animals this is much more complicated, in particular with those that have long generations cycles, like camels. It makes genetic improvement of AnGR by either selection or back-crossing with improved breeds more time and money consuming.

2.3 Importance of in-situ conservation

The fact that most PGR can be stored relatively easy in the form of seeds makes *ex situ*

conservation much easier for PGR (most crops) than for AnGR. It places an extra weight on the importance of *in situ* maintenance of the AnGR. This is particularly the case in developing countries and for rare breeds. Few developing countries can count with reliable *ex situ* PGR conservation. For rare breeds in developing countries there is little possibility that expensive biotechnology (in vitro techniques) will be applied for conservation and breeding. There are similar arguments for minor crops. Because their importance is restricted to relatively small areas and groups of farmers, the priority to extensively collect and store them ex-situ is lower than for the major crops. Their *in situ* use is under the pressure of introduction of improved varieties of the major food crops and modern lifestyles.

2.4 Limited information and attention for AnGR management

In general, there is limited information on AnGR diversity in developing countries. For definition of priorities in support to AnGR management at the community level, more information is needed on the species and breeds that are under pressure, the character of the production systems in which they occur (pastoral systems vs. mixed farming systems), and factors affecting their use and management. Particularly the understanding of traditional practices and systems of animal breeding are important for support to AnGR at the community level. The FAO data-base DAD-IS contains an inventory on livestock breeds, but it lacks information on their use and importance for local people.

In developed countries *in-situ* conservation of rare breeds principally receives its attention from NGOs/hobbyist. Similarly, organisations of NGOs/hobbyist cover the small agricultural and horticultural crops through active exchange and use in allotment gardens. There are small EC subsidies for threatened animal breeds; there is no significant government support.

[3 Maintaining and supporting livelihood systems](#)

[3.1 Genetic diversity in traditional livelihood systems](#)

[3.2 Common approaches in community-level management of PGR and AnGR](#)

[3.3 Implementation of support to community management](#)

3 Maintaining and supporting livelihood systems

3.1 Genetic diversity in traditional livelihood systems

Farming and pastoral systems in marginal areas tend to make use of high levels of PGR and AnGR diversity. This GR diversity is essential for the farmers to cope with agro-ecological and socio-economic variation, and to meet the multiple needs of home consumption and other uses. The *in-situ* conservation of these GR are also important from a global perspective: they may contain genes that are valuable for future crop and animal improvement that serves world development (GPA, 1996, see Almekinders 2000b). The vulnerability and poverty of the farming and pastoral families on the one hand, and the limited access to improved adapted technologies on the other, suppress the capacities of these users to maintain relevant GR diversity.

In the case of PGR, decisions on the planting of varieties, and seed selection and storage are normally household-based. Support may therefore involve selected households in a community, or address household-members that have a specific role in PGR management. For example, women are often responsible for seed selection; they are therefore the logical key-participants in activities that aim to improve seed selection. In AnGR, there is little information on 'gender', and specific roles and interests of the different household members.

In traditional livestock management, community organisation seems to play a prominent role. Animals are often kept in communal herds, on shared grazing grounds, and traditional mechanisms exist in which male progenitors are shared for breeding (see Köhler-Rollefson, 2000). This means that influencing AnGR management practices may need to involve the entire community.

Also in agricultural communities, social relations and community structure play a role: the exchange of seeds between households and spontaneous cross-pollination between plants from neighbouring fields are considered important for the dynamics of local genepools and the maintenance of diversity in many crops (potato in the Andes, maize in Mexico). For this reason, approaches that address the community rather than individual households are relevant for PGR management as well.

The use of PGR and AnGR is influenced by changes in farming and pastoral livelihoods. Effects can be the result from changes in the socio-economic or political environment. In PGR, for example, migration and the availability of labour have shown to affect sweet potato and maize diversity in respectively the Philippines and Peru (C. deRaedt, pers.com., K. Zimmerer, 1992). In general, lifestyle changes, in first instance, seem to cause gradual changes. In most reported cases, such changes involve the partially replacement of crops or varieties, and a reduction of genetic diversity. They do, however, not necessarily result in complete desintegration of community systems. The local PGR system does also not necessarily

collapse because of serious social disturbances. After a period of extreme violence in the early '90s in Rwanda, a surprising level of diversity of seeds and planting material was still available in the informal system (Sperling, 1996).

