Relief and Rehabilitation Network

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Good Practice Review 4

Seed Provision During and After Emergencies

ODI Seeds and Biodiversity Programme

December 1996

This review is intended to stimulate discussion as to what constitutes 'good practice' in the field of seed provision during and after emergencies. Comments are therefore welcomed as are suggestions of actual examples which illustrate particular contexts and practices. Comments should be sent to:

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Subsequent versions of this review will, at the editor's discretion, take account of comments and suggestions received.

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Good Practice Review

Seed Provision During and After Emergencies

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ODI Seeds and Biodiversity Programme

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Seed Provision During and After Emergencies

1. Introduction

1.1 Purpose and scope of this Review

The aims of this Review are to bring readers up to date with the latest developments in knowledge and techniques in seed provision during and after emergencies. We aim to stimulate discussion as to what constitutes 'good practice' in this field; the emphasis is on providing practical information concisely and accessibly. There are a number of different types of organisations involved in seed provision, including UN agencies, donor agencies, non-governmental organisations (NGOs) (i.e. charitable organisations), seed companies, national agricultural research programmes, and international agricultural research centres (sometimes known as CG Centres). This Review has been written with personnel of all these organisations in mind, but particularly those in UN, donor and NGO agencies who may have little prior experience of seed provision during and after emergencies.

There is no single widely-accepted definition of what constitutes an 'emergency', and what period of time emergency conditions might be expected to last. In this Review, we define emergencies as including armed conflict, natural disaster (drought, flood, cyclones, volcanic eruption, etc.), or – in the worst cases – a combination of these phenomena. In a number of recent emergencies, it has been possible to distinguish three broad phases: an acute phase, which may last around three months; a settling-down period which may last from six to nine months after the acute phase; and a rehabilitation phase. However, conditions vary from emergency to emergency and emergencies may continue in chronic form for many months or even years. These exceptions are often chronic political emergencies, with the current situation in Sudan and Liberia offering two such examples.

For the purpose of this Review, we distinguish between emergency seed provision (ESP) and longer-term seed capacity-building activities. We define ESP as being '*a period of significant seed distribution and associated activities following the acute phase of an emergency*'. In most circumstances, ESP should be a short-term intervention covering only the first few agricultural cycles following the onset of an emergency. ESP is rarely relevant or feasible while an emergency is still in the acute phase, and usually starts during the settling-down period. It may evolve from initial blanket seed distribution, to targeted seed distribution to identified vulnerable groups.

We have identified one exception to the principle that ESP should be a short-term activity, and this relates to the duration of the emergency. If the emergency itself (not the *effects* of the emergency) continues for a number of years, then it may be necessary to continue ESP for a number of cycles, rather than moving directly to longer-term seed capacity-building.

Otherwise, if agencies wish to continue with seed activities after the first few agricultural cycles, they should aim to move on from ESP to longer-term seed capacity-building. We define this as '*supporting the development of sustainable access to seed in the longer-term, once an emergency has ended*'. It may be possible to begin such capacity-building while the settling-down period is still underway, but it should be a long-term commitment which lasts into the rehabilitation phase and very likely beyond.

The Review will go on to good practice in ESP in Chapter 2 and in longer-term seed capacity-building in Chapter 3. Chapter 4 describes three main disaster scenarios in which ESP or seed capacity-building may be relevant, and the particular characteristics of seed activity that are needed in each scenario. Chapter 5 summarises the directions that seed provision may take in the future. The Annexes provide check-lists of the data required for planning, monitoring and evaluating ESP (Annexes 1 and 2) and seed capacity-building (Annexes 3 and 4).

1.2 What is seed?

Seed is a complicated commodity. On the one hand, it is one of the main outputs from crop production, in the form of grain (from cereal crops), nuts, or beans (from legume crops). But on the other hand, it is also a vital input to crop production: without seed to plant, crop production cannot take place. Seed produced by seed companies has usually been through a process of quality control which adds to its value for planting. However, many farmers the world over simply save grain from their previous harvests and plant that as seed the following season. Seed is always used for planting cereal and legume crops. However, root and tuber crops like cassava and sweet potatoes can be planted from cuttings as well as from seed.

Each crop (maize, wheat, rice, etc.) has a number of 'varieties', which can be likened to 'brands' of commodity: maize can be of the variety *Katumani* or *R201* in the same way that soap can

be of the brand *Lifebuoy* or *Camay*. These varieties can be 'local' in origin, i.e. selected and maintained by local farmers, or 'modern', i.e. the result of organised plant breeding by scientists.

Four other characteristics of seed are important, relating to quality:

- *genetic quality* – this refers to whether the seed is varietally pure, and will thus grow true to type when planted, and to the adaptation of the variety to the environment for which seed is being provided;

- *physiological quality* – this refers to the germination capacity of the seed (what percentage of the seed planted starts to grow in a given period of time) and to the vigour of the seed (how well it grows);

- *analytical quality* – this refers to the percentage of inert matter (dirt, stones, etc.) and broken or otherwise damaged seed that is found in a given quantity of seed; and

- *sanitary quality* – this refers to whether there are any pests and/or diseases carried on, in or with the seed.

Only analytical purity and sometimes sanitary quality can be assessed with the naked eye when viewing a given quantity of seed – genetic and physiological quality usually only become obvious after the seed has been planted. This means that quality control systems are very important. Section 2.5 gives further details.

We can only include a very basic summary of seed issues here. For more information, see, for example, Henderson (1988).

1.3 Rationale for seed provision during and after emergencies

The underlying rationale for seed provision during and after emergencies is that it can help to re-establish a 'self-help' mode within communities affected by emergencies: once families have seed and basic tools, they can start the process of producing their own food and/or

making money from selling crops, and thereby reduce their dependence on external sources for their livelihoods. It is important to remember that in many situations families want to use their own initiative as much as possible to restore their seed stocks. After the 1994 genocide and war in Rwanda, for example, women farmers confidently predicted that shortages of sweet potato cuttings would be quickly overcome through gift-giving (Pottier and Wilding, 1994).

The precise contribution that seed provision can make will vary according to the local situation (see Chapter 4); this variation must be allowed for in the planning and implementation of all ESP and seed capacity-building activities, whether they are intended to be short- or long-term in nature. Therefore, it is vital that there is a thorough and detailed investigation of seed need, and the pre-emergency seed system in the area, before a decision is made to intervene. Nonetheless, some general principles apply concerning when seed provision is appropriate, and these are outlined in the following paragraphs.

Emergency seed provision should take place following a disaster only if there is a strong expectation that a degree of 'normality' will have returned to the local farming system by the time of the next planting season. In particular, there should be evidence that families are committed to staying in the area, will have access to land and labour, and will be able to harvest their crops. It is irresponsible to distribute seed if there is not this expectation, for at least two reasons. Firstly, if families plant seed distributed by humanitarian agencies, even though the realistic expectation of a harvest is slim, this involves them making an investment of their own resources (land, labour, etc.) on which there will be no return. When this occurs, the agencies that distributed seed are actually *depleting* families' resources, rather than contributing to them. Alternatively, if families do not plant the distributed seed, then the money invested by agencies in ESP will be largely wasted, because seed does not store well from season to season so families are highly unlikely to keep it for planting when comparative normality does return.

Even when a degree of normality has returned following an emergency, it is a waste of agency resources getting involved in distributing seed – either ESP or seed capacity-building – unless there is a clear indication that lack of seed is the key factor preventing communities from returning to 'self-help' mode. Even after severe droughts or armed conflicts, seed is often still available within communities (from secret stores, or through traditional supply

lines from outside the area) and other items – such as building materials, drugs, and tools – are in much greater demand. In these circumstances, it may be more useful either to provide these items, or simply to provide food aid so that families are not forced to eat their hoarded seed.

Furthermore, in some cases, rural communities may not actually be very dependent on agriculture for their livelihoods, and their main priority after a disaster may be earning income off-farm rather than planting crops. The argument is sometimes put forward that identifying whether or not intended recipients of ESP are active farmers is not necessary, because seed can always be traded for other goods by recipients who are not interested in or able to farm. This argument overlooks the fact that the cost of delivering good quality seed to beneficiaries is relatively high (seed is expensive, and in addition it has special transport and storage requirements if it is to stay in good order for planting), so if the recipients are not active farmers, agencies could have provided them with something useful at far lower cost.

In situations where none of the above factors are evident, and there is a perceived need for seed provision, the aim should be to distribute seed that is as close as possible to what the target communities were using prior to the disaster. This means seed not just of the same *crops*, but also of the same *varieties*, as those which were previously being grown. The aftermath of an emergency is not an appropriate time to experiment with introducing new crops or varieties to an area: evidence shows that such experiments usually fail. Crop and variety issues relating to ESP are discussed in more detail in Section 2.3. There can be a greater role for experimenting with different crops and varieties in longer-term seed capacity-building; the heavy demands – in terms of skills and resources – that this places on agencies are discussed in Section 3.2.

A final point to note is that 'more' does not necessarily mean 'better' in the case of seed provision during and after emergencies. Repeated distributions of ESP seed after the first few 'post'-emergency agricultural cycles interfere with the restoration of a functioning local economy and the re-establishment of local seed supply (although repeated ESP may be necessary in chronic emergency situations where there is little prospect of a degree of normality returning in the foreseeable future).

1.4 Key components of seed provision during and after emergencies

Chapter 4 describes how the precise situation in which seed provision is organised varies from emergency to emergency. Nonetheless, in virtually all situations seed provision should include a number of key components; these are detailed in Box 1.1. Each of these components is discussed in more detail in Chapters 2 (for ESP) and 3 (for seed capacity-building).

Box 1.1

Key Components of Seed Provision During and After Emergencies

- pre-planning to assess whether or not seed is needed and/or relevant;
- deciding which agencies and structures to work with and/or through;
- identifying the type of seed to work with;
- selecting an appropriate source of seed;
- identifying which supporting services should be provided together with the seed (e.g. fertiliser, tools, etc.);
- identifying target recipients for seed;
- calculating the quantity of seed needed;
- organising the logistics of seed distribution;
- tracking (monitoring) seed;
- evaluating the impact of seed; and
- deciding to stop.

1.5 Coordination of agencies involved in seed provision

One characteristic of humanitarian responses in emergencies is that many organisations may be involved at once, and this applies equally to seed provision. For example, during the first agricultural season after the genocide and war in 1994 in Rwanda – a tiny country – at least 30 different agencies were involved in ESP. The type of agency varied considerably: large international organisations such as the International Committee of the Red Cross, and the Food and Agriculture Organisation (FAO); international NGOs such as CARE and CONCERN; bilateral government assistance; church groups such as Caritas; and even some in-country NGOs which managed to find their feet quickly. In other countries, such as Bangladesh, national government agencies are also directly involved in seed provision during and after emergencies (Brammer, pers. comm.).

There are many different approaches to organising seed provision, reflecting the range of agencies involved, not to mention the range of conditions, crops and emergency situations that may apply. Some big international agencies may know how to move seed quickly but have no knowledge of local agriculture; some smaller local NGOs may have a very good grasp of local needs but be poorly financed. Some specialist agencies, such as the international agricultural research centres (CIMMYT, ICRISAT, CIAT, etc.), serve mainly as intermediary

suppliers of germplasm and expertise to other agencies. Very few NGOs, large or small, have specialist knowledge about seed, so they should be prepared to take advice from agencies which do, such as national agricultural research institutes, NGOs with on-the-ground local knowledge, and IARCs.

Because of their different skills and resources, it can be beneficial to involve a number of different types of agencies, but links need to be created between agencies as soon as possible, to avoid duplication, and to capitalise on each agency's comparative advantage. For this purpose, it can be useful to arrange for coordination of seed provision efforts through a government or NGO coordinating body (see Sections 2.2 and 3.3).

1.6 'Fools rush in where angels fear to tread'

Our earlier description of the rationale for seed provision during and after emergencies suggests that the number of situations in which seed provision is helpful to local communities is relatively limited, and that successful ESP needs thorough advance planning by people with a good understanding of a broad range of seed-related issues in agricultural systems (social and institutional seed issues, as well as technical ones).

As the 1996 FAO Global Plan of Action on Plant Genetic Resources states:

'Food aid, combined with importation of often poorly adapted seed varieties, can lower yields and keep them low for years. Whilst addressing the immediate crisis, such practices can exacerbate hunger conditions, undermine food security and increase costs of donor assistance well into the future.'

FAO Global Plan of Action (1996) p.16

A basic principle of seed provision during and after emergencies must therefore be 'to think long-term before planning in the short-term'.

2. Emergency Seed Provision

As we saw in Box 1.1, ESP involves a number of well-defined steps which include 'seed issues' but also go well beyond them: in ESP, an agency is intervening at the heart of the agricultural process. This Chapter explores the practicalities of ESP, step-by-step.

2.1 Pre-planning for ESP

Here we introduce five basic questions to which an agency needs to respond 'yes' in order to be confident that ESP will be a useful activity to undertake. Agencies need to be able to collect the basic information needed to answer these questions in an appropriate manner, and to be able to properly evaluate its accuracy. Useful guidance on how to collect and analyse rural information can be found in Pretty *et al*, 1996; Ashby, 1990; and ETC, 1992.

The time pressure imposed by an emergency situation, and the pressure which agencies are under to 'sell' their well-intended programmes and to follow their own political agenda, should not be allowed to divert this initial pre-planning activity, although we recognise that this is difficult.

2.1.1 Question 1: Is seed needed after this emergency period?

Farmers usually need a range of things after a crisis period, seed being only one of them. An agency should determine whether seed is what beneficiaries most need compared to other inputs or services (for example, fertiliser, credit, market outlets), and, if so, why.

Seed shortage alone may not be sufficient reason to undertake ESP; is the shortage acute or chronic? That is, is the shortage of seed due to the emergency, or are some farmers always short of seed? The first scenario indicates ESP, while the second suggests longer-term seed and perhaps economic capacity-building (see Chapter 3).

Furthermore, the objectives of ESP need to be defined: is the seed needed for food security or for income generation? Agency staff then have to decide whether they can commit themselves to meeting the appropriate objective.

2.1.2 Question 2: Is ESP the best way to ensure that farmers have sufficient seed stocks?

In many situations, farmers have seed immediately after an emergency, but are then forced to consume stocks as food becomes increasingly scarce. Agencies might ask whether it is possible to *keep existing seed stocks in place*, before even contemplating moving in new seed supplies through ESP. This implies that immediate food relief is needed first. While the end goal is 'seed-focused', the actual activity might consist of the distribution of significant amounts of food aid, not seed.

2.1.3 Question 3: Can farmers make good use of seed aid?

Seed should only be distributed if farmers can sow with a reasonable chance of a positive outcome. Farmers may need seed, but the current agricultural production and social systems also have to be sufficiently viable for ESP to be worthwhile. Farmers have to be prepared to plant, and to have access to the necessary land, labour and tools to manage the crop. Further, there has to be sufficient physical security and climatic stability for farmers to be able to harvest what they have sowed. Land mines, a particularly vicious legacy of war, can make routine farming an extremely hazardous operation.

In some cases, ESP may actually aggravate social tensions. This is particularly true in resettlement situations where land tenure claims by internally displaced persons (IDPs) or refugees may be unclear (see Section 4.3). If an agency suspects that distribution of seed has the potential to stimulate conflict (for example, by being appropriated by local factions), aid activities other than ESP should be explored.

2.1.4 Question 4: Can the agency draw on the necessary skills to implement ESP?

ESP demands considerable expertise within and beyond the seed sector; access to these skills and links needs to be arranged before an ESP intervention starts. As a minimum, agency teams should be able to:

- draw on seed/varietal expertise appropriate for the local context;
- collaborate with individuals knowledgeable about local agriculture;
- ensure sufficient logistical skills to procure and distribute seed on time; and
- develop strong links to local communities to ensure that seed reaches intended beneficiaries.

2.1.5 Question 5: Can the agency make the time and financial commitments necessary to implement all steps of ESP?

As we outlined in Box 1.1, an ESP comprises a number of key components in addition to the physical distribution of seed. These require different kinds of personnel to ensure that the operation runs smoothly.

It is important that the agency is fully aware of *all* the steps in the ESP process, before even embarking on the first. In particular, because using ESP seed can have long-term impacts, evaluation of the performance of ESP seed on-farm, in addition to assessing the distribution process itself, has to figure prominently in ESP activities. This follow-up activity, which might spread over several seasons, demands important time and financial commitments from any ESP agencies.

