

Draft not for citation

**Local Organizations Involved in Conserving Crop Genetic Resources in
Ethiopia and Kenya: What Role for On-Farm Conservation?**

by

John Mburu and Edilegnaw Wale

Paper presented at the CAPRI-IPGRI International Workshop on Property Rights,
Collective Action and Local Conservation of Genetic Resources
September 29th-October 2, 2003, Rome, Italy

Local Organizations Involved in Conserving Crop Genetic Resources in Ethiopia and Kenya: What Role for On-Farm Conservation?

John Mburu¹ and Edilegnaw Wale²

Paper Presented at the International Workshop on Property Rights Collective Action and Local Conservation of Genetic Resources, September 29th-October 2, 2003, Rome, Italy

Abstract

Local organizations comprising of farmers, local formal and informal institutions and public conservators can potentially be relevant options to confront the challenges of conserving indigenous crop varieties in developing countries. Since property rights and market failure problems experienced in crop diversity are different from other resources such as forests, wildlife, etc., considering crop diversity as a common-pool resource provides fascinating insights on the marginal utility of such organizations and contractual arrangements within them. The limited experiences from pilot projects in Ethiopia and Kenya show that community-seed banks and exchange networks provide a unique chance to integrate farmers' knowledge, decision-making power, rights and responsibilities in conserving crop diversity. However, empirical investigations of such local organizations in order to determine the dimensions of their feasibility have been scarce. Against this background, this paper analyses these local organizations to determine the conditions for their emergence and success, and factors affecting farmers' collective action for a better crop diversity outcome. The analysis uses empirical data on sorghum and wheat (from Ethiopia) and African leafy vegetables (from Kenya). Besides pointing out key conditions for the feasibility of these organizations, the results also provide useful insights regarding the problem of considering crop diversity as common-pool resources. The paper concludes by outlining several policy implications for community-based conservation of crop genetic resources.

¹ Corresponding author's address: Center for Development Research (ZEF), University of Bonn, Walter-Flex-Strasse 3; D-53113 Bonn, Germany. Tel: ++49-228-731915; Fax: ++49-228-731869; Email: jmburu@uni-bonn.de; Web: <http://www.zef.de>.

1. Introduction

The principal managers of crop genetic diversity in developing countries are farmers and particularly those living in marginal areas. Driven by survival motives involving issues far from simple profit maximization, these farmers produce crop diversity as a positive externality (Virchow, 2003). They make decisions on the choice of crop and varieties to plant, produce seeds and select them for storage and planting. Confronted with a diversity of interests and the absence of a single variety that they can fully depend on for food sufficiency, these farmers manage a range of varieties using a diversity of selection criteria. Moreover, the seeds produced are usually exchanged with other farmers from within and outside their communities and thereby new varieties are obtained, and lost or degenerated ones are replaced. By producing food and seeds, these farmers practice a form of crop development and maintain crop genetic diversity through in-situ conservation. Thus, past studies on agrobiodiversity conservation acknowledge that farmers are a major stakeholder group involved in maintaining traditional varieties (Thies, 2000; Virchow, 1999).

Despite uncertainties concerning the extent and rate of diversity decline in crop genetic resources (CGRs)³ (Virchow, 1999), the conservation of CGRs is taking place in a number of developing countries. Although ex-situ conservation is still dominantly utilized for CGRs conservation, in-situ conservation has recently entered the stage for conservation of intra-species diversity of CGRs. Taking ex-situ and in-situ to be complementary conservation strategies, the latter is more preferred due to its dynamic feature to allow the genetic resources to adapt themselves to the natural and socio-economic environment (Evenson, et al., 1998).

Conservation or production of CGR's diversity is not undertaken by farmers for its own sake. For this reason, their derived demand for diversification of varieties and thereby its effect on the conservation outcome is usually coined in the literature as '*de facto conservation*' (Meng et al., 1998). The level of diversity that farmers produce is less than

² Address: Center for Development Research (ZEF), University of Bonn, Walter-Flex-Strasse 3; D-53113 Bonn, Germany.

³ Plant genetic resources include farmers' varieties (cultivated species) and non-cultivated species from other plant species (Heywood, 1995). CGRs in this study refer to farmers' varieties.

what society wants to have mainly because each farmer makes independent decisions based on observable characteristics of the varieties. For this reason, there could be landraces of no interest to any farmer (resulting in possible extinction) and there could be landraces of interest to thousands of farmers (resulting in redundancy). Although farmers have a role to play in the conservation of CGRs through managing diversity and maintaining it by utilization in their production systems, governments and other stakeholders such as non-governmental organizations (NGOs) and private companies also make important contributions. Success of CGRs conservation cannot therefore wholly depend on farmers' conservation activities alone (Rajanaidu and Ramanatha Rao, 2002). Moreover, due to imperfect markets and transaction costs, the social and private marginal benefits are not identical and therefore the level of conservation is sub-optimal. This calls for creation of institutions or institutional arrangements that, by creating new incentives or imposing new constraints, would enable stakeholders of CGRs to transcend these limitations. Contracts between NGOs, research institutions and farmers (other stakeholders may also be involved) in agro-biodiversity conservation initiatives could be regarded as a good example of such institutional arrangements. These contracts are notably informally created but, in a few cases, they may also be formal.

Empirical analyses of contractual arrangements for in-situ conservation of CGRs in order to determine their characteristics and dimensions of their feasibility have remarkably been scarce. Studies based on theoretical advancements of New Institutional Economics (NIE) which are particularly important in analyzing situations where non-market institutions and market failures feature (North, 1995), are also not common in studies on the conservation of CGRs. In designing institutional arrangements of in-situ conservation of CGRs, it is also important to consider essential determinants of their effectiveness, for example, important socio-economic characteristics of farmers, driving forces such as accessibility to markets and the capacities of the public institutions. Against this background, this paper analyses local organizations involved in CGRs conservation in Ethiopia and Kenya to characterize the contractual arrangements within them and determine the conditions for their emergence and success, and factors affecting farmers' collective action for better crop diversity outcome. Addressing these issues is hoped to throw light on some of the incentives that local organizations create to improve the non-

optimality of conservation through harmonization of farmers' variety choice criteria with national and international CGRs conservation strategies. For the national governments, such knowledge would be important in the setting up of policy and institutional frameworks that have to be applied in close cooperation or partnership with the farmers.