The change from nomadic to a sedentary lifestyle is, however, likely to have more dramatic influences on community organisation and the use of AnGR. Such a change may result in the complete disappearance of traditional mechanisms of sharing resources (grazing grounds, male progenitors) and radically change the conditions in which the animals are kept (i.e. feed and climate). However, systematic studies on the relation between community organisation and the maintenance of PGR and AnGR are not available.

3.2 Common approaches in community-level management of PGR and AnGR

Approaches in agricultural PGR and AnGR that combine objectives of *in-situ* conservation and agricultural development at the community level (see Almekinders, 2000b, and Köhler-Rollefson, 2000) are based on the following arguments:

- Communities need genetic diversity: i) to cope with the variation in the agro-ecological environment (variation in climate and soil) and in socio-economic conditions (market, price fluctuations), and ii) to meet the multiple purposes of use and consumption.
- Strengthening the communities improves their capacity for sustainable utilisation and maintenance of PGR and AnGR genetic diversity.
- Strengthening the communities involves participatory improvement of production technology - based on community knowledge and capacities, local varieties and with local breeds (on farm seed production and selection, feed & fodder use, etc.) - and providing access to genetic diversity needed to cope with the environmental variation (through PPB, seed fairs, etc.).
- The creation of a socio-economic environment that is favourable to the access and use of genetic diversity will contribute to sustainable livelihoods in marginal environments and their management of genetic diversity. This involves for example the market development for products from local GR, a legislative PGR system (patenting, plant breeders' rights, seed legislation) that does not restrict the use of genetic diversity.

Activities targeting IPR are mostly originating from concerns that in the future farmers' access to GR will be reduced as a result of patenting or biotechnological tricks such as the 'terminator' gene. The call for Farmers' Rights seeks recognition for the fact that farmers developed and maintained genetic resources over thousands of years, and aims to ensure farmers' access to these resources.

3.3 Implementation of support to community management

Support to *in-situ* AnGR management is lagging behind in comparison to *in-situ* PGR. In the case of PGR, 10 year ago, information on community management of genetic diversity had an anecdotal character. Although understanding is still limited, there is now considerable more information. There is much less understanding of AnGR community-management structures and practices, and less information of the genetic diversity in AnGR maintained and lost by communities (Köhler-Rollefson, 2000).

Activities and approaches to strengthen the community use and maintenance of PGR diversity are outlined elsewhere (Almekinders, 2000a, Almekinders & Louwaars, 1999, see also table 1). They involve community seed banks, participatory variety selection and plant breeding

(PVS/PPB), improved seed selection, seed fairs, and others.

Opportunities to directly support community management are less explored for AnGR and are hampered by the existing information gap. Because of the slower reproduction of AnGR and community character of their utilisation in pastoralist societies, support to AnGR management is likely to be more complex than to PGR management. As a consequence, building on socio-cultural structures, and integration of local knowledge and practices may be even more essential in AnGR than in PGR community work. For AnGR management in pastoral communities, it may be necessary to work with entire communities as the AnGR are often managed in communal forms - which can prove difficult and time consuming. Working with, for example, key-persons from the community may not be sufficient in situations where AnGR are community-managed. Strengthening community management may therefore require more delicate involvement over longer time-spans than, for example, working through key-persons in PGR management. Long-term involvement does not necessarily increase the costs of such support; this depends also on the intensity and type of the support. This does, however, require long-term commitment of the organisations involved, including donors. Some support activities are identified by Köhler-Rollefson (2000). They involve village-breeding programmes, record keeping, animal competitions, development of niche markets for animal produce and services.

[4. Constraints and opportunities](#)

[4.1 Lack of integration of PGR and AnGR management at the community level](#)

[4.2 Market development and awareness raising](#)

[4.3 Legislative issues](#)

[4.4 Impact](#)

[4.5 Need for institutional changes](#)

4. Constraints and opportunities

4.1 Lack of integration of PGR and AnGR management at the community level

Attention for GR management at the community level is lacking integration between PGR and AnGR. The discussions on 'what genes' should be conserved, and 'how', do in general take place in different meetings and fora. Issues in community management of PGR and AnGR involve different researchers and organisations. The lack of integration between PGR and AnGR management is also apparent at the project level. Most projects that explicitly address community management of PGR diversity do in general not include AnGR.