The results of the above pre-planning exercise may indicate that ESP is unlikely to be helpful, and that the agency should investigate other ways of assisting families affected by an emergency. Some of the key scenarios where this is likely to be the case are:

- when intended beneficiaries are not yet settled enough to farm;
- when the farming system is no longer sustainable for economic and/or environmental reasons;
- when households are not normally primarily dependent on farming for their livelihoods;
- when the agency(ies) involved do not have expertise in technical, social and

institutional issues related to seeds and agricultural systems.

2.2 Organisational issues

2.2.1 Working with governments and/or alternative structures

From the outset, agencies involved in ESP need to develop good working links with whatever authorities may facilitate the general planning of ESP in the local area. These may be governmental, as in the case of Bangladesh, where the Bangladesh Agricultural Development Corporation is charged with dealing with the effects of repeated cyclone and drought. Or they may be explicitly *not* governmental, as in a number of areas of Mozambique in the late 1980s, where relief agencies found the local 'authorities' through which they had to work were in fact opposition Mozambique National Resistance forces. Agencies may also be compelled to work in emergency situations characterised by the absence of any coordinating body.

2.2.2 Liaison with other agencies involved in ESP

Delineating geographic areas of action and dividing activities

Joint delineation of target zones should ensure that all vulnerable areas are reached with the minimum of overlap. Definition of target zones has to be iterative as populations are often fluid (for instance, refugees and IDPs may be returning), and needs may change. For example, following an emergency one area may have a good harvest, the other a total failure.

Coordination of complementary aid at the early stages of the ESP operation normally also leads to more effective use of emergency seed supplies by beneficiaries. This is certainly the case when food aid is timed to arrive first, so that families have enough energy to sow ESP

seed and so that it is not eaten. Such coordination can also help to identify economies in distribution logistics (e.g. a single organisation can help deliver supplies for several others).

Agreeing on guidelines for amounts of seed distributed

Detailed discussion among agencies about production assumptions, household seed needs, and other parameters which are needed to make seed ration calculations, can serve to clear up misconceptions quickly (for example: 'Your target zone is not an important maize growing area') or to hone the intervention strategy (for example: '2 kgs not 5 are normally sown per household during the heavy rains'). Discrepancies in the amount of seed received can create tensions among beneficiaries and should be avoided.

2.3 Type of seed

2.3.1 Choice of crop

The choice of crops for an ESP can only be made after the target area and farming population have been identified. In areas with more than one agricultural season in a year, decisions must also be made about the feasibility and relative priorities of addressing each of the cropping seasons.

ESP is a complex task and there are rarely resources or time to consider a very wide range of crops. For each season in which an ESP programme operates it will be necessary to concentrate on providing seed of relatively few priority crops. It must be emphasised that this is not the time to experiment with new crops, and the programme should only consider seed of crops that are well-established in local farming systems. There have been instances where agencies have tried to use ESP as an opportunity to promote new crops, often on nutritional grounds, not realising that it is exceptionally difficult for farmers recovering from a disaster to test new production techniques associated with unfamiliar crops.

Sources of information

The most important sources of information for choosing the appropriate crops for ESP are discussions and group meetings in the target farming communities themselves. The choice will be based on a review of the priority crops in the local farming system and a discussion of current seed supplies. Seed supplies for different crops may not be equally affected by an emergency, and farmers may have better access to seed of certain crops than others. For example, in some cases farmers store more than one year's supply of seed as normal practice.

Women should be key informants in these discussions, both because of their role in crop production and because they often have primary responsibility for seed storage and management (see Box 2.10). Because different ethnic or social groups living in the same area may have different resources and different crop priorities, the initial enquiry should also pay attention to any differences of this nature.

Box 2.1

Aid workers and farmers may not always have the same crop priorities

From January to June 1995, CARE distributed sorghum seed in its prime action area in Rwanda. Follow-up surveys showed that some of the seed distributed was used for local beer production, and there was some concern about the wisdom of distributing the seed of a crop whose end product (whether planted or directly consumed) might be alcohol.

But sorghum plays a particularly important role in Rwandan agriculture. It is a drought-resistant crop and stores unusually well. It is an important supplier of calories and, in its brewed form, one of the few widespread sources of non-cropping income. Small amounts of sorghum are used as a weaning porridge and more generally to fortify those who need nutritional supplements such as the sick and the elderly.

Additional information regarding priority crops for ESP may be obtained by consulting with local officials, local leaders and extension agents. However, care should be taken to avoid any bias towards crops that are more important to local elites than to the farmers most affected by the disaster. Official reports and agricultural census data can provide useful information for selecting priority crops, but this information should only complement the assessments of the target farmers themselves.

Guidelines for crop choice

The crops that are chosen for ESP will almost always be major components of the local diet. Crops that are grown solely for sale are rarely a suitable choice for ESP until there is assurance that markets are functioning. However, crops that are important for household consumption *and* for the local food economy (such as those that are processed for beer or market food) may also qualify for ESP (see Box 2.1). Seed of crops that supply fodder for farm animals may also be important.

Emphasis should be given to the crops that are most likely to be productive in the conditions following the disaster. If an area has been affected by drought, for instance, it makes sense to give additional emphasis to those crops that are more drought tolerant. If local infrastructure has been affected or equipment has been destroyed, consideration must be given to those crops that require less traction, external inputs, or labour for their production. Intercropping is often a way of saving land and labour, and seed of crops that are normally planted together are logical candidates for ESP.

This Review focuses on the provision of seed for cereals and legume crops rather than planting material for roots and tubers, because root and tuber crops are not likely to be emphasised in ESP (although they may be a possibility in some cases). This is because, unlike cereal and legume crops, a root crop such as cassava can be left in the field for a long period and is less likely to be destroyed during a disaster. In addition, many root crops have relatively long growth periods and are thus not priorities for quickly re-establishing local food supply. Finally, the large-scale provision of planting material (such as cuttings) for these crops is often quite complex, and the material is weighty and voluminous, and these factors imply a quite different set of procedures than for distributing cereal and legume seed.

The Review also does not specifically address the provision of vegetable seed, although this is sometimes part of ESP, and all of the concerns discussed in the following sections about finding seed of the appropriate variety and quality do apply to vegetable seed as well. The immediate priority in ESP should be major food crops, but where seed of traditionally grown vegetables is available it may provide a useful complement to staple crop seed distribution. There are several characteristics of vegetable seed that can make it an attractive addition, when feasible. The quantities of seed required are usually quite modest, compared to those of staple crops. Vegetables are usually grown close to the home, and therefore can be managed and tended fairly easily. And they can be quick-maturing, providing farmers with

speedy access to additional nourishment or cash.

In areas that have more than one agricultural season in a year, a sequencing strategy is helpful in setting priorities. In Rwanda in 1994-95, for instance, the initial ESP programmes emphasised bush beans, which are more rapidly maturing and require less labour, while ESP during subsequent seasons gave increasing emphasis to more productive but more labour-intensive climbing beans.

2.3.2 Choice of Variety

Once the crop or crops for ESP have been identified, attention must turn to choice of variety. The objective is to return the local farming system to a situation as close to its pre-disaster status as possible. Choosing the appropriate varieties is crucial to achieving this goal, and errors at this point may be responsible for exacerbating the emergency rather than ameliorating it. This is a very important point: many ESP programmes have made mistakes with the varieties that they have supplied, usually because the agency personnel involved do not appreciate the subtle but highly significant differences between different varieties. One such example concerns the distribution of sorghum seed in Mozambique in response to the armed conflict of the 1980s and early 1990s. Sorghum is a widely grown crop in Mozambique, but the varieties commonly used are transplanted by farmers after initial germination. When agencies distributed seed of *Segbalume*, a variety new to the area that should not be transplanted, farmers followed their traditional practice with disastrous results (J. DeVries, pers. comm.).

Local or 'modern' varieties

There is sometimes a tendency to take sides between local varieties (i.e. the products of breeding by local farmers) and modern varieties (the products of formal plant breeding). Some people believe that modern varieties are automatically superior to local ones, while others hold the view that modern varieties are only appropriate for high-input agriculture and local varieties are always better adapted to small farmers' needs. Neither extreme is useful or accurate and ESP programmes must be able to take a much more pragmatic approach to variety choice.

The starting point is an understanding of the farming community's pre-disaster situation.

If farmers have been growing only local varieties of the target crop(s), then these should be the focus of the programme. Similarly, if farmers have depended on modern varieties, then these should be provided. In many cases the situation will be more complex, however, and farmers may have experience with both local and modern varieties. Indeed, it may be difficult to tell the difference, as farmers will have used and adapted a range of varieties from different sources. Thus the programme must be willing to organise detailed discussions regarding variety preferences and experience. It is important to focus on a variety's characteristics and performance requirements, not on whether it is 'local' or 'modern'.

Another term that sometimes causes confusion is 'hybrid'. The term is sometimes loosely used to refer to any product of formal plant breeding, but in its strict sense hybrid seed is the first generation product of a cross between two (often inbred) 'parents'; the important point to note is that seed saved from a hybrid crop will not yield well. Thus hybrid seed must be purchased each year and farmers cannot save hybrid seed on-farm. Hybrid seed use for food crops is not common in developing countries, although there are exceptions such as maize and, to a lesser extent, millet and sorghum. If farmers in a disaster-affected area have been using commercial hybrid seed in the past, and if the local seed industry has sufficiently recovered to enable farmers to be assured of future seed supply, then hybrid seed can be considered for the ESP, but this is not a very likely scenario.

Number and diversity of varieties

The number of varieties of a major food crop that farmers usually plant may range from one or a few to several dozen. An ESP should try to provide as wide a range of appropriate varieties as possible, but logistical considerations will necessarily restrict the options. An understanding of the rationale for variety diversity is needed in order to make decisions about the number of varieties to be provided.

Box 2. 2

Choosing varieties for ESP in southern Sudan

In response to a drought in southern Sudan during 1990, CONCERN initiated an ESP to provide seed to farmers for the 1991 planting season. CONCERN's area coordinators carried out a survey that classified the 660 villages in the project area by soil type and rainfall pattern, and on this basis designed specific seed packages for each subset. Seed was purchased locally, and the varieties were well adapted to the various conditions identified in the survey.

Seed Packages Distributed

Soil Type	North (lower rainfall)	South (higher rainfall)
Clay only	10 kg *gisheesh* sorghum	10 kg *gadam al hamam* sorghum
Sand only	5 kg *wad fahal* sorghum 7 kg *baladi* millet 3 kg *hirehir* sesame	(no villages in category)
Clay and sand	5 kg *gisheesh* sorghum 7 kg *baladi* millet 3 kg *hirehir* sesame	5 kg *gadam* sorghum 7 kg *baladi* millet 3 kg red mixed sesame

Source: Borton et al., 1992

Farmers often rely on more than one variety because of differences in soils or growing conditions, or to match the characteristics of different seasons. In some cases, farmers plant a mixture of varieties in the same field to help minimise the susceptibility of any single variety to risks such as plant disease or variable rainfall. ESP should try to provide a sufficient range of varieties to address the major growing conditions of target farmers (see Box 2.2).

When seed of more than one variety of a particular crop is provided, programme management must ensure that each variety is clearly identified and that the rationale for its inclusion is understood. Maintaining the diversity of the local farming system is an important consideration for ESP, but this goal will not be met by a random or haphazard selection of varieties. The initial provision of emergency seed should try to restore the original varietal profile to the extent possible, although in many cases this will require longer-term efforts (see Sections 3.2.3 and 5.1).

Box 2.3

Assessing varietal erosion:
beans during the Rwandan conflict

Doing varietal diagnoses, as well as seed assessments, during an ESP is particularly important in areas known as centres of genetic diversity. Seed may be plentiful, but the varietal base endangered. In the Rwandan case, however, agencies prepared to intervene in the germplasm area after the 1994 genocide and war had a positive surprise.

The varietal diversity of beans (Phaseolus vulgaris, L.) in Rwanda is remarkable. Before 1994, at least 550 local varieties were found countrywide, with important and unique types having evolved from their Latin American centres of origin: farmers grew the greatest range of bean varieties found in active use anywhere in the world.

The genocide and war peaked in the midst of the normal February-June growing season, with overall harvest losses estimated as high as 60 percent. On the one hand the varietal heritage of Rwanda was of concern to the world community. But varietal diversity was also deemed integral to rebuilding productive agricultural systems for Rwanda's predominantly farming population.

Contintued oveleaf

Box 2.3 (continued)

The *Seeds of Hope* initiative – a collaboration among IARCs, national agricultural research programmes and NGOs – started to monitor varietal diversity on Rwandan farms, with the aim of reintroducing lost local varieties, if necessary. Multiplication of 160 Rwandan landraces, stored in gene banks, started as early as July 1994.

However, on-farm surveys and varietal mixture analysis gave surprising results. First, the pattern of the war was such that loss of varietal diversity proved minimal: 30% of farmers (spread across country) had not moved at all, and over half had been able to harvest even during the crisis events of mid-1994. Food aid and ESP had proved crucial for allowing farmers to keep their own seed stocks. Second, local seed channels, particularly the tiny markets found every 5-10 km in the rural areas, had continued functioning – so most specific varieties which farmers "lost" could be re-obtained through neighbours or through these local, weekly sales.

However, bean diversity had changed in some areas over the previous decade, *not* due to war and displacement, but rather because of soil disease build-up, as well as the need for agricultural intensification, so that more productive climbing beans have replaced bush bean types. To anticipate changing diversity will require longer-term agricultural research, not an emergency intervention.

Source: Sperling, 1996a

Variety characteristics

There are several specific factors that must be considered when identifying appropriate varieties for ESP (see Box 2.4).

Environmental adaptation

Crop varieties may have a very narrow range of adaptation. Many sorghum varieties, for instance, are adapted to local day length and rainfall patterns and will yield poorly or not at all when planted in a different environment. Altitude (and particularly its relation to temperature) is another important factor that influences variety performance. In addition, crop varieties may only be appropriate for certain moisture regimes or soil types, and these must be investigated before bringing in an untested variety. There have been examples where emergency rice seed provision has not even distinguished between rain-fed and irrigated varieties, for instance, with the result that a large proportion of the seed distributed did not survive.

Management conditions

Even varieties that have been tested or used locally may not be appropriate for the management conditions of the specific target farmers. Certain varieties do much better on good soils, or with fertiliser applications; similarly, some varieties only perform adequately with appropriate pest protection. Varieties may need to fit into farmers' multiple cropping practices and be compatible with an intercrop, or be of appropriate maturity to fit into a cropping rotation in bimodal rainfall areas. The management requirements of any new variety must be identified to see if they fit with target farmer conditions.

Local farming practices influence choice of variety. Crop maturity is one of the most important factors, and farmers may grow several varieties of different maturities. In uncertain and unstable conditions, farmers often place particular emphasis on earlier maturing varieties that provide a timely harvest when food is in short supply. Rapidly maturing varieties are also less dependent on extended rainfall and may provide an acceptable yield even if planted relatively late in the season.

Box 2.4

Factors determining the acceptability of a variety

Agroecological adaptation
- Day length
- Temperature regime
- Rainfall pattern
- Soils
- Disease incidence
- Insect populations

Cropping system characteristics
- Maturity
- Compatibility with intercrops
- Input requirements

Consumer acceptability
- Harvesting and processing qualities
- Cooking quality
- Fodder quality
- Market value

Food preferences

Food preparation techniques are also an important consideration, and a maize variety that is not appropriate for local grinding techniques, or a bean variety that requires a long time (and much fuel) to cook, are examples of variety choices that can cause considerable and unnecessary hardship. Food preferences can play an important role in variety choice for ESP; one important example is the refusal of farmers in many parts of Africa to eat yellow maize (the type available from North America and Europe), or black-coloured beans.

Sources of information

The best place to start identifying appropriate varieties for ESP is in discussions and meetings with farmers. It should be possible to assemble an inventory of the most important varieties grown by farmers. Emphasis should be placed on those varieties most frequently used by the programme's target farmers and the qualities that distinguish each variety. It should be noted that the same variety may have a different name in different locations. A collection of seed samples that can be shown to farmers is a useful aid in these discussions, especially for crops such as beans where seed size, shape and colour are varietal characteristics that can be important to farmers culturally.

The inventory should include, for each variety, the usual off-farm sources of seed, length of growing period, food uses, additional production requirements (e.g., type of soil), and other distinguishing characteristics. It must be remembered that different types of farmers (as distinguished by gender or access to production resources) may have different varietal priorities.