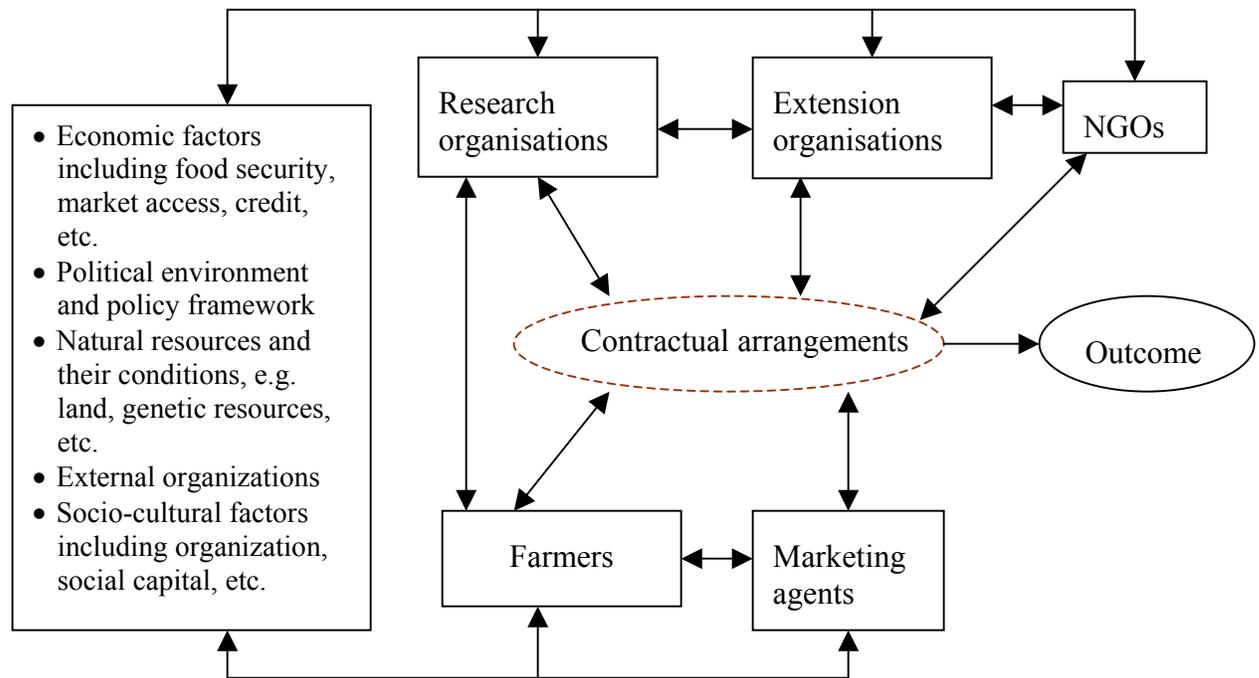
The paper applies the concept of participation and draws on concepts from the New Institutional Economics (NIE), including collective action and property rights analysis. The paper is structured as follows: Section 2 explores how contractual arrangements within CGRs conservation initiatives can be designed to meet the interests of different stakeholders. Further, it provides some theoretical background on how the concept of participation can be applied to classify the anticipated arrangements. Section 3 analyzes the empirical examples from Ethiopia and Kenya. It discusses the roles and interests of the participating stakeholders, identifies different factors influencing the emergence of the local organizations and characterizes the different kinds of contractual arrangements that are created. In section 4, conditions determining the success of local organizations are analyzed and factors influencing farmers' capacity for collective action are identified. Finally, section 5 draws some conclusions and policy implications.

2. Contractual Arrangements for the Conservation of CGRs

2.1 Design of Contractual Arrangements

We argue in this paper that farmers, in their efforts to enhance production of indigenous or traditional varieties, relate with other stakeholders (see Figure 1) in the local area leading to the formation of a local organization. The farmers may be individuals or organized in groups e.g. women groups, self-help groups, work groups, etc. The stakeholders involved enter into a relational contract or institutional arrangements which structures how they are going to relate with each other in the long term.

Figure 1: Interactions among stakeholders in local organizations conserving crop diversity



Source: Own schematic presentation

The creation and maintenance of such arrangements is expected to be dependent on a wide range of factors including the political environment and policy framework conditions, economic factors, organizational capacity and socio-cultural aspects of the farmers and nature of crops being conserved (Smale and Bellon, 1999). It is also expected that these factors will affect the internal organization of individual stakeholder groups and their capacities to participate as members of the local organizations (see Figure 1). Environmental factors are particularly important for the farmers in that they can be the sole determinant for the choice of the varieties that can be maintained in their farms. For instance, through their indigenous knowledge farmers have learnt that traditional varieties of cereals always do well with low rainfall or short rainfall seasons. Largely, it can be hypothesized that the factors shown in Figure 1 are key determinants of the incentives created for stakeholders' participation and the overall outcome or success of the

contractual arrangements. This outcome can be analyzed in terms of efficiency, equity and sustainability (see Section 4.1).

As mentioned in the previous section, the contractual arrangements formed are in most cases informally instituted but there may also be formal ones. For instance, informal contractual arrangements could exist in conditions where the stakeholders want to share or exchange information on certain genetic resources. This has been evidenced in Kenya where the stakeholders, comprising of government agencies (extension, research, etc.), farmers, private research groups, local non-governmental organizations (NGOs), private business groups and private seed companies, normally hold forums to demonstrate and exchange their experiences in the growing and cooking indigenous vegetables. Formal contracts, on the other hand, could involve contracts of seed production between farmers, research organizations (e.g. the Institute of Biodiversity and Conservation Research (IBCR)) and NGOs involved in research and extension activities. Such formal arrangements are common in both the seed bulking activities in Ethiopia and the exchange networks in Kenya.