The lack of integration can be partly explained by the fact that much of the valued and threatened PGR and AnGR are utilised by different communities. Pastoral communities are often not importantly involved in agriculture. In agricultural-oriented and mixed farming, AnGR diversity may not be felt as an urgent issue by either the farmers or the involved development-oriented organisations. The AnGR in agricultural communities may however be important from a global perspective, i.e. for genetic improvement of animal resources (e.g. pig breeds in China, poultry breeds in India). The 'plant'-bias in the attention is probably increased by the fact that AnGR-oriented activities are more difficult to design and implement (see also 3.3).

Although PGR and AnGR-issues show important differences, much may be gained from a systematic sharing of ideas and experiences regarding opportunities and design for supporting activities. It seems also logical to integrate support to PGR and AnGR when considering that in mixed farming systems, the farmer-households themselves manage PGR and AnGR in an integrated way. In mixed farming, decisions on allocation of inputs and resources, i.e. the use of animal manure, food and fodder plants, etc., are inseparably linked to each other. In other situations, such as in the case of rangelands, the animal grazing and management regime is strongly associated with the presences of particular plant species or the maintenance of special plant vegetations (Blench and Sommer, 1999).

4.2 Market development and awareness raising

One way to support *in situ* maintenance of valuable PGR and AnGR is to develop a market demand for the products from these resources (Demissie, 1999). When the produce has distinctive qualities (good taste, mineral or fat content), a good price can compensate for lower production or higher production costs. Local varieties or animal breeds can also serve for specialty foods or handicraft items (Köhler-Rollefson, 2000). The consumer is the key-factor in

the marketing possibilities. Awareness-raising that addresses consumer-behaviour is therefore an important tool in supporting the utilisation and *in-situ* conservation of local GR. The 'low-status' of local produce is an extra 'handicap' for local species like for instance indigenous vegetable crops (see Almekinders, 2000b). Awareness-raising activities, using arguments of quality and cultural heritage, can contribute to a change of consumer-attitude. However, like all processes of attitude change, the impact of such activities is likely to be slow and difficult to assess.

Market development can also involve product development and processing. An example is the production and promotion of snack food from sweet potato in the Philippines. Other examples are the market development for forest products (fruits, spices), medicinal plants, and wild or semi-wild vegetables. Developing labels with recognised status can support the development of demand for regional products.

New type of markets may be identified as well, such as in tourism. The community in Isla del Sol in Lake Titicaca, Peru, has developed as a tourist attraction which is organised by the community itself. The culture and agricultural setting is part of the attraction. Maintenance of a local breeds of buffalo, and local sheep and goat may have opportunities as elements of eco-tourism in Nepal, i.e. as milk producers and pack animals (see Köhler-Rollefson, 2000).

4.3 Legislative issues

The fact that seeds are small, needed in large quantities for yearly planting, and are easy to transport as compared to most animals, increases commercial interests. This partly explains the higher investments in (bio-)technology in PGR, and the more intense discussions on legislation and property rights (see Almekinders, 2000b, GRAIN, 1999). The debate of appropriation and free access to GR is only recently receiving increased attention among AnGR-actors. Rights to grazing grounds are important legislative issues for rural and pastoral communities, but these rights are not (yet) generally discussed in relation to the conservation of the AnGR involved.

For both PGR and AnGR, rural communities in developing countries do not yet seem significantly affected by property right and legislative regulation of utilisation of GR. The GR management of farmers is largely an informal sector activity; biotech-products are not (yet?) adapted to this environment, and enforcement of formal sector regulations is problematic. This situation may however change considerably in the future. NGOs and organised farmer-organisations have an crucial function in representing farmers' interests at the national and international fora. Support to such groups is important to contribute to maintaining free access to GR. Support to national government to implement appropriate (*sui generis*) systems of intellectual property rights is required as well (Tripp & Louwaars, 1997).

4.4 Impact

Systematic information of impact of activities on the community management of GR will not be readily and easily available. Most on-going activities are relatively young (initiated in the last 5 years), and the impact of many of these activities is slow (Almekinders, 2000a). Assessment of involved parameters is complicated as well: it is difficult to measure, for example, the effect on a genetic resource base, biodiversity, and benefit of increased genetic diversity on the well-being of the community. General applicable methodologies for impact assessment at the community level are not available – and may not exist. These difficulties may partly explain the limited attention for monitoring and evaluation of impact at the community level.

Impact in the form of 'adoption' of seeds or varieties by local communities is probably clearest in successful cases of on-farm seed production and PVS/PPB (see Almekinders & Louwaars, 1999, ILEIA Newsletter, 1999). Important impacts may, however, be in the area of capacity

development and empowerment of communities. The assessment of these impacts are much more difficult.