Local agricultural research and extension staff are also excellent sources of information. As in any planning exercise, no single source of information should be relied upon, and opinions and observations should always be cross-checked. This is particularly true when the farmers' usual varieties are not available and new varieties are to be considered for ESP (often the case following natural disasters such as floods). If a new variety has been tested and demonstrated on farms in the target area, under typical management conditions, and some farmers have begun to grow the variety and are satisfied with it, then the variety is a reasonable candidate for ESP (see Box 2.5). If, on the other hand, the variety has not yet been adequately tested under appropriate conditions (even if it appears on an official list of recommendations and researchers or extension agents express enthusiasm for it), extreme caution must be exercised.

Box 2.5

Distributing new sorghum and millet varieties in Zimbabwe

In response to the 1991/92 drought in Southern Africa, a number of agencies sought to provide emergency seed. Although most farmers in Zimbabwe plant local varieties of sorghum and pearl millet, a SADC/ICRISAT emergency project produced and delivered seed of the new white sorghum variety SV2 and the pearl millet variety PMV1. Neither variety was generally available to farmers, but this was because the commercial seed system concentrated on hybrid maize seed production. Both varieties had been officially released by the Zimbabwe research service and had been extensively tested on farmers' fields. The farmers that did grow these varieties in years before the drought were pleased with their performance, and so officials were confident that these were appropriate choices for an ESP. Follow-up surveys after an ESP indicated that the majority of farmers who received seed of the new varieties planned to continue growing them.

If the nature of the emergency obliges agencies to look to other countries as sources of varieties, even more care is required in analysing information. Expert advice must be sought regarding evidence that the proposed variety will perform adequately under the conditions of the target area. Crop varieties are often very narrowly adapted to particular environments, and importing seed of varieties only vaguely similar to local ones has led to very unfortunate results for a number of ESP programmes in the past.

Caution related to imported varieties also needs to be applied to situations where IDPs or refugees from another area have managed to bring seed with them. They will probably wish to plant this seed, but an ESP should still plan to supply them with locally adapted seed in case their own varieties fail. There is, however, a necessity to help ensure that IDPs or refugees also have seed of their own varieties, if there is a possibility that they may eventually return to their home areas.

2.4 Source of seed

When planning an ESP, an agency should consider five factors before deciding on the appropriate source of emergency seed: the varieties that have been selected; the quantity of seed required; the quality (purity, cleanliness, etc.) of the seed; the time requirements of the distribution programme; and the price of seed from alternative sources. The following

discussion examines the principal alternatives for acquiring seed.

An ESP programme has two basic alternatives for acquiring its seed: purchasing seed that has already been harvested and is available for sale; or contracting seed production in advance. Possible advantages of purchasing from available stocks include saving time and seeing the quantities, type and quality of seed. Timeliness is a particularly important consideration. Seed must be acquired and distributed to farmers in time for planting. In many environments a few weeks delay in planting may cut potential crop yield by half, and longer delays can result in total crop failure. Arranging for contract seed production in advance will usually require extra time, but may provide better control over the type and quality of seed.

2.4.1 Local markets

Local markets are one of the most under-utilised resources for ESP. Even in normal times many resource-poor farmers depend upon local grain markets for their seed. These markets may be quite resilient and, even in times of disruption, traders may be the most efficient source of seed for ESP. For example, an NGO barley seed distribution programme in Wollo, Ethiopia, found that 89 percent of the farmers who had received emergency seed that had been purchased in a neighbouring province exchanged some or all of it for more appropriate varieties from local grain markets. A review of the programme indicated that it would have been preferable to simply provide farmers with a small cash loan so that they could organise their own local seed purchase (Pratten and Shone, forthcoming).

Even after the massive displacements in Rwanda in 1994-95, it was found that in many cases local markets had supplies of many preferred bean and sorghum varieties (being sold as grain, but suitable for seed); the problem was that many farmers did not have the resources to purchase them.

Although local grain markets will not always be an option, they should be one of the first resources that an agency explores for acquiring emergency seed. Indeed, they may be the only potential source in certain situations. In Rwanda, for example, farmers plant a mixture of at least 10 bean varieties, but the formal seed production system produces seed of few of these varieties. Therefore, agencies supplying ESP seed after the 1994 genocide and war had

no choice but to purchase seed of the required varieties from local sources over the border in Uganda (M. Denys, pers. comm.). Such exploration of local sources should be done with the participation of farmers who are knowledgeable about local varieties and seed quality. Cash loans or some type of voucher system may be considered to help farmers acquire seed directly. Price of seed in local markets may be high, reflecting local demand for food and seed, but if the quality and varietal type is appropriate this should be a preferred option to importing untested seed of unfamiliar varieties.

Local traders can also be enlisted to help acquire additional quantities of seed. For example, an NGO working in Sierra Leone had been involved in long-term research on local farming systems before the recent violence and civil unrest began, and was therefore aware of the most commonly planted landraces of rice. It provided a loan to a local rice merchant, who was able to acquire 600 bushels of some of the farmers' most favoured varieties (Richards and Ruivenkamp, 1996).

There are a number of caveats when relying on the local market, however. Merchants deal basically in grain for consumption rather than seed for planting, and they serve as important seed sources only because farmers are able to recognise their preferred varieties and to establish relationships with traders that help ensure seed quality. If an agency with little experience attempts to use the grain market for seed provision (or if farmers themselves are not accustomed to buying seed of the target crop in the grain market), traders may provide inappropriate varieties or material that has been stored for a long time and is not viable as seed. Thus considerable local expertise and control is required if the grain market is to be utilised for ESP.

If an ESP makes extensive use of local markets/traders, it should be aware that it may be buying up scarce seed or food stock, and/or be forcing up the price of remaining stocks. Where rural disruption is prolonged, many trading networks may have disappeared. In addition, markets are not important in all settings; in sparsely populated areas of southern Africa, for instance, there are few rural markets that farmers can use for seed supply.

2.4.2 National grain markets

Much of what has been said about local markets holds true for the use of grain markets

elsewhere in a country. To the extent that specific or equivalent varieties are shared across areas of a country, or are found in neighbouring countries, casting the net more widely in grain markets can be a useful strategy. If distant grain markets are to be used as potential seed sources, particular attention must be given to investigating the variety and the source of the material, and to careful control of the type and quality of seed is necessary throughout the process.

2.4.3 Seed companies

In some countries a formal seed supply system is in place, comprising government seed companies and/or commercial enterprises. In these cases, the companies may be able to supply the seed that is required. A great advantage is that they are locally based and specialise in seed production. If the emergency is very widespread or prolonged, however, it may have affected the seed companies' capacity to provide a sufficient supply of seed. In any case, few companies are prepared to hold sufficient stocks of seed to cope with potential emergency needs, for cost reasons.

If the disaster has been more localised and a company is able to supply seed, two principal warnings are necessary. First, seed companies often provide varieties that are appropriate for more commercial farmers. These may or may not be useful for the target population of an ESP, and this needs to be checked. Second, although the quality of formal sector seed should be quite good, there are unfortunately instances where a request for emergency seed may be seen as an opportunity to clear a warehouse of old, unsold seed, so checks on seed origin and quality controls (see Section 2.5) will be necessary. It may also be appropriate to specify to the companies in advance what varietal purity and germination percentage will be acceptable in the seed that they deliver.

2.4.4 Importing seed

In most cases, importing seed should be a last resort. All of the concerns about varietal adequacy, timeliness and seed quality are particularly relevant here. Unless the agency has excellent contacts in the country where the seed originates, and has the expertise to satisfy itself that it is buying seed of the appropriate variety, relief resources should be spent on other things.

If buying seed abroad is the only option, a commonsense rule is to try to buy from suppliers in neighbouring countries, to save time and transport costs. If that is not possible, a basic principle is to source seed from similar longitudes: seed is better adapted east-to-west than north-to-south, and vice versa (J. DeVries, pers. comm). It is also much better to buy from a legitimate seed company rather than through middlemen or brokers, who are often dealing in grain they may call 'seed' in order to take advantage of the emergency situation. In response to the long-term rehabilitation needs of countries such as Mozambique and Angola, some seed companies in southern Africa are beginning to offer a customised service of seed production and packaging.

Imported seed is also subject to possible delays because of transport problems, legislation in the country of origin (countries may decide to prohibit seed export at short notice if there is a chance their own domestic seed needs may not be satisfied), and the phytosanitary, plant quarantine, and seed certification controls that affect international seed trade. If seed is being imported, the agency must check with national authorities about the requirements for a phytosanitary certificate and other regulations for imported seed.

2.4.5 Donated seed

Donor agencies sometimes offer seed supplies during an emergency. Seed that is offered in this way may represent a well-meaning attempt to lend a hand in an emergency, but such offers require careful screening, because seed from Northern countries may not be compatible with the needs of the majority of recipient countries, which are Southern. Seed may not be an appropriate variety and it may come from stocks that have been stored for a considerable period of time.

2.4.6 Contracting for seed production

An alternative to buying seed is to contract for its production. This requires lead time, however, including the arrangement of the contract, the time required for seed production itself, and the preparation of the seed for distribution. In areas with access to irrigation or multiple growing seasons in a year, contracting seed for the next growing season may be a viable option. Where possible, tenders should be for supply of a given quantity of seed, as this can reduce costs significantly, and holds suppliers to a specified quality, date of arrival, etc..

Seed production should be contracted to experienced people, preferably to government or commercial seed producers. Seed production requires skills, supervision and facilities well beyond those needed for grain production: a seed production operation must be able to maintain a minimum standard of varietal purity, must know when and how to harvest the seed crop, and must have experience in cleaning, drying and bagging the seed. This does not mean that contracted seed production should necessarily be carried out under conditions required for official seed certification or quality control, but it is a reminder that there have been many unfortunate experiences when seed production has been assigned to inexperienced organisations or individuals (see Box 2.6). When seed production is contracted, it is advantageous to locate the production as close to the zone of distribution as possible.

If seed production is specially contracted, the possible interaction with seed legislation should be investigated. Seed production is quite strictly controlled in some countries, and there is the danger that ESP might be blocked or delayed by insistence on conformity with seed law. For example, seed companies in Zimbabwe have sometimes had difficulty producing seed of open-pollinated maize varieties to supply contracts for ESP seed for neighbouring Mozambique, because such varieties are officially discouraged in Zimbabwe, in favour of hybrids. In these circumstances, the ESP programme should contact seed certification authorities to enlist their support early in the process.

Box 2.6

Emergency seed production
by government research staff in Malawi

When the government of Malawi tried to produce sorghum for an emergency seed distribution programme in 1992, the research service contracted rice farmers who had access to irrigation and could thus produce a crop in the dry season. But the small rice plots interfered with mechanical land preparation and farmers were not enthusiastic about growing sorghum, so government research staff had to assume much of the responsibility for the seed production. In addition, funds were delayed for purchasing the seed from farmers. The extension service, which was assigned responsibility for distributing the seed, had little experience in this task, and the majority of seed ended up in storage rather than being distributed.

This experience illustrates that when contracting for emergency seed production it is necessary to work with seed producers that are familiar with the production, conditioning and distribution requirements of the target crop.

2.5 Seed Quality

Seed is a living organism, and particular attention must be given to ensuring its quality: distributing poor quality seed is often worse than distributing no seed at all. There are a number of components of seed quality, some of which are easier to check than others. These include genetic physiological, analytical and sanitary quality (see Section 1.2 for explanations of these terms).

Seed specialists recognise two dimensions to seed purity: varietal and analytical. Varietal purity is concerned with the genetic homogeneity of the seed. Depending on the crop, seed production may be subject to cross-pollination or contamination from other fields unless safeguards are applied. If seed is provided by an experienced seed production enterprise, standard procedures for ensuring varietal purity should be followed. Analytical purity is concerned with the possibility that broken seed and inert matter may be mixed with the seed. Careful visual inspection may be able to detect this type of problem. ESP does not require seed of exceptionally high varietal or analytical purity, but care must be taken to ensure that the seed meets the purity standards to which target farmers are accustomed.

Visual inspection of seed by an experienced person can provide an assessment of some other aspects of physical quality. If there are many weed seed or insect-damaged seeds, the lot should be cleaned or rejected, or the quantities distributed should be increased to compensate. Again, absolute purity is not the goal as farmers usually carefully sort through seeds before planting – but for a small grain like millet or barley, extensive hand cleaning may be difficult. If there is much seed of weeds that are very difficult to control, especially when they are new to the target area, distribution of such seed may cause more problems than it solves.

In certain crops seed-borne disease may be a problem. Visual inspection of the seed may be sufficient in certain cases, but in many others more expert advice would be required. Standards for diseases endemic in an area can be less strict than for new diseases that may be introduced through ESP.

Seed viability declines from the time of harvest. If seed has been stored for a long time or under improper conditions, little or none of it may germinate. Such seed is usually

impossible to distinguish visually from healthy seed. A portable humidity meter can measure the moisture content of seed, but germination tests should also be carried out on all emergency seed supplies (see Box 2.7). Such tests can be done as soon as the seed is obtained, and if there is any significant delay in transport or storage a second test should be done as close to the time of distribution as possible. This requires some planning, because a germination test may take up to two weeks to complete.

Box 2.7

Germination tests

In order to calculate a germination percentage, an agency will need to:

- obtain a representative sample of the seed;
- perform the test at the right time and place; and
- calculate the germination percentage (see below).

A separate test should be carried out on each lot of seed; if seed is received from different sources (e.g., different traders) several tests are required. Even if the same seed has been stored in different parts of a warehouse, it is often worthwhile doing separate tests.

Although the test can be performed in a field, it is preferable to use a small container filled with sand, as this helps control for the unknown effects of pests and moisture conditions. Unless carefully sterilised, sand may well contain weed seedlings that will also germinate and must be distinguished from the test seed. The container, a calabash, wooden tray or large bowl, can be kept inside or outside, but not in the sun. Make sure the container has holes in the bottom to allow for drainage or the seed will get too wet. The container should allow for a depth of 10-12 cm of clean sand. Large seed (e.g. maize, groundnut) should be planted 3 cm apart and small seed (e.g. millet, rice) should be planted about 1 cm apart.

Clean moist sand is placed in the container and smoothed out. Seeds should be planted in uniform rows using a small stick to make the hole for each seed. Large seed should be planted 2 to 3 cm deep while small seed should be planted 1 to 1.5 cm deep. Make sure seed is planted in a pattern so that young seedlings will be easily distinguished from weed seedlings that may find their way into the container. After planting, check the seed daily and check that the sand does not become too dry for the seed to germinate. The sand should be damp but not extremely wet. You may want to cover the container with clear plastic or glass to keep the sand from drying out.

Continued overleaf

Box 2.7 (continued)

Germination tests can also be conducted by placing the seed samples in rolled up paper or cloth towels that are kept damp. The number of days required to make the final germination count varies by crop. The following table provides an indication of the range.

Crop	Days to last count
Rice	14
Millet	7
Cowpea	8
Groundnut	10
Maize	7
Sorghum	10
Beans	9

The speed of seedling emergence is a measure of seed vigour, an important parameter. After taking the final count, calculate the germination percentage. Acceptable germination percentages vary by crop, but you (and the farmer) should expect as a minimum 75 percent germination for seed of most cereals and 65 percent for most legume seed. Higher or lower germination percentages can be used to calculate appropriate seeding rates (and will help determine the amount of seed that needs to be distributed). If the germination percentage is below 50%, this will require a significant increase in the seeding rate. Consideration should be given to reselecting the seed or rejecting this seed lot.

Source: Osborn, 1995

2.6 Supporting services

2.6.1 Food aid

An ESP will usually take place as part of a wider programme of relief services following a disaster, and there are opportunities for coordination among various elements of the programme. One of the most important considerations is the coordination of seed and food relief.

If the population suffers from low food supplies, it is important to initiate food distribution before ESP in order to minimise the possibility that seed will be

consumed as food. Agencies should take into account the side-effects of distributing food aid unevenly. For example, in Bwisige commune, Rwanda in 1994, some farmers had been given food aid which they sold to buy seed, so they were not short of seed; but other farmers remained desperately short of seed, because they had not received food aid and so had no resources to buy seed (Pottier and Wilding, 1994).

When food distribution precedes, or is combined with, ESP it is important that food and seed be distinguished. Seed packets should be clearly marked, and meetings, announcements and other forms of publicity should be organised to alert the population to the purpose and nature of the seed distribution.

2.6.2 Chemical fertilisers and pesticides

Efforts should be made to understand local crop management practices (planting dates, intercropping, local treatments) and to make sure that the ESP does not interfere with these practices (by encouraging dependence on an unsustainable external product, for instance).