2.2 Objectives of the Contractual Arrangements

Depending on the objectives of the contracts, two general categories of arrangements can be identified:

1) Arrangements whose sole objective is to promote utilization of CGRs and hence ensure their conservation. This category of contractual arrangements is currently being practiced in areas without community seed banks in Ethiopia where it involves the IBCR entering into formal agreements with the local farmers, whose benefit or incentive is the monetary compensation they receive for the reduced crop yields after growing traditional varieties of sorghum, wheat, barley, tef and millets (Wale et al., 2003). It is also being applied in the promotion of indigenous vegetables in Kenya where non-governmental organizations have contracts for seed production and seed exchange projects with local farmers.

2) Arrangements whose primary objective or motive is not in-situ conservation through enhanced utilization of crop diversity. Such arrangements, which are often adopted

during participatory crop improvement breeding approaches, e.g. participatory varietal selection, are often tailored to involve farmers in the testing of the adaptability of varieties in their localities, conducting seed production activities, and sometimes extending new crop varieties or supplementing agricultural extension services (Nielsen et al., 1997; Thies, 2000). For example, in India and Nepal the participatory approach has been successfully applied in enabling farmers to identify existing local varieties that they greatly prefer but had never had the opportunity to try them (Witcombe, 1999). Most arrangements of CGRs conservation in developing countries fall under this category where the main contract partners to the farmers are the research institutions and agricultural extension departments. For instance in Kenya, the Kenya Agricultural Research Institute (KARI) is working with farmers to identify locally important varieties of indigenous vegetables and their morphological characteristics.

The above types of contractual arrangements would be expected to have different levels of achievement of CGRs conservation; and their application depends mainly on the local conditions and the set objectives. Though both categories may exist in the form of simple formal or informal agreements with research institutions, extension departments and farmers, complex arrangements that as well involve universities, seed producing companies and non-governmental organizations could occur. Moreover, regardless of who the partners are, most of the contractual arrangements may have a share cropping character and represent different levels of farmers' involvement in decision-making, and contribution of local knowledge and material resources.

2.3 'Consultative' verses 'Interactive' Arrangements

Drawing on Oakley's (1991) criteria for identifying typologies of participation⁴, contractual arrangements within local organizations conserving CGRs could further be classified according to the levels of farmers' participation and benefits (mainly in terms of power) drawn from variety testing and crop utilization activities. Thus, we can

⁴ Since the broad concept of participation has diverse meanings and interpretations, we wish to redefine participation to reflect its application in this paper. In this case we regard participation as a process where farmers not only take an active role in contributing their own resources (farmland, farm inputs, labor, local know-how, etc.) in the CGRs' conservation activities but also are actively involved in the decision making process.

subsume two broad groups of contractual arrangements, which are likely to be present wherever farmers are involved in the choice and promotion of certain crop varieties. Seen from the perspective of the government agencies (research, extension, seed producers, etc.), we refer to these arrangements as *consultative* and *interactive* relational contracts.

Under *consultative* arrangements the role of the farmers is to answer questions from extractive crop breeders, agronomists, extension agents, etc. Farmers are told of the usefulness of the genetic materials but they are not able to influence their analysis or use since there are no structures for making common decisions. This category of contracts is therefore close to the top-down approach, which is characterized by minimal exchange of information between the farmers and external researchers. They are also referred to as 'take or leave contracts' since the farmers do not have the possibility to negotiate (Salanie, 2000). Usually, solutions provided as to the suitability of the varieties are externally formulated since farmers are not involved in the decision making process. Many of the compensatory approaches being employed in developing countries fall under this category of contracts. For instance in Ethiopia, those farmers in areas where community seed banks have not been established are paid opportunity costs (cash benefits) of growing traditional varieties without being involved in decisions on varietal choice (Wale et al., 2003). Consultative contractual arrangements are also common among participatory breeding approaches where farmers are not given a chance to influence the decisions of the breeders.

The *interactive* contractual arrangements are characterized by researchers and farmers co-operating in making decisions on the analysis of varieties to be grown or conserved in-situ. Thus the farmers have a stake in maintaining their traditional farming practices (e.g. keeping existing landraces) or adopting new ones. Usually farmers' representatives and researchers form a committee to assess the adaptability of the CGRs and to approve the variety that would be maintained or conserved. These kinds of contractual arrangements have recently received considerable attention from research institutions, universities, NGOs and the international community. In most developing countries, interactive contractual arrangements with farmers (most contracts are informal) have been applied in conducting on-farm trials for adaptability of varieties on a willing-basis in participatory

breeding or crop development approaches (Witcombe, 1999). Such contracts have been known to involve small-scale farmers fully, to utilize their indigenous knowledge, and to provide farmers with a permanent and a stronger voice in the adoption of diverse crop varieties. They have therefore been very instrumental in facilitating evaluation of new varieties and retention of much of the crop genetic diversity in farmers' production systems (Nielsen et al., 1997).

An extreme case of the interactive arrangements is characterized by farmers mobilizing themselves and adapting certain crop genetic materials in their localities due to their high capacity for organization and driving forces such as market access, change of consumer behavior, etc. These kinds of arrangements, which we refer here to as '*informative*', are not common in crop conservation initiatives. There are however a few cases in Kenya where organized groups are well ahead of local research and extension agencies in acquiring knowledge of growing and cooking indigenous vegetables.

Drawing on the foregoing discussion, interactive and informative contractual arrangements can play an important role in enhancing in-situ conservation of CGRs. However such contracts can only be realized in conditions where decision making arrangements are decentralized to empower farmers make their own choices as to which kinds of crops they are going to retain in their farms. It can be hypothesized that the level of in situ conservation of CGRs will be lowest with consultative contracts and highest with the informative contracts since the major determinant is the level of farmers' involvement in the decision-making process. However, we emphasize here that each of these contracts are tailored to meet unique and specific needs of in-situ conservation, depending on the local conditions and capacity for self-organization of the farmers. Hence one is confronted with the problem of identifying the criteria for comparing their advantages and potential problems in the conservation of CGRs.