4.5 Need for institutional changes

Support to community management of GR-diversity requires in many organisations a re-orientation in terms of approaches and methodologies. Community resource management has a 'local focus', and its support involves direct interaction with community-members. Given the agro-ecological and socio-economic variation in a region or country, the needs and priorities of communities can vary significantly and change over time. Effective approaches need to be able to deal with such variation. Almost inevitably this asks for participatory methodologies of problem identification, technology development, etc. Experiences so far confirm that support to communities in the use and maintenance of agro-biodiversity has to be location specific and flexible in time (Almekinders & de Boef, 2000).

Most institutions in the NAR-system are still organised around centralised programmes and using top-down methodologies of technology development. Considering the farmer as a collaborator and equal partner, with valuable knowledge and expertise, is not yet a generally accepted view among professionals. In this sense, an attitude change is needed. This need for institutional attitude change is relevant for both PGR and AG management (Almekinders & de Boef, 2000, Almekinders, 2000b, Köhler-Rollefson, 2000). Workshops, seminars, training courses, publications etc. are important tools in bringing about such a change.

[5. Discussion and Conclusions](#)

[5.1 Target groups for technical co-operation](#)

[5.1.1 Communities](#)

[5.1.2 National researchers and policy makers](#)

[5.1.3 International research](#)

[5.1.4 NGOs](#)

[5.2 Type of support activities](#)

[5.2.1 Project activities at the community level](#)

[5.2.2 Institutional changes](#)

[5.2.3 Awareness raising](#)

[5.3 Lessons learnt](#)

[5.4 Opportunities for technical co-operation](#)

5. Discussion and Conclusions

5.1 Target groups for technical co-operation

Target groups for strengthening the support to community management of PGR and AnGR are in principle all stakeholders in GR management. For each group some relevant issues are outlined.

5.1.1 Communities

The farmer-households are the most important target-group for direct support in agricultural and mixed production systems. Pre-defining priority-communities or priority type of activities is dangerous. Experiences indicate that improving the access to genetic diversity is effective in many situations, even in high potential areas like India (Witcombe, 1999). The focus of needed support (i.e seed quality, genetic maintenance or enhancing of local varieties, access to new varieties, etc) will depend very much on the specific local situation and problems that farmers are facing. A brief overview of the focus and type of activities in ongoing PGR-oriented projects are presented in table 1 (annex).

Depending the situation and the focus of the support, the target-group for activities can be defined, eg. individual key-farmers, organised groups, women. In general, the information on the role of women in PGR and AnGR is still meager; the planning of activity addressing local GR management should involve a gender analysis. Especially in activities that address seed selection and storage it may be necessary to involve women; in many situations their traditional role and knowledge on seeds and varieties has been overlooked. Community-based activities supporting GR management may be part of any general rural or agricultural development programme. Integration in existing programmes provides the advantage of

building on existing community-organisation and actors that facilitate developing process.

Although the needs of the farmer-households have to be the guiding principle in support, some additional points may be considered for technical co-operation in the field of PGR.

- Farmers in the 'centres of origin' where the majority of the crops have been domesticated are still maintaining a large wealth of genetic diversity. The fact that in these areas wild relatives may occur as well adds to the importance of *in situ* conservation.
- For AnGR, the lack of information limits possibilities to set priorities based on importance of the AnGR from a global perspective. 'Centres of origin' seem in this respect less relevant in AnGR than in PGR. Attention may focus on known 'hot spots' of AnGR diversity, such as pigs in China, cattle in sub-Saharan Africa, poultry in India. There could be hot spots of AnGR that are not yet well recognised.
- Apart from the centres and hot spots of diversity, there are other areas where valuable local genetic diversity may have developed over time and where this diversity plays a crucial role in the farmers' and pastoral subsistence.
- Genetic diversity may also be used as a tool in pest and disease reduction, and may offer opportunities for more efficient use of soil fertility and other natural resources. This may be very relevant in organic and low-input agriculture, and may be particularly important for farmers in National Parks and in the surrounding buffer zones.
- Areas where the Green Revolution had important impact may now be areas where most need exists for increased access to genetic diversity. Local varieties can play an important role in returning to an ecologically sound agriculture with lower levels of chemical fertiliser and crop protection.