Just as the identification of the correct variety of seed is crucial, so the identification of the appropriate (rather than just any) fertiliser or pesticide is often a challenge. In addition, the requirements of transporting and storing a bulky input such as fertiliser, and the problems of storing and protecting toxic chemicals, mean that ESP programmes themselves should rarely contemplate the distribution of complementary inputs.

It is useful to distinguish among crops or varieties that *respond to* external inputs, such as chemical fertilisers or pesticides, and those that are *dependent on* external inputs to produce a yield. If a variety *depends* on a particular input in order to yield acceptably, the ESP should not consider distributing it unless the input supply is already assured.

This is not to take a stance one way or the other on the use of external inputs as the agricultural situation returns to normal, but only to point out that the logistical challenges of managing complementary input supply during seed distribution can overwhelm many

ESP programmes.

2.6.3 Seed treatment

Seed from formal seed enterprises is often treated with fungicides and/or insecticides to control seed-borne diseases and storage and field insects. In most cases, a bright colour signals the presence of these toxic substances, and the containers (bags) are supposed to be marked with a warning that the seed is not for consumption. However, treatment with highly toxic insecticides is not recommended for ESP seed for several reasons. First, there is a significant danger that some seed will be eaten as food in emergency situations. Second, identification of appropriate pesticides (and application technology) is often difficult in an emergency situation, unless the seed is being provided by a commercial seed enterprise that has experience with seed treatment. Finally, if pest protection is an important aspect of crop production for the target area, efforts can be made to understand local pest management practices, rather than introduce potentially inappropriate and toxic chemicals.

2.6.4 Tools and draught animals

Tools and draught animals may have been lost during the disaster. Many ESP programmes acquire and distribute tool along with seed. If this is required, the same care used for selection of variety type and source should be devoted to tools. Local farming communities are accustomed to particular types and styles of tools such as hoes, and there may be differences across the region, or even within a community. As with seed source, it is preferable to investigate local markets and artisans first, before moving further afield. If hoes are distributed, enough should be provided for all members of the household that work on the farm.

If traction animals have been lost, it is unlikely that a short-term ESP programme can do much to address this. Nonetheless, an analysis of the current draught animal population is required, as is an understanding of how this affects the types and amounts of seed that should be distributed in the first season after the emergency. The rehabilitation of the draught animal population could be a high priority for longer-term disaster recovery efforts.

2.7 Targeting recipients

In general, those distributing emergency aid have noted that home-based populations, such as those on-farm, can be more difficult to target than those in camps, as their needs and resources may vary more widely. ESP, both because of the nature of seed and because of the settled nature of farming, has strong targeting challenges. Earlier Good Practice Reviews have made targeting one of their central themes (see Shoham, 1994; Jaspars and Young, 1995; and Telford, forthcoming), so only the special challenges of ESP are given focus below.

An agency might well ask whether the population to be reached in ESP can be considered as comparable to that identified during emergency feeding programmes (assuming that both populations are rural). The answer is only a partial 'yes'. To be able to use seed, recipients have to have access to land. In some places, this is not possible. Extreme cases are present-day Afghanistan, Cambodia and Angola where millions of land mines are deterring farmers from going to fields altogether. Furthermore, in many poor rural areas, for example parts of Eastern Zaire, there is a good deal of disguised unemployment in the countryside. People may live there, but without having fields. Further, to be able to use seed, farmers have to be committed to staying in a site, at least to the end of the season. In acute crises, families might not be able to fulfill this condition.

2.7.1 Requirements for targeting ESP

Defining active farmers

Seed has to reach people who farm. Finding out who is actively farming can only be done locally. Centrally-stored land deeds indicate who owns fields, not who makes use of them (perhaps through renting). Official population registers merely say who lives on farms, not if they work them. Even in times of extreme disruption, when agencies are planning a blanket distribution 'for all', at least two questions should still be asked in reference to target groups for ESP: how many families live in a zone, and roughly what proportion of these people actually farm?

Targeting farmers in multi-crop environments

Within any one zone, not all crops may be equally affected by the disaster, so farmers may need ESP for some crops, but not for others. For instance, the genocide and war in Rwanda in 1994 spanned the phase of bean maturity time and harvest. About half the crop was stolen in the field or stores. Cassava, in contrast, has a highly staggered cycle and can be stored in

the ground for a number of years. During the same events, in the same area, it was selectively pillaged, but survived sufficiently to be recut and regenerated relatively easily.

Targeting farmers within an area

Crops may be very differentially affected across small spatial distances. This can be especially true during natural disasters, such as the flash floods in Bangladesh of 1984 (Montgomery, 1985). Such localised seed shortages are also experienced after cyclones or in areas of conflict. In Rwanda in 1994, some areas that were in the combat zone experienced total loss of their sorghum crop, while farmers as little as 25 km away had normal harvests (Sperling, 1995). Obviously, those targeting need a good knowledge of local agro-ecological zones, and also (in the case of armed conflict) detailed information on any movements of IDPs or refugees that have occurred.

Targeting between the sexes

Having targeted farming households, crops, and specific zones, relief agencies need to take into account the gender implications of ESP (see Section 2.8 and Box 2.10). To which farm household members should ESP be going? Men or women? Who might be best equipped to help in identifying local vulnerable groups by crop – men or women? Given that women are usually the primary keepers of seed and seed knowledge, and children usually live with their mothers, some people argue that women are the natural recipients of seed aid.

A case from Ariquipa, Peru illustrates how rigid gender division can be in reference to seed and the effect this division can have on the success of ESP. A seed aid project set up a fund to help farmers get access to seed of improved potato varieties, with the idea that farmers would repay seed after harvest. The project distributed the seed to men, but the men immediately handed over the seed to their wives – who are the traditional seed managers in the area. When the time came for the seed to be paid back, the men could not do this since the seed now belonged to the women. The women did not hand back the seed, because they were not part of the project. (P. Howard-Borjas, pers. comm.).

2.7.2 Delivering targeted ESP

During the acute stages of an emergency, when it is logistically difficult to assess need, blanket distribution is the norm. As agencies become more familiar with local networks, and

as the emergency situation starts to settle down, efforts are made to reach out only to the more vulnerable within any single zone.

Blanket distribution

The most common form of targeting involves defining a vulnerable zone and then distributing ESP equally across the farming population (note that distributions are blanket in that they target all *farmers* within a zone, not all those living within a zone). Jaspers and Young, 1995, give useful lessons about this approach drawn from experience with food aid.

In terms of ESP, vulnerable zones for blanket distribution might generally be those in which farmers: a) have lost a good portion of their harvest in the field; b) have lost most of their stocks (maybe because of pillage or widespread consumption); or c) have been unable to sow the previous season due to emergency-related disruptions. Refugee and IDP resettlements just starting to farm are sometimes candidates for blanket seed distribution – as was the case, for instance, with the temporary settlement of Sudanese refugees in northern Uganda in the late 1980s and early 1990s. Populations are often beneficiaries of blanket distributions after war, simply because targeting can be so hazardous in insecure areas.

Overall seed stress within vulnerable zones – suggesting that blanket distribution is necessary – is reflected in the functioning of seed channels: for instance, if the system is market-based, indicators of stress would be that seed for sale is very scarce, probably imported from outside the region, and high-priced. If the system is based on exchange, stress indicators might be that flows become very truncated, only to the closest relatives, very best of friends, maybe immediate neighbours.

Targeted ESP to vulnerable populations

Some of the concerns about targeting ESP to vulnerable groups are discussed below.

a) Giving seed only to vulnerable populations within a zone:

Vulnerable populations are those who have neither sufficient seed nor the means to access it from elsewhere. It is hard to 'see' seed-deficient households (i.e. they may not look malnourished). Aid workers have sometimes suggested that populations are 'seed vulnerable' when they still have to buy local seed from the market. Such an assumption does not hold

up under closer scrutiny in many locales. Surveys in Zaire, Burundi and Rwanda in the early 1990s, for example, showed that even in normal years both rich and poor farmers get at least some of their seed from market channels (Sperling *et al.*, 1996).

Seed vulnerability can probably only be defined using local expertise. Sowing quantities and 'acceptable' seed system functioning have to be evaluated site by site. If administrative structures are operational, government agronomists and extension agents can be useful sources of information for an overview. Community leaders (men and women) might be able to help in assessing vulnerability on a household by household basis. In the absence of formal structures, ad hoc meetings (gathering those in the region to discuss seed issues) are certainly better than nothing. In both cases, with or without institutional support, the biases of information channels have to be ascertained and counteracted. Therefore it is best to use several information sources.

b) Pro-rating ESP according to number of household members:

Family size is not necessarily correlated with farm size: many large families have very little land and therefore need only small amounts of seed. Thus, pro-rating by persons, sometimes used for calculating food aid, is not appropriate for seed aid.

c) Pro-rating according to size of land holding:

Land size is also not necessarily an indicator of seed need. Seed needed may differ according to land management, e.g. sowing densities and intercropping, and according to a family's access to other resources (rich families with large land holdings may have sufficient cash to replenish seed stocks through market channels). Assuming that aid agencies could get information on land holdings, a highly sensitive issue even in prosperous times, pro-rating using this criterion would give questionable results.

Difficulty of targeting ESP

Many accounts of targeting and pro-rating exercises suggest that they are time-consuming, costly, and subject to substantial bias; for instance, beneficiaries may try to inflate numbers to get more; aid agencies themselves have been known to explode assessments to advertise 'pressing needs'. There may also be 'risks' in targeting: some of those in need may be excluded,

through ignorance or deliberate manipulation of proposed beneficiary lists (see also Shoham, 1994; Jaspers and Young, 1995; and Telford, forthcoming).

Nonetheless, despite its limitations, even seasoned aid workers acknowledge that sensitive aid targeting can make a difference and can be cost-effective. Box 2.8 describes an example from Sudan, where CONCERN targeted by crop environment and level of seed need with promising results.

Box 2.8

Targeting ESP to farmers in Kosti, Sudan, 1990-91

A seed distribution was initiated by CONCERN and the Kosti Relief Committee in response to consecutive years of drought and pest attack (see also Box 2.5). Socio-economic data collected was used to construct a targeting system based upon three classifications of need:

- riverine villages where many farmers have access to irrigated land;
- farmers in need, but not critically so (non-irrigated areas);
- all farmers facing acute food and seed deficits (non-irrigated areas).

The package of seed distributed to each category of farmer was determined on the basis of soil types, which were described as: clay only; mostly clay; clay and sand; mostly sand and sand only.

Twelve different seed packages, comprising sorghum, millet, sesame, cowpea and groundnut were designed to reflect the different combinations of economic need and environmental parameters in Kosti Province. Depending upon the seed type and the needs classification, the seed package provided between 20 and 60% of the total estimated family seed requirements. These classifications were by no means considered 100% objective but were sufficiently representative to allow a more effective resource allocation than would have been achieved by a standardised distribution.

Source: Borton et al. 1992 and CONCERN, 1992

2.8 Calculating the quantity of seed needed

This discussion looks at calculating seed needs per household rather than overall coverage

(for latter, see particularly Shoham, 1994; Jaspers and Young, 1995; and Telford, forthcoming). A relief programme naturally wishes to reach as many farmers as possible, so there will normally be a trade-off between the individual seed quantities distributed and coverage.

Box 2.9

Seeding rates

Crop	Seeding rate (kg/ha)	Multiplication rate
Maize	20	100
Sorghum	10	100
Pearl millet	5	200
Wheat	100	25
Barley	100	15
Rice	20 (upland), 80(swamp)	50
Beans	100	8
Groundnut	120	6-10
Cowpea	90	15

Crops differ significantly in the amount of seed required to plant a given area. The first column in the table above provides a rough guide to the amount of seed required to plant one hectare. These figures, combined with an estimate of the average field size available to the target households for the particular crop, can be used to make initial calculations of the quantity of seed required for ESP.

These seeding rates are only approximate. Farmers may be accustomed to planting at higher rates, especially if they normally experience poor germination or have other problems with plant establishment. Equally, the actual rates may be lower than these if the crop is planted on poor soil or is intercropped. Discussion with local farmers will allow a more precise estimate of seed requirements.

The second column provides multiplication rates, an equally rough estimate of the yield that can be expected under small farm, low input conditions. Thus for maize, a seeding rate of 20 kg/ha can be expected to give a yield of (100 x 20 kg) 2000 kg/ha. Yields may be significantly lower than these under difficult conditions, while good management can give higher yields.

2.8.1 Calculating seed needs per household unit

In order to calculate how much seed should be given per household, agencies have to find out how much farmers normally use and – of this – how much farmers can procure for themselves. Three basic calculations need to be made.

Normal seeding rates

The amount of seed planted is a function of how much land farmers have allotted to the particular crop, the seeding rates on any given field (see Box 2.9), and the expected germination rates. Enough seed should be provided to make it worthwhile to prepare the land and manage the crop, but it is important to remember that farmers can only sow a certain amount of seed and excess seed cannot usually be stored satisfactorily. Excess seed will be eaten or sold on the open market. Too much 'free seed' may undermine the operation of local exchange or market channels. Further, distributing too much seed, and distributing for too many seasons, can be an expensive proposition for the agency involved.

The amount of seed farmers normally sow can sometimes be distilled from written reports. Pre-emergency national statistics often have household estimates of 'average areas planted per crop'. This area figure can be converted to 'kilos sown' by dividing by the average normal seeding rate, but remember that official 'recommended' seeding rates often differ significantly from what farmers actually plant. It is important to verify 'recommended information' with a range of farmers who actually sow the crop.

If national or regional statistics are not available, interviews with knowledgeable farmers (often women) can quickly reveal similar information. Here, it is important to speak in measures which farmers themselves use for sowing purposes, for example, ½ bag (which may be equivalent to 50 kgs), 3 baskets (possibly 15 kgs), etc..

This figure of "average quantities sown" is not a bad proxy for general use assessments and it is particularly useful in emergency zones where all farmers are more or less similar. Where land holdings are very differentiated, calculating seed needs based on averages is less effective.

Normal resowing rates

In many regions, farmers seed a field a second time each season, sometimes to fill in for unexpected poor germination, but often to replant totally after poor emergence. In drought-prone areas, in particular, seed may fail to emerge if rains are tardy, and resowing has to take place if farmers are to get any harvest at all. In calculating seed requirement per household it is important to adjust for this need for resowing. ESPs have to find out how

often re-seeding is done in both normal and stress seasons and to add the appropriate seed margin. In drought-prone areas, agencies might additionally make spot checks in the field to assess the proportion of plants that are emerging. In all cases, this tendency to resow suggests that seed need calculations should allow a wide margin and not be cut too finely.

Ability to get seed supplies

After assessing how much seed farmers normally use, ESPs then have to find out how much farmers can actually access after the crisis period. An ESP may simply need to supplement what farmers can get themselves, rather than supply farmers with all their seed needs.

Two questions can help gauge farmers' access to seed stocks: firstly, how much households have generally saved in their own storage bins and pots; and secondly, how much households can obtain through functioning seed channels, such as friends or markets.

This distinction between 'existing stocks' and 'access to stocks' is very important. Farmers sometimes prefer not to keep too much seed in the house (due to theft or deterioration), but rather to buy or barter for seed just before sowing time. ESPs should try to supplement, not undermine, farmers' own initiatives. There may be considerable variation within a community and within a household in access to stocks.

Although we pointed out earlier that the area planted during or just after emergencies is often smaller than that planted under normal conditions (due to shortages of labour, insecurity or the need to prioritise agricultural rehabilitation), agencies should be cautious about adjusting seed need figures downwards.

2.8.2 Calculating seed needs by agro-ecological zone

In calculating seed needs, it is important to remember that different regions of a target zone may give varying importance to a particular crop. For instance, while it may make sense to give 10 kgs of maize per beneficiary in a key maize-growing area, such an amount would be wasted where farmers plant a stalk here and there in what is primarily a milieu for sweet potatoes. Intercropping issues are also important: adjustment must be made for areas where crops are systematically planted together in a complementary manner, such as maize and beans in many areas of Africa and Latin America. Of course, the seeding rates are lower

if a crop is planted in association than if it is grown as a monoculture.