3. Analysis of the Local Organizations

3.1 Gathering of Data

In Ethiopia, data on in-situ conservation of sorghum and wheat, and the organizations involved was generated in May 2003. Though the survey focused on these two crops, data on in-situ conservation of tef, barley, maize and pulses was also gathered. Informal discussions and interviews were conducted with farmers within the areas covered by the community seed banks projects, NGOs groups and the IBCR technical staff. Other organizations interviewed include the Ethiopian Agricultural Research Organization (EARO) and multilateral and bilateral donors of the seed bulking projects.

In Kenya, data on indigenous vegetables was gathered in April and August 2003 from the western part of the country where individual farmers, groups (mainly women groups), local NGOS, local research and extension departments have established themselves into local organizations. Methods used for data collection in this area included informal interviews guided by a checklist, joint field visits with the members of the local organizations and participant observation. Market agents, who are mainly middlemen selling vegetables in cities and big towns, were also interviewed. Indigenous vegetables grown in this region include Amaranths (*Amaranthus dubius*, *A. hybridus*, *A. cruentus*, and *A. graecizans*), Ethiopian Kale (*Brassica carinata*), cowpeas (*Vigna unguiculata*), Spiderplant (*Cleome gynandra*), Jute Mallow (*Corchorus olitorius*), Sunnhemp (*Crotalaria ochroleuca* and *C. brevidens*), Pumpkin leaves (*Cucurbita maxima/moschata*), and African nightshades (*Solanum americanum*, *S. scabrum*, *S. villosum*, and *S. eldorettii*). These vegetables are produced mainly in four zones: 1) Molo/Elburgon/Kabarak (mainly serving Nakuru town), 2) Ainamoi (mainly serving Kericho town), 3) Kilgoris/ Magena/ Nyangusu (mainly serving Nairobi and Kisii towns) and 4) Vihiga, Butere and Luanda (mainly serving Kakamega and Kisumu towns).

3.2 Stakeholders' Organization, Roles and Interactions

In both Ethiopia and Kenya, local organizations involved in the conservation of CGRs can be classified depending on the type of the organizations mobilizing the farmers and the factors or driving forces leading to their emergence. Whereas in Ethiopia all the farmers groups were mobilized by the IBCR, in Kenya different kinds of stakeholders in different local organizations were involved. Another major difference arises from the structure of the local organizations: all the community seed banks in Ethiopia have a

similar structure whereas in Kenya the local organizations are organized in different forms and with different structures. The latter have been formed mainly to establish a network for the exchange of seed and knowledge on important plants of indigenous leafy vegetables (also called African Leafy Vegetables (ALVs)), how they can be marketed and how production can be enhanced through seed multiplication. We refer to these local organizations as exchange networks⁵, though some are also involved in bulking and marketing of seed.

Thus, the following four types of local organizations can be identified in Ethiopia and Kenya:

I) Groups Organized by Research Organizations

In areas with community seed banks in Ethiopia, key stakeholders include the farmers and the Institute of Biodiversity Conservation and Research (IBCR). A national NGO, the Organic Seed Action, is not a recognized stakeholder member though it participates in some meetings. During the time of data collection there were a total of 12 community seed banks in Ethiopia.

To become members of the community seed banks farmers have to pay a membership fee and contribute an agreed amount of seed as membership shares (in most cases one share =25 kg of seed). Many farmers find this contribution of seed difficult and thus the membership has been as low as 20 farmers in some bulking sites. During times of seed scarcity farmers are given seed from the local banks but are expected to return it at the end of the season. In addition, these farmers are free to sell the rest of the seed to the seed bank at the local market prices. The IBCR is the community organizer and the monitoring agency of the community seed banks. It supports one technical staff per site who helps in organizing the farmers. Both farmers and the IBCR staff are organized in four types of committees that coordinate bulking activities: the ‘general assembly’, which is the main

⁵ In Kenya, knowledge on important types of indigenous vegetables, their cultivation and cooking techniques is still with the local farmers and especially those who are above 50 years old. The NGOs, researchers and extension agencies have been going for this knowledge and the ‘indigenous’ seeds from the farmers. On the other hand, farmers are advised of improved techniques of cultivation after on-station and on-farm trials have been conducted by the researchers.

decision making body and three other subcommittees under it. However, none of the 12 local organizations are registered as societies or groups and therefore the government does not legally recognize their existence. Although the Organic Seed Action (OSA) promotes marketing of the traditional varieties by linking farmers with marketing agents, it has not been accepted as a member of the seed bulking organization. This is because of the mistrust that exists between the NGO itself and the IBCR⁶. The latter fears that the OSA can eventually take over the bulking activities and start using them to solicit for funds. Another key stakeholder, which also operates in the bulking areas, is the Ethiopian Agricultural Research organization (EARO). The EARO is however not a member of the local organization since it tends to promote use of improved varieties against the traditional or indigenous ones. As such, its activities are antagonistic to those of the IBCR and the OSA.

Kenya does not have an organization like the IBCR whose sole responsibility is biodiversity conservation. Thus conservation of indigenous vegetables is handled by the Kenya Agricultural Research Institute (KARI) which is also mandated by the government to promote production of the exotic varieties, e.g. the cabbage. The organization lacks incentives to promote production of indigenous vegetable since the policy emphasizes on enhanced production of exotic varieties in efforts to alleviate food shortage and poverty. As such there are very few local organizations where farmers have been organized by the KARI to grow indigenous vegetables. Such groups are normally contracted by the KARI to conduct farm trials and exchange information on the evolving and unidentified varieties, e.g. the *Solanum* spp.

II) Groups Organized by Traders

In these kinds of local organizations, farmers are organized in farmers' groups or working groups which relate with certain traders' groups or middlemen. No other stakeholders belong to these organizations. The farmers are organized in small groups of 10-15

⁶ The key technical persons of the OSA are actually former IBCR scientists who initiated the bulking activities.

persons. In an Administrative Location with a population of 300-500 farming households, for example, there can be as many as five such local organizations. Likewise the traders belonging to each local organization are organized in a group of 3-5 persons. Members of both the farmers' and traders' groups are women though men, whose wives are members, also participate in the cultivation of vegetables. There are no men in the traders' groups.