5.1.2 National researchers and policy makers

Another important target group are the national policy makers, and national research & development-staff in developing countries. The objectives of support to this group of actors are i) to change general attitude (see 4.5), ii) creating a socio-economic and policy environment that is more favourable for use of GR-diversity, and iii) mainstream approaches for support to management of GR-diversity at community level. Bringing about attitude changes is a slow and sensitive process. National NGOs and technical co-operation have an important role to play in this change through lobbying and funding. National policy makers can be addressed directly at the national level. NGOs involved in advocacy can address national policy makers via international fora. International donor agencies can address policy makers in bilateral contacts, via support to NGOs or via the international fora (COP, FAO Undertaking, UN, WTO, etc.) Technical co-operation can have important influence through the funding activities that stimulate such attitude change, like workshops, seminars, training courses, publications etc. This type of activities is corresponding to 'awareness raising' and 'human capacity building' at the institutional level (see Almekinders, 2000b).

5.1.3 International research

The IARCs are important organisations for the introduction and up-scaling of new approaches and methodologies. Interesting approaches in GR management at the community level are developed by the CG-centres. The SWP-PRGA merits special attention for efforts in this field (see table 1). The set-up of small comparative studies in NRM and PPB, the linkage of IARC and NARs with NGOs, and the significant generation/exchange of information are the crucial element in this network-programme. Projects in the field of (German) technical co-operation may utilise the experiences of such programmes and can integrate with these networks to

ensure that experiences from other projects become readily available among a wide audience.

5.1.4 NGOs

Many NGOs are weak in monitoring and evaluation, and systematisation of experiences. Analysis and sharing of experiences is particularly relevant in a field like GR management at the community level. Projects are usually small-scale and have a local focus. The innovative character of many of these activities is another reason to stress the importance of sharing experiences and learning from each other. Sharing experiences enhances up-scaling and mainstreaming. The sharing of experiences is stimulated through workshops, publications, and network-programmes. These can be organised in the context of technical co-operation.

Collaboration between organisations is important for the up-scaling of decentralised approaches. NGOs can be functional in facilitating links between researchers and extension staff of GOs, and farmers (see also Almekinders, 2000b). Such linkage should be based on complementarity and be beneficial for all involved actors (Almekinders & Louwaars, 1999). Technical co-operation could facilitate inter-institutional collaboration in its programmes through joint priority setting, definition, planning and implementation of projects, or by involving members of other organisations as project-partners. Participatory approaches are also important at the level of project planning, with technical co-operation playing a facilitator role.

5.2 Type of support activities

5.2.1 Project activities at the community level

On the short term, most relevant is the i) generation of information on community systems (particularly AnGR), and ii) exchange of experiences in support to community management. Monitoring and evaluation of project impact ask special attention.

The facilitation of the sharing of experiences is important. The local character of most community-level projects increases the importance of linking with other initiatives to exchange experiences. Another objective of linkage between projects is to create a weight for impact on awareness of researchers and policy makers at national, regional or international level. Network-programmes fill part of these requirements (exchange visits, workshops). Electronic communication (publications, discussion lists) offer interesting potentials (see Almekinders, 2000 b)

Increasing the number of initiatives at the community level is important as well. They will be partly ask for new initiatives. Particularly in the field of community management of AnGR the initiation of more and new activities seems important. In PGR the up-scaling of new approaches and the re-orientation of others seems more relevant.

5.2.2 Institutional changes

Workshops, seminars and training courses are the tools to develop participatory capacities of researchers and to up-scale successful approaches (see also 4.5). They also support a paradigm shift in the professional attitude of researchers and stimulate re-orientation of programmes. To arrive at more decentralised and flexible programmes, changes at the policy level have to be realised as well. Such processes of institutional change ask long-term commitment of all stakeholders, including those who provide the financial resources.

5.2.3 Awareness raising

Many of the opportunities to support PGR and AnGR management at the community level lie in the area of awareness raising. The majority of the activities aiming at institutional change and market development fall in this category. They can be directed at a range of stakeholders (see 3.1) and issues (see Almekinders, 2000b). There are also a range of activities and tools that have shown to be functional in awareness raising. Seed diversity fairs (Neuendorf, 1999) and animal competitions (Gupta, 1996) are good examples of activities at the community level. Important are the advocacy activities aiming at the national policy makers, such as those in relation to the formulation of legislative frameworks. Influencing the consumer behaviour is another important area for awareness raising activities (see 4.2).