2.8.3 Which farmers to consult on seed needs

Not all farmers are equally knowledgeable about all aspects of agriculture. Divisions of labour, by market orientation, by crop, even by task, mean that there are specialists in the community and even within the household. Too often, the (usually male) household head is consulted by outside agencies for all key information – despite the fact that he may not be the one who knows the most about seed need. Variety choice and sowing strategy are often women's decisions, at least for subsistence crops. Even in areas of Bangladesh, where women in Purdah may not even see the field, they may be the ones primarily responsible for selecting and storing seed (H. Brammer, pers. comm.). With women at the core of seed management, taking account of gender issues in ESP is essential. Box 2.10 outlines some of the common gender divisions in different small farm farming systems and the implications of such patterns of responsibility for ESP.

Box 2.10 (continued)

Pattern of gender responsibility in agriculture and implications for ESP

Pattern		*Implication for ESP*
! Female-headed households	*de facto* Men work away from the farm for days, weeks or even years, while the women manage in their absence.	Women head of households have to be recognised as legitimate direct aid recipients. They should also participate in needs assessments, targeting processes (such as when community meetings are used to identify the most vulnerable households).[1]
! Separate crops	Women are responsible for production and disposal of different crops	The household head will probably decide who gets the seed aid – but the evaluation should include the appropriate 'field manager'. In addition, if some fields are reserved for commercial use (often the household head's) and some for home consumption, special attention should be made in trying to ensure that seed reaches the latter.*
! Separate fields	Women produce the same crops as those produced by men but in different fields	Needs assessment, targeting, distribution and evaluation should be done in collaboration with appropriate person according to the crop in question.
	de jure Households are legally headed by women.	
! Separate tasks	Some or all of the tasks within an agricultural cycle are assigned by gender. Seed selection and storage is done by women in many systems.	Minimally, needs assessment and evaluation should be done with the appropriate person for seed, often women.**
! Shared tasks	Men and women share tasks on the same crop. This may mean that it is acceptable for both men and women to do the task or that there is actual sharing of responsibility. In many systems, only labour intensive tasks, such as weeding and harvesting, are shared.	If tasks are shared on target crop, same as above.

Notes:

* Within the same crop, women may give higher priority to different varieties than men, eg. to those associated with nutrition and ease of cooking. An example from Tanzania illustrates the point: a particular maize variety distributed in an area characterised by food shortages was predominantly popular with women since it matured early and was harvested green for feeding children (Thomas, pers. comm.).

** Special strategies might have to be devised to ensure that women have a say in constructing beneficiary lists. Women are sometimes reluctant to speak at public meetings, as cultural norms may perceive such behaviour to be inappropriate.

Source: Modified from Feldstein et al, n.d.

Continued overleaf

2.9 Distribution and logistics

General issues in relief distribution logistics, and the advantages of government-managed versus community-managed aid distribution have been discussed in general at length elsewhere (see Jaspers and Young, 1995) and there are no special issues associated with ESP. However, seed remains useful only if it arrives on time, its quality is maintained, it is of varieties adapted to the local area and with known traits (that is local farmers know how to use it). These seed-specific distribution issues are explored below.

2.9.1 Getting seed to farmers on time

The season for sowing seed lasts any time from about one week (in harsh environments) to six weeks (in areas of higher rainfall, better soils etc.). Agencies need to get seed in farmers' hands several weeks before *farmer-defined* sowing date cut-offs, as it is better to aim conservatively and be prepared for the rains' arriving early. Furthermore, early distribution gives farmers the option to re-sow (see Section 2.8). If seed arrives towards the end of the sowing period, farmers risk a compromised harvest. When distribution is substantially delayed, seed cannot be planted and will fill the cooking pot – whether coated with fungicide or not (see Section 2.6).

2.9.2 Labelling and packaging

The right varieties need to be delivered to the right places and this requires considerable effort and expertise by the distributing agency. When distributing a number of varieties (and particularly if they are similar in appearance), agencies may consider labelling seed lots by end-destination. For instance, in Rwanda in 1994, the *Seeds of Hope* programme proposed markings by altitudinal adaptation, with distinct coloured packets for 'low', 'medium' and 'high' altitude. Furthermore, distributors all along the line need to be informed of which varieties go where. A first sorting may take place at the central distribution point; a second in trucks going to multiple towns and villages; a third in the local community itself. Distribution manager, driver, and local distributor all need practical aids to get the

right variety to where it should go: provision of labelled lots, detailed transport papers, or written varietal distribution guidelines.

In some cases, agencies will have to repackage bulk seed in quantities appropriate for their seed distribution programme. Features such as quantity of seed per package, protection desired, cost of package, and value of seed help to determine the appropriate packaging material (see Box 2.11 for some general guidelines). If possible, small bags should be provided, labelled with the varietal name in appropriate language(s) for the agency personnel, drivers and target farmers. Agencies should take particular care to maintain the integrity of the seed bags; many problems are caused when bags spill, seed is mixed, or identifying tags are lost.

In some cases, farmers may have to provide their own containers in which to carry seed, and here, it will be helpful if they can be provided with a simple information slip (see Section 2.9.5).

Box 2.11

Suggestions for packing material to be used in seed distribution

The following types of packaging are often used for different sizes of seed package:

- *1 gm to 0.5 kg*: laminated paper and polyethylene packets, laminated aluminum foil packets, cotton bags, tins and polyethylene bags;
- *1 kg to 5 kg*: various kinds of rigid plastic boxes, cotton bags, and polyethylene bags;
- *10 kg to 100 kg*: gunny bags, woven polypropylene, and laminated polyethylene bags;

Source: adapted from Reusche and Chopra, 1993

2.9.3 Maintaining seed quality during transport and local storage

Just because seed is in good shape when it leaves the distribution depot, does not mean it is still good quality when it arrives at the final distribution point. Fluctuating temperatures, water infiltration or pests may substantially change the quality en route. Seed can also be damaged by contact with fertiliser and

agrochemicals (e.g. if bags touch each other during transport). If there are delays during transport, it is necessary to arrange for a seed inspection (see Section 2.5) upon arrival at the final distribution point.

Local storage facilities need to be carefully planned if larger quantities of seed are to be moved. Just a few hours in a tin roof shed, or left out in the sun, can damage seed irretrievably. Stores need to be dry, kept free of rodents and birds, not too hot, and secure. Agencies should also consider whether fumigation is necessary, either because insects or mites might have been brought in with the crop or because the store itself might be infested with pests.

Ideally, local storage sites should be relatively near the final distribution point (say within about a 15 km radius, or the distance farmers can walk in one day). In estimating the space required, some seed specialists suggest that 100 kgs of cereal crop require about 0.15 m^3 of storage space. However, room also has to be allocated for passageways, entrances, and some space between seed lots for ventilation. Therefore, as a rough guide, approximately twice that amount, i.e. 0.30 m^3, would be needed for a 100 kg stock (Reusche and Chopra, 1993).

In general, seed distribution should be timed so that agencies do not have to rely on local storage for very long.

2.9.4 Alerting farmers to the arrival of ESP

Seed is an input which can be used only if farmers have prepared the land. Therefore they need to be alerted well in advance not only that ESP is arriving, but for which crops and, if possible, varieties (e.g. maturity cycle). This gives farmers time to search for seed of other crops and varieties elsewhere, if necessary.

CARE in Rwanda has suggested community meetings are suitable for passing on information about ESP. Discussions at such meetings have allowed beneficiaries to better distinguish between seed and food aid, and to eliminate some of the inequities in the distribution system. However, CARE notes that information shared with local leaders – on distribution procedures and allocations of rations

– does not necessarily trickle down to household representatives, so there is a need for broadly-based community meetings. In one situation, where community meetings had not been held, it was noted that, 'Those who took advantage of the system may have been prevented [if such meetings had been held]. Knowledge is power!' (CARE, 1995b – parentheses added)

2.9.5 Supplementing ESP with information

Varieties with management requirements different from seed previously sown in the area might best be accompanied by a brief information leaflet. Information should be put in an easily comprehensible form: in pictures or the local language, and made available through local distributors and key individuals in the community. Farmers need only know the salient features – not the ABC's of how to plant – as they should be receiving seed of a crop they know how to manage. If agencies are finding that too much basic information has to go in the pamphlet, they are probably providing the wrong crop or variety. A possible exception is with IDPs or refugees who have been displaced to a new farming environment and who may welcome some advice.

2.9.6 Charging for seed

An issue arises in many kinds of relief distributions as to whether beneficiaries should be charged for the aid received. In the case of ESP, a primary production input, charging at the time of distribution is rare because seed is (or should be) only given when large numbers of farmers have neither sufficient stocks nor money to buy in seed. Some of the general principles associated with charging for seed in longer-term rehabilitation situations are discussed in Chapter 3.

2.10 Tracking seed

An ESP must be followed up by monitoring and assessment in farmers' fields. Agencies need to ask not only 'who' and 'how many' received seed at the beginning of the season, but also 'which seed performed well' and 'where' at the end of the

season. As such, tracking of specific material is extremely important, in order to provide the data to make this assessment. However harried the distribution process may be, a minimum set of data needs to be recorded during the ESP process. Annex 1 gives an outline of minimum requirements for record keeping.

2.11 Evaluating ESP

Data collection may seem to be a somewhat superficial or secondary activity when compared to the day-to-day, sometimes overwhelming, demands of ESP. However, without some sort of monitoring and evaluation system, it is quite possible for ineffective or even damaging seed programmes to continue unchallenged.

While some ESP programmes plan an evaluation at the end of a project phase (often at the point when the emergency programme moves towards longer-term seed capacity-building), the particular demands of evaluating seed activities suggest that evaluation should rather take place in accordance with the seasons. Note also that farmers quickly forget the specifics of any one aid intervention. If an agency wants useful insights, a simple, seasonal follow-up gives the best results.

Seed use, also has direct longer-term consequences, over seasons and years. Those working in the longer-term, particularly on building seed system capacity, also need evaluations which reflect these more lengthy horizons.

2.11.1 Whose point of view?

When evaluating the success of an ESP, the question: 'evaluation by whom?' needs to be raised. The aid agency, or supplier, needs to know how the process went from their point of view. However, equally important in ESP evaluation, is the users' or farmers' point of view and the impact the seed has had in farming areas. The true value of ESP lies in whether farmers' benefited from the seed distributed. Quite simply, did farmers have a harvest, or a better harvest than would otherwise have been the case, because of the aid seed distributed? Answers to such questions can help shape the donors' future strategies for ESP.

2.11.2 When?

Evaluation should be programmed to take place at several points in time, with three distinct phases to be considered:

- covering the period of the ESP itself, which might take place before harvest;
- an evaluation post-harvest, to assess the importance of the aid seed to farmers' agricultural output; and
- an evaluation after several crop cycles to assess the longer-term impact of the ESP on broader issues such as agricultural stability, income distribution, or varietal (genetic) diversity.

Box 2.12 suggests what sort of evaluations may be appropriate for ESP agencies and which for those groups involved in longer-term seed capacity-building. There may be some overlap if an ESP agency is moving into seed capacity-building activities. Where agencies intend to leave the country as soon as the emergency is over, they should be prepared to work with local authorities to give them the information needed to carry out the longer-term evaluation.

Box 2.12

Overview of ESP Evaluations

Time of year	Role for ESP agency?	Role for capacity building agency?	Agency's viewpoint on:	Users' viewpoint on:	Timing (after ESP)
Right after seed distribution (post-sowing)	Yes	No	Logistics of seed distribution		c. 1 month after distribution
After first harvest	Yes	No	Performance of seed on-farm		after 6 months - 1 year
After several seasons	No	Yes	Impact of ESP on: production, varietal diversity, income, etc.		after 3-5 complete agricultural cycles

2.11.3 Whom to interview ?

Perhaps most important in evaluating ESP is to ensure that the person interviewed during ESP evaluations has the necessary experience. As mentioned previously, interview protocols which insist on speaking with the 'household head' or which are not sufficiently sensitive to cultural norms concerning communication with women might miss important insights. Attention should be devoted in advance to ensuring that the interviewer has the sensitivity necessary to conduct interviews appropriately. In some circumstances, using interviewers of a particular sex may be necessary.

Different types of farmers (e.g. commercially-oriented versus those producing primarily for home-consumption) may also evaluate materials differently. Separating evaluations by user types (e.g. very poor, poor and medium farmers) can be important for understanding which groups of farmers benefited most from

the ESP. Analyses by user type demands a good deal of background information, however, and probably can only be done if one has previous detailed knowledge of the beneficiary population or if focused socio-economic surveys have been completed in the area.

It is also useful to remember that crops and varieties will perform differently in different agro-ecological zones. Evaluation and impact assessments should be structured to try to capture these effects. For example, yield data should be segregated according to ecozone to help answer the basic question of what worked well where.

2.11.4 Guide questions

A set of guide questions to cover the different stages of evaluation appears in Annex 2. While the specific format might vary by crop and region, several principles hold true across contexts. First, the interviewer needs to clearly distinguish between seed and varietal issues. Seed delivery and quality might have been acceptable, but the variety inappropriate – or vice-versa. Second, ESP should be directly compared with what farmers normally use. In stable times, farmers are very active managers of both germplasm and seed. They have a well-defined set of standards. The evaluation has to answer the question of how well the aid seed measured up to farmers' own standards. Only focused ESP evaluations can help develop more focused ESP strategies for the future.

2.11.5 Who should lead evaluation and impact analyses?

In looking for an evaluator, agencies should seek those with varietal and seed expertise as well as knowledge of the local agricultural systems. For most evaluations, a well-rounded farming systems agronomist or economist who has worked with seed would be quite adequate.

Whether evaluators are recruited internally or externally, money should be earmarked from the beginning to ensure that such evaluations take place. In all cases, funds should be reserved for extensive feedback: to the donors, to national

ministries, to other relief agency colleagues, and, if deemed useful, to the farming communities themselves.

2.11.6 Developing common evaluation procedures

While individual ESP agencies are primarily interested in to evaluating their own impact, those devising national or regional ESP strategies (whether government or non-governmental) need comparable information across zones, to assess past activities and plan the next steps. Agencies involved in ESP should therefore consider the value of joint or standardised evaluation efforts. Agreement to monitor basic ESP parameters could be done at little cost to each relief agency in their particular zone of action. Further, agencies with a national or regional ESP mandate often suffer from not having the time to do proper yield assessments, not having local contacts, and not being able to go where cars cannot go.

2.12 Deciding when to stop

As in all relief distribution, there is almost as much long-term harm in giving too much as in giving too little, as prolonged ESP undermines local production. Zimbabwe's experience clearly shows that prolonged blanket distribution of free food, fertiliser and seed during the early 1990s disrupted local economics and farming systems, until the government was able to take steps to make the distributions smaller and more targeted.

Aid agencies often go through a three-stage seed distribution process – initial blanket distribution; then a targeted distribution to the more vulnerable; and then complete withdrawal. Deciding when to stop often seems to be arbitrarily defined (often being simply when project funds run out). Making the decision partially depends on knowing what a normal situation looks like. For seed issues, aid agencies need to know something about pre-disaster seed stocks and the functioning of pre-disaster seed channels, hence the importance of proper initial needs identification and regular monitoring (see Sections 2.1, 2.10 and Annex 1).

It is important to ask the right questions when deciding whether to stop ESP. If farmers want more seed, do they know where they can get it? Are seed channels

adequately functioning? Can farmers access the type and quantity of seed material they need? If the answer to any of these questions is 'no', then aid workers have to find out why. As Box 2.13 shows, the problem may not be lack of seed *per se*.

There will always be some farmers who need or want more seed than others. In many societies, the very poor consume their seed stocks on a regular basis. Continual support of such a group is not the job of emergency relief agencies but could be a focus of longer-term seed capacity-building (see Chapter 3) as well as more general poverty-alleviation projects.

Box 2.13

Deciding when to stop ESP is not a clear-cut issue

In November 1995, three seasons after the genocide and war in Rwanda and after massive ESP, many farmers complained of lack of bean seed. Surveys countrywide showed that at least 60% were sowing the same or greater areas to beans than before the genocide and the war. Further, the vast majority knew where they could get bean seed: at the local open markets or through neighbours. The seed on offer was adapted, at close distance and plentiful. So what was the problem? The problem was simply that farmer priorities were elsewhere. Rather than secure their seed stocks, farmers first wanted to get doors on their house, fix the windows, maybe pay for labour that had not been needed before. Surveys showed overwhelmingly that most farmers were poorer than before the war. Their livestock (essential for manure) had been stolen or eaten, and farm infrastructure needed repairing.

Was the problem here really lack of seed? Was the solution more ESP? The answer is not clear-cut and the concerns extend beyond the seed sector to strengthening the economic base of marginal groups (Sperling, 1996a).