The key driving force for the establishment of these organizations is the opening up of market in Nairobi for the indigenous vegetables and particularly the African nightshades, cowpeas and amaranths. It is the traders who mobilize the farmers to organize themselves into groups in order to grow vegetables to sell to them in bulk. These vegetables are then taken to Nairobi, which is about 400 Km away. By organizing the farmers, the traders are able to get agreed upon times of harvesting the vegetables. Their interest is to get enough produce to transport to Nairobi in order to reduce their costs. Normally the traders set the farm gate prices but the farmers groups have the option to negotiate and reach an agreeable price. However the traders have a stronger bargaining position since they can threaten farmers of abandoning their produce and fetching other growers. Farmers who do not belong to any of the farmers'-traders' groups are forced to sell their vegetables at lower prices since there are no prior marketing arrangements. The traders' groups have the role to keep the marketing groups informed of the prevailing consumer prices in Nairobi, consumer preferences and any other information necessary for the maintenance of the contractual arrangements. In Kilgoris District (Kenya) where these local organizations are common, all the participating farmers and traders belong to one ethnic group: the Kisii. Thus, homogeneity in terms of culture and social background plays a vital role in the emergence and maintenance of these organizations.

III) Farmers' Self-Organized Groups

In these organizations, farmers who were already organized into groups come to realize the gains of cultivating indigenous vegetable by themselves. Thus, the key driving force for the emergence of these groups has not been profits from vegetables but other socio economic problems that they had been established to handle. However, involvement of

the group in vegetable production activities was cultivated by the demand for leaves in Nairobi and other nearby big towns, and for seed by the local farmers. The members of such groups are close neighboring families who are homogeneous (in terms of culture) and characterized by high levels of social capital. The groups have the capacity to invite the research and extension agencies to train or advise them on any technology they desire. These organizations are however not allowed to participate in the decision making process. The groups do not have any contractual arrangements with marketing agents or traders since they sell their farm produce in big cities (including Nairobi) to whoever is offering better prices. Such groups are not many and one is likely to find only a single one in an administrative District. One such organization is the Technology Adoption Through Research Organization (TATRO) women group in Siaya District, which is involved in the cultivation of Sunnhemp and Spider plant leaves and seeds.

IV) Groups Organized by NGOs

These kinds of local organizations have two key members: the NGOs and the farmers. The latter are normally organized as women and self-help groups. The farmers' groups are mobilized by the NGOs whose key interest is the promotion of vegetables' cultivation. The key driving force for the emergence of such organizations is the donor funds from bilateral donors and international research organizations. However, maintenance of the farmers' groups is also enhanced by the accessibility to ready markets for their farm produce and particularly the seed which is bought by the NGOs and re-supplied to the farmers. As such the NGO also relate to the farmers as the marketing agents for the seed (NGO sells and buys the seed). The research and extension agencies do not have any relational contracts with the farmers' groups since the NGO has the capacity to train the farmers and share any technical information with them. Normally it is the NGO that sets the buying and selling prices of the seeds without negotiating with the farmers. However, the NGO's prices are in most cases below the prevailing market prices. Examples of such NGOs include the Rural Outreach Programme (ROP) in Butere-Mumias District and Sustainable Agriculture Centre for Research Extension and Development in Africa (SACRED Africa) in Bungoma District.

Following the discussion in this section, the various types of contractual arrangements found in the empirical cases in Ethiopia and Kenya can be summarized as shown in Table 1. Our analysis in this table shows that most of the contractual arrangements in Kenya are of the informative type since the government agencies are not directly involved. The major hindrance in this case is the policy which fails to clearly spell out their roles. In addition, these agencies also lack the capacity to mobilize farmers and establish local organizations with them due to budget limitations. It can also be noted from Table 1 that the extension departments are not members of the local organizations. This may be because of the difficulties they face while attempting to pass conflicting messages to the farmers: one for in-situ conservation and the other for increased food production by growing high yielding exotic varieties. Notably, the extension departments enjoy close relationships with the EARO and the KARI in Ethiopia and Kenya respectively whose priority is promotion of the exotic varieties. Overall, Table 1 shows that emergence of the Kenyan local organizations is mostly being propelled by market access which as a result of consumers' realization that the indigenous vegetables are more nutritious than the exotic ones (Chweya and Eyzaguirre, 1999).

Table 1: Types of contractual arrangements within local organizations involved in in-situ conservation in Ethiopia and Kenya

Organization mobilizing farmers	Key driving forces	Examples of local organizations	Type of contractual arrangements from governments' viewpoint
Institute of Biodiversity Conservation and Research (IBCR)	Conservation objectives	Community seed banks	Interactive
Kenya Agricultural Research Institute (KARI)	Research objectives	Farmers-Researchers groups	Consultative

Vegetable traders	Market access	Farmers-traders groups	Informative
Farmers (self-mobilization)	Market access	Farmers groups	Informative
NGOs	Donor funds Market access	Farmers-NGOs organizations	Informative

4. Conditions for the Success of Local Organizations

To assess the conditions for success, one is first of all confronted with the problem of quantifying whether the local organizations have been successful or not as CGRs conservation organizations. Thus we develop first in this section the criteria for assessing the success of these local organizations. This is followed by an assessment of the factors affecting the success of the case study local organizations.

4.1 Criteria for Evaluating Success of Local Organizations

Within the context of sustainable development (WCED, 1987⁷) and the Convention on Biological Diversity (CBD), three broad criteria i.e., economic, ecological, and social (socio-cultural) can be used to evaluate success of local organizations involved in the conservation of natural resources. However, considerations of success in a short-term perspective will entail further elaboration of the above criteria. According to Hanna (1995), the most common evaluative criteria that can be applied practically are: efficiency, equity and sustainability. Most of these criteria have been applied in assessing success of the local organizations or co-management organizations involved in the conservation of fisheries, forests and wildlife.