5.3 Lessons learnt

The target group for technical co-operation exists of all actors involved in GR management at the community level: the communities, development agencies, market-players and policy makers. They all have an influence on what genetic diversity is used and maintained.

At this moment, the innovative activities that specifically address management of GR diversity are still young. The experiences are being exchanged to some extent, but so far serious analysis of results so far is in general lacking (Almekinders, 2000a). This is partly explained by the fact that the relation between (increased) biodiversity and sustainable agriculture and farmers' livelihood is not well understood. Also, monitoring and evaluation of new approaches asks for an important place in project/programmes. Support and facilitation of exchange mechanisms among organisations active in the field may be needed.

The new approaches are based on the recognition of diversity in and among conditions and communities. Definition of a 'blueprint' for support to management of PGR at the community level is not possible. Extrapolation of successful experiences to other situations do not necessarily give satisfactory results. Approaches that can be adapted to the diversity of conditions and problems faced by communities are likely to be 'decentralised' and based on participatory methodologies for working with farmers and collaborating institutions.

In general, the impact of support to GR management at the community level is expected to be slow.

Support to GR management therefore asks long term commitment of all stakeholders, from farmers and pastoralists to policymakers and donor agencies.

5.4 Opportunities for technical co-operation

The support to PGR and AnGR at the community level is needed to maintain livelihood systems that harbour important genetic diversity. Providing access to GR diversity is one way to support those communities – and increase their capacity to sustain under variable, marginal conditions, changing climates and socio-economic pressures. The experiences with new approaches and activities learn that there are ample opportunities for translation of objectives *in-situ* conservation of GR diversity and agricultural development into activities at the community level (Almekinders 2000b, Köhler-Rollefson, 2000). In the field of PGR these opportunities are more clearly identified than in the case of AnGR. Technical co-operation can contribute significantly through support to all actors in the field, i.e. directly to communities, directly or via NGOs and NARs. Also support to NGOs and NARs is needed in order to effectively up-scale and mainstream successful approaches. Technical co-operation can be instrumental in influencing and supporting national policy makers to formulate and effectuate a supportive regulatory framework and a coherent agricultural policy.

6. References

- Almekinders, C.J.M., 2000a. Agrobiodiversity management at community level. A review of experiences in international co-operation. A report for GTZ.
- Almekinders, C.J.M., 2000b. Management of crop genetic diversity at community level. Conceptual elements & practical implementation. A report prepared for GTZ.
- Almekinders, C. & W. de Boef (eds) (2000). Encouraging Diversity. A synthesis between crop conservation and development. IT Publications, London
- Almekinders, C. & W. de Boef, 1999. The challenge of collaboration in managing crop genetic diversity. ILEIA Newsletter 3-4.
- Almekinders, C.J.M., & N.P. Louwaars, 1999. Farmers' seed production. New approaches and practices. IT Publications, London. 292 p.
- Blench, R. & F. Sommer, 1999. Understanding Rangeland Biodiversity. ODI Working Paper 121. ODI, London. 52 p.
- Demissie, A., 1999. In-situ conservation. The Ethiopian experience. ILEIA Newsletter 3-4: 30-31.
- GRAIN, 1999. Biodiversity in agriculture: policy issues. ILEIA Newsletter 3-4: p 5-7.
- Gupta, A. 1996. Indigenous knowledge and conservation and utilisation of animal germplasm. Paper presented for FAO.
- ILEIA Newsletter 3-4. Seeds for agrobiodiversity. Leusden, The Netherlands
- Köhler-Rollefson, I., 2000. Management of animal genetic diversity at community level. A report prepared for GTZ.
- Neuendorf, O., 1999. Seed fairs: creating awareness of a rich heritage. ILEIA Newsletter 3-4: 24-25.
- Sperling, L., 1996. Rwanda nationwide household survey on the status of the bean, sorghum and manioc crops 1995: the impact of war on production and varietal erosion.
- Tripp, R., & N. Louwaars, 1997. Seed regulation: choices on the road to reform. Food Policy 22.
- Witcombe, J., 1999. Do farmer-participatory methods apply more to high potential areas than to marginal one. Outlook on Agriculture 28: 65-71.
- Zimmerer, K., 1992. Land-use modification and labour shortage impacts on the loss of native crop diversity in the Andean Highlands. In: N.S. Jodha, M. Banskota & T. Partap, (Eds). Sustainable mountain agriculture: farmers' strategies and innovative approaches, Vol.2. pp. 415-422.