2.13 Lessons learned

There are a number of themes that have recurred throughout this Chapter and which serve as major lessons concerning ESP.

1. Seed aid is very different from food aid and demands specialist seed expertise.

Varietal adequacy (that is, the genetic material) and seed quality (e.g. cleanliness and germination capacity) are not characteristics that are easily visible or can be quickly evaluated by non-specialists. ESP therefore has to be able to harness extensive seed expertise.

2. ESP needs to consider the functioning of seed channels as well as household seed availability when deciding how to intervene.

Farmers normally get seed through a range of seed channels: markets, exchange networks, gifts, parastatals, or commercial seed companies. During an emergency they may not have seed on-farm, but may be able to access it elsewhere. Bringing in seed is not always the answer, especially from national seed companies who often do not keep sufficient reserve stocks for use in ESP. It may make more sense to give farmers the means to access already available seed materials and to help them better save what seed they have.

3. Seed relief requires an 'agricultural systems perspective'.

Seed is one key component at the heart of an agricultural system. To intervene effectively with seeds, relief agencies have to understand the importance of seed in relation to other possible inputs, relative crop priorities, patterns of agricultural management, and the importance of farming in relation to other economic sectors.

4. 'Local' has to be the operative word in ESP.

ESP has to build on what farmers actually use and what farmers actually do. ESPs are generally not the time to introduce new varieties or new crops. ESPs should aim to support local farmer management practices, including usual sowing dates. As a corollary, the agricultural diversity which farmers already use should be encouraged: risk is reduced by distributing a *range* of farmer-acceptable crops and varieties.

5. Because seed aid has to be actively managed by farmers, ESP should have a strong thrust towards user involvement, especially by women.

ESP needs to build on farmer knowledge, devise strategies according to local management, and alert farmers about seed distribution procedures – so that they can be optimally prepared to receive seed. All these steps require intense interaction with farmers. In many agricultural systems women take the prime responsibility for varietal evaluation, seed selection and storage, so ESPs have to make special efforts to collaborate with female farmers.

6. ESP should build in comprehensive monitoring and evaluation components.

The effects of ESP endure for several seasons and may have even longer-term effects on the stability and productivity of an agricultural system. As such, not only the distribution process has to be monitored but also the actual performance of the seed material on-farm. This may take several crop cycles to evaluate.

7. To complete ESP effectively, agencies need access to very varied skills.

Agencies need to:

- draw on seed/varietal expertise appropriate for the local context;
- collaborate with individuals knowledgeable in the local agriculture;
- ensure sufficient logistical skills to procure and distribute seed; and
- develop strong links to local communities to ensure that seed reaches beneficiaries.

8. If agencies cannot provide seed relief which meets the above criteria, they should change to providing other forms of aid which are appropriate for farmers and within their capability.

Farmers invest labour, resources and hope when planting donated seed. Late seed distribution and distribution of seed of unadapted varieties can lead to partial or total crop failure.

3. Seed Capacity-Building

A community's 'seed capacity' is made up of a number of components: access to seed of an appropriate range of crops and varieties for the local farming system and environment; capacity to manage, select, store and distribute seed; and adequate links to supplies of any external inputs that may be necessary, such as chemical fertiliser, or extension advice. Because seed capacity has a number of aspects, there are thus various entry points for strengthening it:

- simply increasing the quantity of seed available locally, by bringing in seed from outside the area, or supporting local farmers in saving more of their harvested crops for seed;
- helping to improve the quality of existing locally-produced seed (through publicising modified seed selection, harvesting, or storage techniques);
- re-establishing or broadening the previous genetic base, to give local farmers access to seed of the range of crops and varieties that they desire (by, for example, procuring seed from gene banks of varieties that have been lost locally, or obtaining seed of crops and varieties new to the area, from agricultural research institutes, for local farmers to try out); or
- increasing local seed production and distribution capacity, with the aim of generating income for the local community as well as increasing the availability of seed locally.

In this Chapter, we concentrate specifically on the kind of seed capacity-building activities that can help to 'build resistance' to future emergencies. These activities may build on local pre-disaster patterns of seed production and distribution; they may be a progression from activities set up during the ESP phase; or they may be new seed activities that have not been undertaken in the local area before. We explore various specific options in Section 3.2.

Not all the real life cases of seed capacity-building activities documented in this Chapter were implemented after emergencies (some were set up in more stable situations), but we have decided to include them because they are all *relevant* examples of capacity-building activities that can be helpful after emergencies.

Building seed capacity following an emergency is different in a number of ways to setting up local seed projects in more stable situations:

- poverty is likely to more widespread and more acute than in areas which have not experienced emergencies. Having few resources, families cannot, therefore, be expected to take part in capacity-building activities which involve any significant risks as a result of being new or untested in the local area. In fact, in situations where families have been left virtually destitute, attempting to implement self-sustaining seed capacity-building may not be a realistic short-term objective. The immediate need may be to provide families with extra cushions against further disaster (by, for example, replenishing lost genetic resources);

- communities will have been through a period of great stress that may have had a fundamental effect on social relationships. In many societies, the sharing of seed within the community is an important form of social and cultural interaction between different families, social groups, etc.: it is far more than an economic exchange between buyer and seller. Therefore, some people believe that the social and cultural aspects of seed-sharing mean that seed capacity-building after an emergency has the potential to contribute to conflict resolution and social reconstruction if carried out appropriately (P. Richards, pers. comm.);

- the way that families are currently acquiring and exchanging seed may be more complicated and opportunistic than under more stable conditions: the emergency may have brought to an end previous patterns of seed production and distribution, although vestiges may remain; it may have forced families to use substitute sources of seed, which may be more remote or less good quality; and families may have come to rely on short-term ESP handouts. Seed capacity-building after an emergency therefore has to have a thorough appreciation of what kind of seed situation is being built upon;

- it is often dangerously simplistic to define an emergency situation as being

'over'. Whilst three broad phases (an acute phase, a settling-down period, and a period of rehabilitation) can be distinguished in many recent emergencies, it is very difficult to determine which of these phases an emergency is in at any given point in time. For seed capacity-building activities, this implies that the rehabilitation situation in which families find themselves is not necessarily stable: an armed conflict may flare up again at any time; drought may re-occur in subsequent seasons. Agencies involved in capacity-building should not, therefore, assume that seed capacity-building will be implemented in a stable situation; and

- communities' circumstances, and the potential for different types of seed capacity-building, will vary considerably depending on the nature of the disaster experience. Chapter 4 outlines three types of disaster scenario after which ESP and seed capacity-building can be appropriate: as is described in that Chapter, the most appropriate activity varies significantly between the different scenarios.

Once short-term ESP is over, the agencies involved – whether bilateral donors, Northern or local NGOs – often express a wish to continue with seed activities in the longer-term, either for philanthropic reasons or for pragmatic reasons (for example, they may need to spend local currency funds which they are unable to transfer out of the country). But getting involved in longer-term seed capacity-building after short-term ESP requires very careful consideration if it is to provide any real benefit to local communities. Activities must be chosen on the basis of what is needed (i.e. which component(s) of seed capacity is/are problematic), not on the basis of what an agency would like to become involved in for policy reasons. Some of the entry points outlined above, and discussed in more detail in Section 3.2, clearly require long-term commitment and the involvement of specialist seed or agricultural research agencies.

3.1 Pre-planning for seed capacity-building

Pre-planning for seed capacity-building should involve advance survey work in the proposed project area, to identify whether there is a seed capacity problem and, if so, its exact nature. Annex 3 lists the kinds of questions that such a survey should ask, so that agencies can make sensible decisions about whether and how to go about seed capacity-building. It is *not* sufficient to make these decisions primarily based on agencies' own policy agenda, without on-the-ground investigation.

There are a few general points concerning pre-planning investigations that are worth noting.

The state of the physical environment can give useful clues to whether seed capacity-building might be a useful post-emergency activity and, if so, what form it could best take. In most of the scenarios described in Chapter 4, the physical environment has a significant influence on the type of seed capacity-building that will be appropriate. Getting seed of new crops, or seed of improved, adapted varieties out to farmers can be an important means of improving farmer productivity and food security in areas experiencing environmental change.

Agencies should take account of the need to maintain genetic diversity in agriculture. This was touched on in Section 2.3 and applies as much to seed capacity-building as it does to ESP. Seeds are plant genetic resources, and as such what is organised in terms of seed capacity-building can have important implications for the genetic base of local agriculture. The maize and cassava genetic resources that were lost in the armed conflict in Mozambique are not unique to that country and can be replaced relatively easily. In contrast, replacing the endemic plant genetic resources of teff lost in the Ethiopian emergencies, and of Africa rice and digitaria lost in the Upper Guinea region following the conflicts in Liberia, Sierra Leone and Guinea-Bissau is a task requiring highly specialised technical expertise (for more on this, see Richards and Ruivenkamp, 1996).

communities' social context should also be taken into consideration when deciding whether and how to start seed capacity-building. Few farm households anywhere in the world work exclusively in farming. This means that in some communities, households may prefer to invest resources off-farm rather than in agricultural

production: help with seed capacity-building may not be a useful form of post-emergency assistance in this situation.

In contexts where seed capacity-building does appear to have a role, agencies should take care to identify which groups within the community have specific seed responsibilities or needs, so that these can be taken into account in project design. In many cultures, women have the primary responsibility for seed selection and care, not to mention for producing food for the family's own use. Poor or otherwise socially-disadvantaged groups, including certain types of female-headed households, can have specific seed needs, distinct from the rest of the community.

3.2 Choosing a capacity-building activity

This choice will depend on the nature of the seed capacity problem identified at the pre-planning stage: the crops and varieties for which seed is required; the quantity of seed needed; the desired quality; and which social groups need it. Various options are described in the following sections.

In many circumstances, agencies will want to develop a mixture of seed capacity-building activities, as local seed capacity problems will have a mixture of causes. In addition, a mix may be required in order to:

- reach a range of different types of farmers;
- encourage sustainability;
- produce seed for a range of different crops;
- produce seed for different agricultural seasons.

3.2.1 Increasing local seed availability

Local markets

Local markets can have a pivotal role in seed capacity-building, not just because seed is bought and sold there, but also because seed is often accessed *via* the

market for other resources. For example, farmers may access seed of a particular crop or variety by obtaining cash from selling surplus food. Alternatively, many poorer families in Eastern and Southern Africa rely on obtaining seed in return for providing labour to richer farmers.

Therefore, it is important to investigate how well local markets are functioning in total, and not only how well the market for seed is operating. For example, after the genocide and war in Rwanda in 1994, a major problem for families in the *Zone Turquoise* area was that they found themselves cut off from the farms in the Bugesera area which had, in pre-emergency days, provided them with cash and seed in return for labour (Pottier and Wilding, 1994).

As we saw in Section 2.4, local markets often start functioning again remarkably quickly once the emergency is over. They usually re-start under their own steam, and there are no seed-specific activities that outside agencies can use to speed up this process. The only intervention that is sometimes helpful – where conflict has been severe and/or prolonged – is to try to encourage a prompt return to physical security in the local area, so that farmers are willing to travel to use the markets.

Local markets can be a good channel for the diffusion of both local and new seed, because they provide links with many different areas; and they are a useful source of seed where local seed production is not possible for certain crops (for example, vegetable seed may need to come from other zones, if vegetables do not set seed locally because of climatic conditions). Using local markets to increase seed availability has no particular requirements in terms of community cohesion or special seed production skills, so trying to encourage traders back to an area to operate local markets can be a good first step post-emergency; as can supplying traders with seed of a new variety when trying to make it available to farmers quickly.

However, traders will expect to do business trade at prevailing market prices, so agencies may have to subsidise the cost of their own seed if they wish local markets to sell it, or to arrange credit. Otherwise traders may not carry agency seed, nor supply it to farmers who cannot pay the full price.

Local markets may not distinguish between grain and seed (depending on the crop and the region), so there may be genetic and/or physiological quality problems with the seed available through these channels.

Community structures

The available evidence suggests that farmers use community structures (farmer-to-farmer exchange between neighbours, relatives, patrons and clients, or members of community groups) more as a means of obtaining new varieties than for sourcing all their seed requirements. It is often only poorer people who rely on community structures for regular sourcing of a significant proportion of their total seed needs. They tend to use this channel because seed can be obtained through it by non-cash means: for example, patron-client relationships; in return for labouring for richer farmers; gifts from neighbours and relatives. Community structures tend to be more important in areas with few organised markets, and to become less important over time as market penetration increases.

The extent to which there is free access to seed through community structures by all social and ethnic groups varies from area to area, and access may not always be equitable. However, in Tendelti in Sudan in 1993/94, for example, CONCERN was able to use village committees successfully to implement a seed capacity-building project. Seed payback was organised through these structures, with accumulated funds then used to initiate development (CONCERN, n.d.). Box 3.1 describes how SOS Sahel has similarly had a positive experience with using community structures in North Wollo, Ethiopia.

Box 3.1

Choosing seed distribution channels in North Wollo, Ethiopia: SOS Sahel and Burial Societies

Conventionally, relief distributions in Ethiopia are managed through Peasant Associations (PAs) under the auspices of local authorities and the Ministry of Agriculture. The PA committee is responsible for producing lists of vulnerable families, and for transporting the relief food or seed to local distribution points. Increasingly, such distributions are conducted on a credit basis, to reduce aid dependency, and therefore the PA is often also responsible for ensuring repayment.

Discussions between SOS Sahel and farmers in North Wollo, however, revealed limitations in this distribution system for dealing with the chronic shortage of seed that exists there, particularly with regard to targeting, monitoring and follow-up on credit repayments. In general, PA committees were found to lack membership accountability and local legitimacy. Furthermore, under the PA system, repayment rates are extremely poor.

Therefore, in 1995, SOS Sahel's seed distribution programme sought to identify alternative local institutions, based on farmers' recommendations, and eventually focused on the *kire*. *Kire* is the term used in Wollo for a mutual insurance association through which members contribute to offset the responsibilities of burial costs, particularly those incurred feeding mourners at the ceremony.

The *kire* has a range of specific capacities appropriate for the functions required in distribution programmes. In rural North Wollo, it maintains a highly inclusive membership base: every household is able to join. The *kire* leadership is transparent and accountable: it is normally formed by a judge (*danya*) and a secretary, who are publicly elected and chosen because they are popular and respected community representatives.

In 1995, there were 114 *kires* in the five PAs in which SOS Sahel worked. Each *kire* was given standard criteria to help them select households most in need of seed and which could make the most productive use of the input. On the basis of collective wealth-ranking, they were asked to identify all those farmers who had their land ploughed and ready for sowing, but who had no seed, or no money available to buy seed.

Box 3.1 (continued)

Under the SOS Sahel programme, 100 tonnes of barley seed was distributed to 4,000 households. By March 1996, almost three-fifths of borrowers had repaid the seed credit, whereas none of the borrowers had done so in the PA-based 1995 seed distribution in the neighbouring area. Participants suggest that the sense of community ownership was a strong contributory factor to the success of the *kire*-based programme.

Source: Pratten and Shone, forthcoming

If a seed capacity-building activity is intended to reach large numbers of farmers then, purely for reasons of organisational manageability, it has to work with local community/farmer organisations. CARE's experience in Zambia provides an example of this. In 1994, CARE set up a seed capacity-building activity in the Livingstone area. In its first season, it managed to reach 330 farmers with seed, by supplying on an individual basis those who had expressed interest at community meetings. However, in the second season, villages were asked to form committees, and to get the committees to register all farmers who wished to participate. In this way, 180 committees were set up, with 6,800 farmers registered, without any expansion in the number of CARE staff involved beyond the original 3 people (M. Drinkwater, pers. comm.)

Seed banks

Setting up a seed bank is a first step often taken by agencies following on from short-term ESP. The basic principle of a seed bank is that a safe place is established in which to store seed, and households commit seed to it at harvest time, taking it out again in time for planting the following season.

There are many variants on how a seed bank is administered: in some cases, agencies donate the initial seed stock, whilst in other cases it is seed saved by local households that is put into the store; in some cases, the seed bank is operated by a village committee, whilst in others it is controlled by agency personnel; in some cases, seed of a single crop is stored there, and in others seeds of many crops and varieties are stored. Sometimes the local community contributes labour and materials to the construction of the store, in others an existing building is used, whilst in still others the agency builds the store to a technical specification

suitable for seed storage.