Efficiency of CGRs organizations can generally be considered in terms of cost-effectiveness where the lowest costs to achieve a particular or stated level of benefits is determined. However, there are also situations where flows of both costs and benefits have to be considered (see, for example, Mburu and Birner, 2002) in order to identify the level of

⁷ WCED Report (1987) (also called Brundtland Report) defines sustainable development as development which meets the needs of the present without compromising the ability of future generations to meet their own needs.

conservation benefits that is efficient (allocative efficiency). The third aspect of efficiency is organizational efficiency (Mburu and Birner, 2002). This latter aspect involves comparison of benefits and costs in order to identify which organizational structure would make it possible to achieve certain objectives, for example, maximum net benefits from in situ conservation. It is therefore closely related to allocative efficiency. An important question in this case is as what kinds of characteristics or conditions make some contractual arrangements more efficient than others both in terms of allocative and organizational efficiency. Moreover, it would be important to consider whether transaction costs (costs of participation) play any important role in influencing efficiency of the local organizations.

Equity refers to fairness to the stakeholders involved in the local organizations or how the outcomes of the contractual arrangements affect the local communities in terms of race, ethnicity, class and gender (Hanna, 1995). It has four main components which are: representation, process clarity, compatible expectations and distributive effects. These are however not addressed in detail in this paper. Sustainability has three components: stewardship, resilience and governance. Stewardship is defined as the tendency for resource users to maintain productivity and ecological characteristics of the resource (Nielsen et al., 1998). In evaluating the management process in fisheries, Hanna (1995) identifies three components of stewardship: time horizons, monitoring and enforcement. If resource stewardship is to be enhanced, the local organizations should contain incentives to lengthen the time horizon beyond the short term, have adequate and practical systems devised to monitor ecological conditions and human behavior, and lead to regulations that promote compliance and permit cost-effective enforcement. Resilience is the ability of the local organizations to absorb and deal with changes and shocks (Nielsen et al., 1998). The local organizations are expected to have rules that are flexible enough to respond quickly to changing conditions and at the same time be able to adapt to both changes in the structure of the industry and changes in the market. Governance is mainly measured in terms of the level of rule compliance. Other measures may include overall reduction in conflict, existence of an effective conflict mechanism, and existence of practical and implementable enforcement procedures.

4.2 Determining Success of Local Organizations and the Influencing Factors

The various types of local organizations in Table 1 are evaluated in terms of the criteria discussed in the previous section (see Table 2). For efficiency it was not possible to analyze the benefit/costs ratio or compare costs of the different organizations since data on costs and benefits was not collected. The major variables that would affect costs and benefits can however be assessed from the qualitative data. For example, since the IBCR was involved in mobilizing unorganized farmers and did not target a specific category, it is expected that its transaction costs were considerably high. The IBCR also had to construct permanent seed bulking structures, pay field workers and provide transport for supervisors and monitors. Therefore its production costs would also be considerably high. Thus, comparing this local organization with a case where farmers are capable of organizing themselves, one is most likely to find that mobilization by research organizations is not cost-effective. Moreover, without markets for the traditional crops' produce in areas with community seed banks in Ethiopia, the financial benefit/cost ratio is likely to be considerably low and even below one.

Overall, it can be argued that farmers' self-mobilized groups are the most successful as their production costs are likely to be considerably low. In addition, fairness to individual farmers is greatly enhanced and the levels of steward, resilience and compliance with rules are comparatively high. For instance, the TATRO group quoted in this paper has been cultivating several types of indigenous vegetables for more than six years and all along has had a small and constant membership: twenty five households. However, activities of such local organizations are often successful due to management capacity of a few local elites and sometimes farmers' ex post transaction costs may be considerably high. Nevertheless, both financial and social benefits reaped in these local organizations would be expectedly higher than the costs.

Table 2: Evaluating local organizations and key conditions influencing their success

Organization mobilizing farmers	Valuation of success of local organizations in terms of efficiency (E), fairness (F), and sustainability (S)	Conditions favoring success	Conditions hindering success
Institute of Biodiversity Conservation and Research (IBCR)	<p>Ex ante transaction costs could be high (E)</p> <p>Lack of markets for the traditional crops' products (E)</p> <p>Initial investments (production costs) for IBCR could be considerably high (E)</p> <p>Farmers cannot market their products (E): their expectations are not met (F)</p> <p>Strict membership conditions. The very poor may not participate (F).</p> <p>Farmers not organized in formal or legal groups, no experiences in organization, rules compliance, etc. (S). OSA is not fully involved (F and S).</p>	<p>-Supportive policy framework</p> <p>-Integration of indigenous knowledge</p>	<p>-Markets are not available</p> <p>-Donor funds not always available</p> <p>-Farmers are not formally organized and do not have rules to govern their activities</p> <p>-Mistrust</p>
Kenya Agricultural Research Institute (KARI)	<p>Conservation benefits are low due to the experimental nature (E)</p> <p>Farmers are not sure of their roles and responsibilities (F)</p> <p>Farmers not involved in the choice of the varieties they are to grow (S)</p>	<p>Integration of indigenous knowledge</p>	<p>-Farmers not integrated fully in the decision-making process</p> <p>-No policy support</p>
Vegetable traders	<p>Conservation benefits are low due to concentration on few varieties according to consumers' preferences and demand (E)</p> <p>Traders exploit farmers since the latter are not represented in the marketing process (F)</p> <p>No objectives for long-term conservation. Many aspects of the organization determined by market forces (S)</p>	<p>Market access</p> <p>Homogeneity</p>	<p>-Farmers are not integrated in both production and marketing processes</p> <p>-Short term interests</p>
Farmers (self-mobilization)	<p>High ex post transaction costs for the farmers (E)</p> <p>Management process mainly in the hands of the local elites (F)</p>	<p>-Small group with self-mobilization capacity</p> <p>-Market access</p>	
NGOs	<p>Initial capital investment and ex ante transaction costs for the NGOs could be considerably high (E)</p> <p>Women groups lack financial, human and self-mobilization resources; need outside support (S)</p>	<p>Market access</p>	<p>-Donor funds are not always available</p> <p>-Weak groups</p>

The farmers-traders' groups can be evaluated as the least successful among the Kenyan organizations due to the expected low conservation benefits, proneness to market forces, and the fact that farmers lack the incentives to extend production of vegetable to the long-term.

In our analysis in Table 2, we identify factors that would both favor and hinder success of each of the empirical cases of local organizations. We argue that important factors favoring success arise mainly from farmers' characteristics. The farmers have to be in small groups, have the capacity to organize themselves and have clear and achievable objectives. But the single most important factor seems to arise from the prevailing economic conditions as farmers have to have markets for their crop produce. Moreover, there has to be a supportive policy that is not biased on certain genetic resources but which would favor farmers' choices of the crop varieties they would like to promote and maintain in their farms. We emphasize that in rating these factors in terms of importance one has to take care of the country and local conditions. It would be expected that a certain factor could be very important for a certain case and less important for another. Nevertheless, generalization could also be allowed as we find that these factors are very similar to conditions that have been documented as key factors favoring success of local organizations involved in the management and conservation of other natural resources such as forests, wildlife, water and fisheries (Rasmussen and Meinzen-Dick, 1995: Meinzen-Dick and Knox, 2001).

4.3 The Role of Property Rights and Collective Action

In both countries, property rights to the crop genetic resources belong to the government or government agencies. Thus it is the responsibility of the governments to provide favorable policies for conservation and create agencies for conservation (e.g. IBCR in Ethiopia). If the governments lack the capacity to conserve the resources then it could provide an enabling environment for other organizations such as NGOs to participate. Thus as our empirical evidence has shown, the governments or their agencies and the NGOs are the key organizers of the farmers in in-situ conservation endeavors. The farmers have also de facto rights to these resources since they have been growing these crops for hundreds of years. However these rights are neither transferable nor divisible and therefore individual farmers cannot be able to exclude others from using the resources. This is mainly due to the nature of the resource and

lack of technologies to exclude other users within a local area. Farmers can therefore choose to grow or not to grow the indigenous varieties depending on the factors discussed in the previous sections and particularly whether there are favorable conditions to enhance their involvement in local organizations. Thus as our analysis has shown, allocation of property rights in CGRs does not play a major role compared to the capacity for collective action. In all our studied cases it is evident that for local organizations conserving crop genetic resources to emerge and be successful the capacity of collective action within the farmers' groups has to be there. This enables farmers to freely share information among themselves, reduce incidences of opportunistic behavior, enhance collective decision-making and hence reduce the costs of participation (transaction costs).

4.4 CGRs as Common Pool Resources and the Role of Local Organizations

To visualize how CGRs can be treated as common pool resources (CPRs), one has to understand that CGRs are threatened because they are not used and not because of overuse, as is the case with fisheries, wildlife, etc. Thus, the main objective of in-situ conservation initiatives of CGRs would be to encourage utilization instead of restricting use. The analysis in this paper also showed that assigning of property rights for CGRs does not contribute to on-farm conservation as this only places responsibility on the governments, without having a direct influence on utilization. Thus as Thies (2000) argues, it is difficult to have an 'open access' condition in CGRs and 'sustainable use' would be interpreted as 'promotion of use'. This is a key reason why incentives measures for conserving CGRs may be quite different from those of other resources which are likely to fall under CPRs. For instance, it has emerged from this paper that market access is a key incentive in the utilization of traditional varieties whereas in resources such as wildlife and forests specification of property rights plays the most important role in maintaining the CPRs (Meinzen-Dick and Knox, 2001).

One important similarity of conservation initiatives of CGRs and CPRs however is the fact that local organizations have an important role to play in enhancing conservation, and increasing social recognition of indigenous knowledge and marginalized rural populations. Involving such organizations often leads to fair and equitable sharing of benefits of CGRs utilization, hence fulfilling the third objective of the Convention on Biological Diversity

(CBD). Moreover, on-farm conservation initiatives are made more long lasting and costs, particularly transactions costs, are reduced. We emphasize in this paper that due to the diversity of local organizations, policy makers have to study the characteristics of each and identify the ones which can be best adapted. It also useful to consider that, unlike in CPRs where local beneficiaries of a resource are identified through a geographical location and encouraged to participate in local organizations, farmers involved in CGRs conservation mainly participate after considering the opportunity costs of utilizing traditional varieties. If such costs are higher than benefits of utilizing traditional varieties, then the very poor may not be in a position to participate. This may be the reason why local organizations mobilized by outsiders (not by farmers themselves) in Ethiopia are disintegrating after withdrawal of external funding (Satayo, per. com., 2003).

5 Conclusions and Policy Implications

The analysis of organizations involved in community seed bulks and exchange networks in Kenya has provided some useful insights as to how local organizations can be structured to maximize benefits of on-farm conservation of CGRs. We have seen that interactive and informative contractual arrangements play an essential role in a number of ways: first, they facilitate integration of farmers' indigenous knowledge in conservation initiatives, second, they enable devolvement of decision making power on the choice of varieties to farmers, and third, they are a means of transferring the responsibility of maintaining crop diversity to the local populations. Thus incentive designs for on-farm conservation in developing countries could target local organizations with such contractual arrangements so as to enhance supply of crop diversity.

The empirical cases analyzed in this paper presents many different types of driving factors that can lead to the emergence of local organizations for on-farm conservation. These include efforts to attain conservation and research goals, markets access and availability of donor funds for farmers' mobilization. Market access has emerged as the single most important driving factor and particularly in cases where the net demanders of crop diversity (conservation and research organizations, NGOs, etc.) are not involved. As the results of this paper have shown, availability of markets would not only have a positive effect on the

mobilization of the farmers but also on the overall success of the local organizations and contractual arrangements created. This has an important policy implication: on-farm conservation of CGRs could easily be enhanced and be successful through provision of markets for the traditional crops' products. Thus the governments have to invest in infrastructural developments such as roads and consumer awareness programs, and remove adverse subsidies that are disincentives to marketing of traditional crops.

The paper has shown that other important conditions, other than market access, which favor success of local organizations arise mainly from farmers' characteristics and particularly the capacity for self-organization. Thus if self-organizing farmers are targeted in conservation initiatives, initial investment costs for governments could be relatively low and hence could make savings from their tight budgets. However, this has to be taken as a cautious option as the ex post costs for the farmers could be considerably high and varieties chosen would mainly be those whose opportunity costs of conservation are lower than the financial benefits received. Eventually only some varieties would be conserved in situ and probably fewer than what would be recommended by policy.