A number of manuals exist giving useful guidance on seed banking, including one produced by RAFI (RAFI, 1986). The Near East Foundation and CONCERN are two agencies which have worked with seed banks, in Mali and Sudan respectively.

Successful seed banking requires some technical knowledge of seed storage, and detailed agreement on what community rules are going to be, in order to avoid arguments about acceptable levels of contributions and withdrawals, etc.. It can be a useful activity where local seed stocks were destroyed by a one-off disaster. However, on its own seed banking contributes little to seed capacity-building if de-stocking is likely to happen on a recurrent basis (for example, in areas where the varieties traditionally grown are no longer well-adapted, due to declining rainfall, etc.). In this case, seed capacity-building activities that undertake adaptive research into crops, varieties, and production systems (see below) may be more appropriate.

If a seed bank is intended to fulfill a function as a local gene bank, conserving seed of local varieties that are under threat, then specialist knowledge is required to ensure that seed is selected properly in the field, rotated properly in store and grown out on a regular basis. There are a growing number of projects involving local gene banks: for example, Kew Gardens (UK) is working in this area under its Millennium Seed Bank programme; whilst in Eastern Zimbabwe five community-managed gene banks are being established by the Sorghum Landrace Study. In Uttar Pradesh, India, a local NGO called Save the Seeds Campaign is supporting local farmers who are banking 110 common bean varieties (L. Sperling, pers. comm.).

3.2.2 Technical support to local seed production and distribution

In some situations, an emergency exacerbates an existing chronic local seed shortage caused by technical problems with on-farm seed production or storage. In this case, simply injecting new seed stocks into the community – for example, via a seed bank – is not enough to strengthen local seed capacity and more technical inputs are needed.

The appropriate input will vary according to the nature of the problem. For example,

traditional local varieties may have deteriorated in quality over the years. In this case, a useful activity may be to clean and select from existing local varieties, in collaboration with farmers. Community structures (see above) can be a useful way of distributing this kind of material.

Alternatively, inadequate seed storage can be a major constraint to village-level seed security. In Nepal, the Rural Save Grain project was set up in the 1980s to sell metal seed bins to farmers at a 25 per cent subsidy to help with this problem (SEAN, 1991). In Zambia, CARE has been holding group discussions to raise awareness amongst farmers that poor storage can be a major cause of short supply for seed of certain varieties. By getting groups to recognise this and to agree better methods for storing seed for particular crops, farmers are encouraged to tackle their seed storage problems (M. Drinkwater, pers. comm.).

In other situations, the need may be for pest and disease identification and treatment in-field and in-store. Simply publicising official government seed storage or seed treatment recommendations may not be constructive, because the recommended technologies and inputs may be beyond the means of local farmers: a more imaginative approach may be required, such as adapting traditional local seed care methods. For example, in parts of Latin America, CIAT found that simple modifications to the local threshing technique for beans significantly increased the amount of usable seed obtained (Voyest in CIAT, 1982).

Winrock's On-Farm Seed Supply Project has produced a useful guide to technical aspects of seed production (Henderson, 1988) and a workshop convened by CIAT also addressed these issues (CIAT, 1982). Agencies that have provided technical support to local seed production include Crocevia in Mozambique and Burkina Faso, and Action Aid in Malawi, Nepal and The Gambia.

3.2.3 Adaptive research into crops, varieties, or production systems

Capacity-building in the form of adaptive research may be appropriate and necessary in areas where seed shortage is caused by problems with the varieties currently available.

The environment for farming may have changed – rainfall may have declined, soil quality may be deteriorating – meaning that the varieties traditionally grown in an area are no

longer well-adapted to the local situation. In this case, identifying well-adapted short-season or low-input varieties from outside the area may be very helpful. This activity should involve full farmer participation. The material may be improved varieties from the formal agricultural research system, or it may be local material from other areas. For example, following widespread drought in The Gambia in the 1980s, SCF introduced a variety of rice, *Peking*, from outside the area to villages in North Bank Division. This variety has a shorter growing season and needs less rain than existing varieties, so it is well-adapted to the changing growing conditions in the area and has almost completely replaced the previous long-season local varieties (Wiggins, 1992).

In some farming systems, the need is not to bring in new material from outside the area, but to *re-introduce* traditional varieties that have been abandoned, perhaps due to loss of seed stocks during the emergency, or over-promotion of modern varieties by government extension agents. This strategy was pursued successfully by Crocevia in Mozambique in the late 1980s, when the agency collected, tested and multiplied a range of local crop varieties that were in short supply as a result of the civil war (Gaifami, 1991).

Adaptive research can lead to positive changes of a long-term nature. However, it needs a high level of technical skill, it may challenge official government policy and, where changes are decided upon, it requires high levels of extension input. Therefore, it should only be undertaken if agencies have their own qualified agronomists and good working relationships with national agricultural research institutions. Where new crops or varieties are introduced, this should initially be done on a small-scale only.

CIAT has done much pioneering adaptive research work in the Great Lakes region of East Africa (see, for example, CIAT, 1992). Other agencies that have been involved in capacity-building through adaptive research include Crocevia in Mozambique and Burkina Faso, and a number of NGOs in The Philippines (often under the umbrella farmers' organisation MASIPAG).

3.2.4 Increasing local seed production and distribution capacity

Local seed production and distribution capacity can be strengthened in a number of ways, ranging from not-for-profit farmer groups to fully commercial small- and medium-scale

seed enterprises.

Not-for-profit farmer groups

This type of group – which involves farmers coming together to produce seed for their own use, without any profit motive – is appropriate when the goal is simply improving local seed availability; when the community has experience of working together (see Box 3.2); and where farmers have sufficient land and labour to invest in seed production, and knowledge of how to do it. CESA – the Ecuadorean Centre for Agricultural Services – supported groups of this type for potato seed production in the early 1990s and found it was an effective means of making better-performing material available to local farmers at minimal cost (CESA, 1991).

It is important to be aware that farmer groups set up by agencies – whether not-for-profit or commercial – can end up being dominated by community elites. However, on the positive side, agencies sometimes find that the effort put into supporting farmer groups for seed production benefits other aspects of community development. The groups become fora for the community to articulate wider development problems, or channels for accessing other innovations.

Box 3.2

Basic Requirements for Successful Community Seed Groups

A report on the decentralisation of renewable natural resource management in the Sahel provides a synthesis of the basic requirements for successful community resource management and this is highly relevant to seed capacity-building activities that rely on community groups. The report suggests that communities need to be able to:

- undertake collective action;
- facilitate private sector activities;
- coordinate initiatives for the local management and governance of resources;
- solve conflicts.

Then they will be able to create and sustain institutions for the local management and control of activities that can mobilise and manage labour, equipment and funds – and that are willing and able to work with external agencies.

Source: ARD, 1991

Contract seed multiplication

For contract seed multiplication, an agency can itself be the contracting body, or it can organise contracts on behalf of national seed companies.

Contract seed multiplication can be good if local farmers are short of cash, because most contract schemes advance farmers the inputs that they need (seed, fertiliser); and advice, inspections and transport are usually provided by the contracting body. However, it will tend to be the better-resourced farmers who are more suitable as contractors (see Box 3.3). The advantage of contract multiplication for an agency is that it allows it to keep control of the process, which can be useful if either seed production or the particular crop is new to the local area. Contract multiplication can be good in areas where there is little community cohesiveness, as it has no requirement for cohesiveness in order to operate successfully (unlike, for example, not-for-profit groups).

Box 3.3

Selection of farmer seed growers: the experience of CAPSA in Zaire

In Luhoto, a region far removed from government services, the CAPSA development project worked to provide farmers with improved seed of potatoes, beans, peas, soyabeans, maize, wheat, rice and a range of garden crops. To cover its vast area of some 26,000km², in 1989/90 CAPSA opted to train and contract farmer multipliers (who were to produce quality-controlled 'CAPSA' seed), as an alternative to relying on government seed sources.

Both smaller and larger farmers were trained. According to CAPSA management, the advantages of working with small farmers were: they could use family labour; they did not need credit to be able to use project services; and they received needed additional income. The disadvantages were that their large numbers meant increased training needs; and it was difficult to treat and condition the seed in centralised locations. Larger farmers (defined as having at least 10 ha) were easier to train, and production could be grouped efficiently. Also, larger farmers took over more of the project management responsibility. The disadvantages were that these farmers needed to pay labour and therefore needed credit.

In the first year alone, 1,300 small farmers and 70 larger-scale farmers were contracted. However, CAPSA ended when the donor support ended in 1993.

Source: Ngerero, 1992

Arranging contracts on behalf of national seed companies tends to be feasible where farmers are already confident in seed production and are ready to move on to a more commercial footing, but lack links with the relevant external agencies (quality control, etc.). This has been carried out successfully in Zimbabwe, for example, by ENDA for the national Seed Co-op and in Nepal by Action Aid, for the national Agricultural Inputs Corporation (Action Aid-Nepal, 1991).

The main disadvantage of contract production is that the seed produced by the contract farmers may be taken out of the local area by the contracting seed company, unless the agency stipulates that it must not. So this kind of activity is perhaps more useful for income-generation than for increasing local access to seed. The knowledge of seed production technology acquired by contract farmers may, however, have a positive knock-on effect on the quality of locally-used seed.

Local seed enterprise development

Seed enterprises for commercial purposes can be set up on either an individual or a farmer group basis.

Seed enterprises are good for income generating if local demand for seed is high (for example, where there is demand for new varieties or where seed is difficult to store), and if seed production costs are low enough (i.e. there is no heavy pesticide requirement, nor special seed drying equipment needed). Agencies often contribute loans for buying equipment and/or inputs to such enterprises, and may help with transport and training; but farmers need to be quite well-resourced in order to cover the necessary investments in land and labour, and to be relatively well-organised. Seed will tend to stay in the local area as long as there is local demand, because producers would rather sell locally than pay for transport.

For most crops and seed production systems, farmers need to have a minimum level of resources to operate successfully as commercial seed growers (see Box 3.4). Therefore, there is a trade-off between equity (the whole community becoming involved in seed production and distribution) and efficiency of production. This is a common dilemma faced by agencies supporting local level seed enterprises.

Box 3.4 (continued)

Box 3.4

Criteria for identifying farmer seed growers

There is a set of characteristics of the ideal farmer seed grower which appears to be universally accepted for organised seed production and distribution. Growers need to:

- be well educated, so that they are able to understand and follow the technical instructions given;
- be commercialised, so that they can afford to buy the inputs necessary for seed production (unless a credit scheme operates);
- have good quality land, so that they obtain the yields necessary to justify the extra inputs used in seed production; and
- have large holdings so that they can allocate land to seed production without jeopardising domestic food production;
- have some kind of leadership role in the local community, to provide an exemplary role to other farmers;
- be well integrated into existing extension services, so that they get the advice necessary to grow seed well;

Source: Penchant in CIAT, 1982; PAC, 1986; Berg et al, 1991

It is also important to consider the gender implications of local seed enterprise development: the criteria in Box 3.4 will predispose agencies in most farming systems to select men rather than women farmers, even though women may have an important traditional role as seed-keepers. For example, in Malawi the majority of farmers taking part in the 1980s Smallholder Seed Multiplication Scheme were men, even though traditionally it is women who store and select most kinds of seeds (Cromwell and Zambezi, 1993). In Nepal, although women play a major role on-farm, they made up only 25 per cent of the participants in USAID's Private Producer-Seller scheme, because they are unwilling to take part in off-farm activities such as training, due to cultural norms (Rajbhandary *et al*, 1987).

Local seed enterprises operated on a group basis can be good for seed capacity-building where the community is already used to functioning as a group or in groups, and has the formal skills necessary to keep records (there is a higher requirement for record-keeping in group enterprises than in individual ones, because records are needed of what inputs each member uses and how much seed each person puts into store). Such group enterprises can also be good for income generation because they allow sharing of overhead costs.

There is still much debate about whether seed production and distribution – whether as a commercial enterprise or as a not-for-profit activity – is best carried out by individuals or on a group basis. Some development workers insist that production has to be carried out by individuals (Bal and Douglas, 1992), but CESA's successful self-help project in Ecuador is based around production on group plots (CESA, 1991). In The Gambia, the Freedom From

Hunger Campaign switched seed production and distribution from a group to an individual basis when the agency saw that the group seed plots were being neglected in favour of farmers' own fields, but they subsequently switched back again because under the individual system farmers kept the multiplied seed and did not distribute it sufficiently (Wiggins, 1992). The answer regarding individual or group production probably depends on what seed production systems have traditionally been used by the community.

Poorly resourced or uneducated farmers may not be allowed to participate in group production, because of the risk they represent to the rest of the group. However, there are exceptions to this. For example, the Deccan Development Society successfully stimulates local seed production and distribution in Andhra Pradesh by targeting voluntary associations (*sanghams*) of poor, low-caste women (seed production is often done by women in this area). This has not only improved local seed security, but also provided these women with access to seed and income from seed production (Satheesh, 1996).

Seed farms

Agencies sometimes want to take a direct and active part in local seed production, for a variety of reasons.

This may because local farmers have not produced seed before of the particular crop or variety being introduced; or because logistics mean it would be difficult to collect seed from scattered growers producing seed on a sub-contract basis. In other cases, agencies may feel that seed production involving farmers would not be financially viable (perhaps because distances are too great, or there is a heavy need for pesticides or special equipment). In still other cases, seed production may be a speculative activity, in which case it may be too risky for farmers to participate in (remember that farmers in post-emergency situations are likely to be considerably poorer and less able to take risks than they were prior to the emergency).

In any of these situations, setting up and running a seed farm under direct agency control may be an appropriate interim activity for an agency. However, it may do little to increase local seed capacity sustainably in the longer-term, and wherever possible it will be appropriate to plan to move on to seed activities that involve farmers more directly (examples of which were given elsewhere in this Section).

3.3 Organisational issues

3.3.1 Within the agency

One of the most important requirements for successful seed capacity-building is for agencies to have an accurate perception of what their institutional role should be over time. There has to be a flexible and evolutionary approach to project development that takes account of changes in farmers' needs and potential.

Sometimes it may be unrealistic to try to introduce new ways of organising seed activities (for example, a small-scale seed enterprise where none has existed before) and new technologies (for example, seed production for crops or varieties which need new management skills) at the same time. In other cases, farmers may be unwilling to try new organisational structures unless the 'incentive' of access to a new technology (for example, seed of a new variety, new seed conditioning techniques, etc.) is offered at the same time.

3.3.2 Within the community

Whatever capacity-building activity is chosen, a significant amount of time needs to be spent sensitising communities to the idea of seed capacity-building and preparing them for implementation of the chosen activity.

The inadequate amount of time devoted to the careful selection of committees is one of the most commonly cited criticisms of NGO seed capacity-building projects. Particular care needs to be taken over such selection, because any feeling that committees are imposed will make it difficult for them to operate effectively.

3.3.3 Liaison with government bodies and other agencies

Generally, agencies involved in seed capacity-building form their main links with government bodies, but they also work with private traders and with other NGOs. Forming effective linkages with these institutions is important so that agencies do not duplicate other agencies' efforts and add unnecessarily to their own costs. Developing a good

relationship with breeders and seed experts is especially important.

The need to act with speed and in often stressful environments means that there are sometimes problems with co-ordinating different agencies' seed activities for ESP; but networking between NGOs on seed capacity-building has often proved successful. For example, OFSP (the project for networking and technical support to NGOs that has been active in seeds in The Gambia and Senegal), was commended during its lifespan by both NGOs and government bodies for producing much greater coordination between the seed capacity-building activities of different agencies in these two countries.

Agencies should try to operate within the national seed sector policy framework from the earliest stages of planning and to perceive their role as supporting existing government institutions. However, in some situations it may be necessary for agencies to see their role as an alternative to formal sector seed activities or as a substitute because there is no operational government service in the area (see Box 3.3) or because the official seed regulatory requirements are so stringent that emerging formal sector seed activities are smothered.

3.4 Costs and benefits

For some types of seed capacity-building activities – such as working with local varieties, or adaptive research – it is hard to measure the costs and benefits. Therefore in this section we discuss, as an example, the situation likely to face one type of activity where the costs and benefits are more measurable, namely, organised seed production and distribution by contract growers or emerging seed enterprises.

3.4.1 Costs

Box 3.5 shows how the cost of seed produced by contract growers or seed enterprises is made up. Organised seed production is more expensive than producing grain, regardless of the production system used. At the very least, extra labour is required for removing plants from the field that have not grown true to type (known as 'roguing'), and for sorting usable seed from rejected material after harvest. Scaling-up seed production does not necessarily

reduce unit costs: there are only small economies of scale in seed growing. There may, however, be economies of scale in seed processing and storage: it is therefore desirable to produce seed within limited distance of centralised processing and storage facilities.