To enhance participation of government agencies in on-farm conservation strategies, policies on conservation, food production and poverty alleviation in Ethiopia and Kenya, and in other many developing countries need to be harmonized to allow easier and cheaper mobilization of farmers. This would also eliminate the difficulties faced by extension agents trying to pass mixed messages to the farmers and hence enhance their participation in conservation initiatives, which is evidently lacking in the case study countries.

The cases studies in Ethiopia and Kenya demonstrate that just like in common pool resources, collective action has an important role in facilitating emergence and success of local organizations in the conservation of CGRs. We also find that factors motivating collective action in CGRs are very similar to those already studied in CPRs. However, specification of property rights may not have the same effect in CGRs as it has in CPRs since farmers generate crop diversity as a positive externality. Thus, except for the purpose of policy assigning responsibility of conserving CGRs to the governments, the property rights theory may not have a wider application in empirical cases of in-situ conservation in Ethiopia and Kenya.

6 References

- Chweya J. A. and Eyzaguirre P.B. (eds.) (1999). *The Biodiversity of Traditional Leafy Vegetables*. IPGRI, Rome, Italy.
- Evenson R. E., Gollin D. and Santaniello V., 1998. Introduction and Overview: Agricultural Values of Plant Genetic Resources. In: Evenson R. E., Gollin D. and Santaniello V. (eds.), 1-28 (1998). *Agricultural Values of Plant Genetic Resources*. CABI Publishing, New York.
- Hanna S., 1995. User Participation and Fishery Management Performance within the Pacific Fishery Management Council. In: *Ocean and Coastal Management*, **28**, Nos. 1-3, 23-44, Elsevier Science.
- Heywood V.H. (ed.), 1995. *Global Biodiversity Assessment*. Cambridge University Press: Cambridge.
- Mburu J. and Birner R., 2002. Analyzing the Efficiency of Collaborative Wildlife Management: The Case of two Community Sanctuaries in Kenya. In: *International Journal of Organization Theory and Behavior* **5**, No. 3 and 4, 259-297, Marcel Dekker, Inc.
- Meinzen-Dick R. and Knox A., 2001. Collective Action, Property Rights, and Devolution of Natural Resource Management: A Conceptual Framework. In: Meinzen-Dick R., Knox A. and Di Gregorio M. (eds.), 41-74 (2001). *Collective Action, Property Rights and Devolution of Natural Resource Management – Exchange of Knowledge and Implications for Policy*, CAPRI, ICLARM, ZEL/DSE, Eurasburg.
- Meng E.C.H., Taylor J.E. and Brush S.B., 1998. 'Implications for the conservation of wheat landraces in Turkey from a household model of varietal choice.' In: Smale, M. (ed.), 127-142 (1998). *Farmers, gene banks and crop breeding: economic analyses of diversity in wheat, maize, and rice*. CIMMYT and Kluwer Academic publishers.
- Nielsen F., Farley C. and Wortmann C., 1997. Opportunities and Constraints for Farmer Participatory Research for Technology Development and Diffusion. In: Kang'ara J. N., Sutherland A. J. and Gethi M. (eds.), 2-15 (1997). *Proceedings of the Conference on*

Participatory Dryland Agricultural Research East of Mt. Kenya, January 21-24, 1997, KARI, Kitale, Kenya.

- Nielsen J. R., Sen S., Svendrup-Jensen S. and Pomeroy R. S., 1998. Analysis of Fisheries Co-management Arrangements: A Research Framework. Institute of Fisheries Management and Coastal Community Development (IFM) and International Centre for Living Aquatic Resources Management (ICLARM) (www.co-management.org, accessed in January 2000).
- North D. C., 1995. The New Institutional Economics and Third World Development. In: Harries J., Hunter J. and Lewis C. M. (eds.), 17-26 (1995). The New Institutional Economics and Third World Development. Routledge, New York, USA.
- Oakley P., 1991. Projects with People: The Practice of Participation in Rural Development. International Labour Office, Geneva.
- Rajanaidu N. and Ramanatha Rao V., 2002. Managing Plant Genetic Resources and the Role of Private and Public Sectors: Oil Palm as a Model. In: Engels J. M. M., Ramanatha Rao V., Brown A. H. D., and Jackson M. T (eds.), 425-436 (2002). Managing Plant Genetic Diversity, CABI Publishing.
- Salanie B., 1997. The Economics of Contracts: A primer. Massachusetts Institute of Technology, Massachusetts, USA.
- Rasmussen N. L. and Meinzen-Dick R., 1995. Local Organisations of Natural Resource Management: Lessons from Theoretical and Empirical Literature. EPTD Discussion Paper No. 11. IFPRI, Washington, DC.
- Smale M. and Bellon M. R., 1999. A Conceptual Framework for Valuing On-farm Genetic Resources. In: Wood D. (ed.), 387-408 (1999). Agro-biodiversity: Characterization, Utilization, and Management, CABI Publishing, New York.
- Thies E., 2000. Incentive Measures Appropriate to Enhance the Conservation and Sustainable Use of Agrobiodiversity, GTZ, Eschborn, Germany.
- Virchow D., 2003. Financing the Conservation of Crop Genetic Resources. In: Virchow D. (ed.), 21-54 (2003): Efficient Conservation of Crop Genetic Diversity: Theoretical Approaches and Empirical Studies. Pp: 21-54.
- Virchow D., 1999. Conservation of genetic resources: costs and implications for a sustainable utilization of plant genetic resources for food and agriculture. Springer-Verlag: Berlin.

Wale E., Mburu J., and Virchow, 2003. Incentives, opportunity costs and contract design for on-farm conservation in Ethiopia. Paper presented at the Third BioECON Workshop, Economics of Incentive Mechanisms for Biodiversity Conservation, May 22-25, Montpellier, France.

Witcombe J. R. and Lenne J. M., 1999. Does Plant Breeding Lead to a Loss of Genetic Diversity? In: Wood D. (ed.), 245-272 (1999). *Agro-biodiversity: Characterization, Utilization, and Management*, CABI Publishing, New York.

World Commission on Environment and Development (WCED), 1987. *Our Common Future*. Cambridge University Press, Oxford, UK.