Agencies vary considerably in what items they treat as costs attributable to seed activities; most agencies absorb some costs. In many cases, agencies are carrying out other programmes within the community as well, so it is difficult to distinguish what proportion of the costs of – for example – transport, holding community meetings, salaries for community development workers, etc., should be attributed to seeds activities compared to agencies' other activities.

Box 3.5

Tracing the build-up of costs in seed production

Seed multiplication

Cost of basic/foundation seed
Crop husbandry costs:
- labour
- variable inputs (fertilisers, pesticides, etc.)
- supervisory management
- depreciation (on machinery and equipment)
- land rent

Processing and storage

Transport to processing plant/store
Processing costs:
- labour
- variable inputs (fuel, packaging, treatment chemicals, etc.)
- depreciation on buildings and equipment
- cleaning losses, wastage, etc.

Storage costs:
- labour
- variable inputs (fumigants, etc.)
- depreciation on buildings and equipment
- humidity and temperature control
- interest payments or working capital

Distribution and marketing

Transport from store to wholesale and retail distribution points
Marketing costs:
- variable costs (documentation, etc.)
- promotional activities (advertising, demonstration plots)
- maintenance of distribution points
- allowance for unsold seed, wastage

3.4.2 Benefits

Few agencies carry out detailed surveys to assess just how valuable their seed capacity-building activities are for communities recovering after emergencies. However, general experience suggests there are various conditions under which benefits will be small and so

seed capacity-building activities may not be worthwhile:

- if households are not very interested in improving on-farm productivity – for example, because the opportunities for earning income off-farm are better (in this situation, the agency should probably not be involved in agricultural aid at all);
- if the seed provided is not suitable for the local environment;
- if the seed is poor quality, either genetically or physiologically; or
- if farmers are able to multiply and save their own seed satisfactorily.

Seed capacity-building may bring benefits if activities are targeted towards specifically overcoming the underlying constraints (such as lack of suitable varieties, inadequate storage facilities, etc.), but if activities simply take the form of seed production and distribution – without dealing with the underlying constraints – then benefits may be negligible.

3.5 Charging for seed

3.5.1 Decision criteria

Before embarking on any seed production and distribution activity, agencies should work through the following questions in order to establish that they have a product for which farmers will be willing to pay:

- will better access to seed be useful to farmers in their current farming system and socio-economic system?;
- is the type of seed to be made available (whether it is a local variety, or new genetic material) the right one for the local farming system?;
- does the planned seed production system minimise the cost of the seed produced? Agencies are often under the impression that the seed production and distribution system they adopt should be a mini replica of a large-scale national seed project (for example, transporting foundation seed from distant government seed farms, installing complicated seed processing equipment that requires expensive imported parts and chemicals) – this is not necessarily the case; and
- has every effort been made to ensure that demand for the seed produced is as strong as possible? This may involve on-farm demonstrations and extension work, as well

as ensuring that seed is readily available (for example, in local co-operatives, markets, and rural stores).

By dealing with these questions at the outset, it may well be possible to set up a seed capacity-building activity that can be financially self-sustaining. But there are some situations in which it may be necessary to subsidise the price of seed, for example:

- where farmers are very poor;
- where project start-up costs have been very high;
- where the margin between prevailing local prices of grain and seed is very small;
- where other agencies are continuing to provide free seed under ESP programmes, even though the emergency has ended; or
- where the agency is trying to promote the use of local varieties but is facing competition from subsidised modern varieties distributed by government agencies or other donors.

In a survey of 18 local seed activities carried out in 1992 (Cromwell *et al*, 1993), typical costs for seed produced by contract growers or seed enterprises were found to range from 20 per cent more than the price charged to 10 times more, typically being about 3.5 times more. The most common system was for seed prices charged to be around local market prices for seed, with some agencies adding on handling and wastage charges.

Seed activities which are externally funded, i.e. independent of local revenues, can often sustain this cost and pricing structure in the short-run but it can cause problems for long-run sustainability (see Section 3.7). Thus, if it is known at the outset that agency support will have to be withdrawn within a relatively short time, it may be more appropriate to support other kinds of seed capacity-building activity instead, rather than seed enterprise development.

3.5.2 Charging methods

Cash-based

Many agencies assume that seed will be sold for cash. This has potentially negative implications for the social impact of the seed capacity-building activity, because a significant

minority of most farming communities do not have the resources to pay cash (they can only buy seed by selling their labour or bartering another commodity). Supporting local level seed production would therefore appear to achieve little in terms of broadening social access to seed unless it includes non-cash methods of seed distribution.

In-kind loans

A number of agencies distribute seed on the basis that it will be repaid in-kind after harvest. For example, as was described in Box 3.1, in Wollo, Ethiopia, SOS Sahel has worked through community-based burial societies to spur the development of Seed Credit Committees. In this case, rules have been set whereby seed loaned is paid back, in kind, at an interest rate of 20 per cent. After the first season, almost 60 per cent of the beneficiaries had repaid the credit, with the Committees considering punitive measures only against defaulters whose harvest were good (Pratten and Shone, 1996). This raises the point that repayment in-kind does leave projects very much at the mercy of the harvest.

Alternatively, in Rwanda, four seasons after the 1994 genocide and war, CARE asked project beneficiaries to return three times as much seed for each bean seed loan taken out (note that the climbing bean seed that was loaned has a multiplication rate of at least 10). This repayment could be made over two seasons, with the seed collected turned over to the Ministry of Agriculture for redistribution to returning refugees (CARE, 1996).

When agencies decide to ask farmers to pay for seed loans in-kind after harvest, the rate of repayment should be related to the multiplication rate of seed. In addition, care should be taken that the collection system does not become so expensive that it exceeds the value of the seed being collected. If so, an alternative activity for maintaining seed supplies should be considered. Furthermore, seed that has been collected from farmers in this way cannot go through all the same quality control checks as other seed that is to be distributed, but minimally should be tested for germination (quality control issues were discussed in more detail in Section 2.5). Finally, it is important to ensure that there is sufficient organisational capacity within the agency or village committee to recover the loans. If not, building local seed capacity will be undermined by lack of repayment and the initiative is likely to be a failure.

3.6 Monitoring and evaluation

Agencies must have a good grasp of what their programmes are achieving, so routine record-keeping and monitoring must be in place, and arrangements also need to be made for periodic evaluations.

Monitoring should not simply count the number of hectares under seed multiplication and the quantity of seed harvested. Questions about the quality of seed and its impact on local farming systems, and about its use and distribution, should also be asked. Annex 4 gives examples. Participation of the seed beneficiaries in monitoring is essential.

3.7 Deciding when to withdraw external support

Whether or not agencies can withdraw outside support, leaving seed activities entirely in community control, depends on a number of factors:

- the operating cost of the system: high cost systems may not be sustainable without outside support. Elements to avoid include paying large premiums to contract seed growers (which community elites who seek to control seed production may press for); engaging in high cost seed processing activities, such as packaging, which are unlikely to be necessary in local-level seed activities; and transporting seed over long distances – this adds dramatically to the total cost and leads to dependence on access to vehicles, fuel and spare parts;
- the extent of training: just because local groups can assume responsibilities for running schools or maintaining local roads, does not necessarily mean that they can also take charge of seed capacity-building activities. There is a significant difference in the range of technical and organisational skills required;
- the strength of external links (supplies of foundation seed and government extension and seed certification services): links should be strong enough that communities will be able to maintain these themselves after the agency has withdrawn;
- the state of recent harvests: continued harvest failures threaten the sustainability of all kinds of seed capacity-building activities, from seed banks to organised seed

production and distribution.

The seed capacity-building activities which make genuine progress towards sustainability seem to have a common profile: community control or a strongly collaborative approach from the start; seed quality standards adapted to fit community needs and capacity; and a low external input requirement.

It is important to remember that in seed activities, agencies often have to act as substitutes: for government or the private sector, or for local community structures that are unable to operate effectively. Because of this, agencies cannot simply withdraw from the community at the end of the project life unless another institution has accepted the capacity to take over their role, or community capacity has developed to a sufficient degree. Long-term support is also likely to be needed in highly marginal and variable environments.

3.8 The role of government

Government policies can have a critical influence on the success of agencies' efforts to building seed capacity following emergencies. We conclude this Chapter by outlining some of the most important ways that governments can help or hinder seed capacity-building work.

3.8.1 Plant breeding

The goal of seed capacity-building should be to make farmer-acceptable varieties available, whether so-called 'modern' varieties, or adaptations of local material. Indeed, in some contexts, it is possible that the emergency was exacerbated by farmers not having a wide range of material with which to make the farming system more sustainable and productive. A series of breeding approaches can increase the possibility that farmers receive acceptable materials.

Farmers themselves might become more involved in the formal breeding sector: they might help set breeding priorities; cross or screen germplasm in the pre-adaptive testing stages; and even take charge of adaptive testing. In this way, farmers are involved in the formative

stages of variety development and receive access to varietal materials before they are completely 'finished'. An alternate and complementary approach suggests that formal breeders might also give support to farmers' own breeding and seed supply systems. This may involve such activities as: giving farmers access to a greater range of local and exotic germplasm, or introducing farmers to specialised breeding techniques.

In both instances, whether working within formal or farmer-breeding systems, it is clear that farmers have the edge in selecting for site-specificity and in being able to manage heterogenity in any single site (Berg, 1996; Sperling and Ashby, 1996).

3.8.2 Seed legislation

There is much debate about the high national seed quality requirements set by many governments. Whilst some people believe they are essential, other maintain that they are often not relevant to small farmer seed users and could be relaxed, so that local seed enterprises could officially trade as 'seed' the material that they produce. This would enable such enterprises to increase sales and to charge realistic prices, as well as to reduce production costs (see Tripp, forthcoming).

There is a growing international pressure, in agreements such as GATT, for stronger intellectual property protection for new varietal material. This means that countries are being encouraged to allow patents to be taken out by breeders of new varieties, or to recognise Plant Breeders Rights. Other international organisations have responded by promoting the recognition of Farmers Rights. The extent of the likely impact on seed capacity-building activities depends on the extent that countries enact the necessary legislation and then enforce it. However, if implemented, this legislation, by requiring agencies to pay royalties in order to get access to seed of certain varieties, has the potential to increase costs and to limit options for participatory plant breeding.

3.8.3 Institutional linkages

So far, governments have tended to share only discrete tasks of implementation with others, but a range of seed actors (NGOs, farmers organisations, seed companies) could contribute to policy-making and other broader forms of innovation.

For example, governments could include representation by these actors in national seed sector planning and policies. This is working successfully in Angola, where World Vision, CONCERN, SCF and CARE are collaborating with the Ministry of Agriculture and the national agricultural research programme to develop better seed systems under the world Vision/ICRISAT/USAID-sponsored *Seeds of Freedom* programme (J. DeVries, pers. comm.).

3.8.4 Seed pricing

Governments need to ensure as far as possible that official seed prices fully reflect seed production costs. Subsidy and credit programmes, if they operate, should be sufficiently geographically targeted that they do not promote less appropriate varietal options over more appropriate ones in some areas, nor unfairly compete with emerging local level seed enterprises.

3.9 Lessons learned

1. **The choice of crops and varieties on which to build local seed production and distribution capacity requires very careful thought**

   Farmers may want access to seed of a new crop, to seed of new varieties of a crop that they already grow, or to fresh seed of varieties already in use – or a mixture of all of these. The most appropriate combination may vary both between communities and within them.

2. **Agencies seeking to build local seed capacity must pay careful attention to seed quality issues**

   Agencies cannot ignore seed quality issues. This does not necessarily mean trying to attain national seed quality standards, though, and alternative safeguards for purity, germination, etc. may be sufficient. Assistance with pest and disease identification and with simple improved storage techniques and technologies are often among the main requirements.

3. For seed capacity-building activities to be sustainable, they require thorough pre-planning and a long-term commitment by the agencies supporting them

The most appropriate organisation of seed capacity-building in terms of ensuring long-run sustainability of seed activities can only be established from a thorough and participatory initial needs identification.

Quickly setting up new seed multiplication and distribution systems in the project area, and working with a randomly selected portfolio of varieties, can have serious negative implications for the long-run sustainability of seed capacity-building activity.

For many initiatives, especially those that are designed to empower local communities to interact with external institutions, agency support may be needed for a relatively long period.

4. Good linkages to external organisations, such as government extension and quality control agencies, are likely to be needed by many seed capacity-building activities

It is possible to minimise the need for linkages with external seed sector institutions by using low input seed production and distribution systems, but they will still be needed to some extent and they have a major influence on the long-run sustainability of seed capacity. It is important to provide support for strengthening such linkages.

4. Typical Scenarios

This Chapter describes how differences in the characteristics of a disaster affect the organisation of ESP and influence the design of longer-term seed capacity-building. Three major scenarios that are likely to affect the design and management of ESP and seed capacity-building programmes are discussed: *armed conflict*, where farming populations are affected by the results of past or on-going civil disruption; *natural disaster*, where farming populations have experienced a drought, flood or other climatic disturbance, or have been affected by an earthquake or volcanic eruption; and *resettlement*, where populations have moved to new areas because of conflict or natural disaster, or a combination of the two, either of their own accord or as part of an organised programme of resettlement.

4.1 Armed conflict

4.1.1 ESP after armed conflict

In terms of ESP, much depends on the duration and intensity of the conflict. For example, as a result of the chronic conflict in Liberia in the early 1990s, farmers missed sowing for almost five seasons; whereas in Rwanda in 1994, those farmers who survived the genocide and war missed at most one or two seasons. The greater the damage of war, to both the physical and social fabric, the harder the rebuilding strategies, both seed-related and other. Clearly, it can be extremely difficult to make an accurate assessment of seed need in situations where conflict has been extremely intense, or is continuing in chronic form.

Certain elements of local seed systems may remain constant through the conflicts. Sometimes populations remain in their home areas throughout the conflict, so in this situation farmers will be facing a familiar farming system. The types of seed used and the management of that seed will, more or less, have remained constant. The environmental agro-ecology is usually basically unaltered.

However, several aspects of conflict can change the heart of seed technology itself.

First, non-functioning of support services may compromise farmers' ability to sow a crop. This is certainly the case with potatoes in post-war Rwanda, where former high use of inputs and current absence of supplies mean that farmers have now cut production by half (Sperling, 1996b). Reduced labour supplies (due to death, breakdown of former labour-sharing arrangements, or displacement of people) may also encourage farmers to veer towards low-management agriculture.

Second, the destruction of physical infrastructure can have dramatic agricultural consequences: the deterioration of water control structures as a result of the conflict in Guinea-Bissau (1962-75) caused extensive salinisation, which could only be reversed through intensive labour input over several rainy seasons (Richards and Ruivenkamp, 1996). More radically, the presence of landmines may mean that farmers cannot venture into their fields at all. The scale of mining in certain recent conflicts is huge: in Angola, for example, it is estimated that there are currently 10 million active landmines – the rough equivalent of one for every person in the country (C. Eldridge, pers. comm.).

Armed conflict poses significant challenges for ESP in terms of coordination and logistics. In most scenarios, bureaucracies will have changed dramatically, if they exist at all. Aid agencies may have to define affected areas, divide up action zones among themselves and sketch protocols for moving seed in and out. Damaged roads, transport systems, and seed storage facilities will also require creative, *ad hoc*, solutions to ensure that rural populations can be reached. While seed parastatals will almost certainly have ceased operating, the evidence concerning the continued functioning of informal or farmer seed channels is mixed. In Rwanda, bean seed channels continued, but farmers primarily relied on local markets, as exchanges among kin and friends were scarce even before the war (Sperling and Loevinsohn, 1993). In Sierra Leone, where 55% of rice seed is usually acquired through informal channels (exchange, loans and gifts) (Richards and Ruivenkamp, 1996), the rebellion of 1991 virtually destroyed the social fabric which allowed such channels to function.

Targeting populations and calculating seed needs is as difficult in a conflict scenario as in any ESP intervention, for several reasons. First, populations within

the same region may be affected by war very differently: combat zones change over short distances and seed needs may do likewise. Second, populations may remain justifiably cautious with outsiders – and neighbours. Community meetings can be tense and divisive. Identifying vulnerable households, which involves making household lists, will be highly political.

There are two fundamental caveats concerning ESP after armed conflict. First, if farming could be dangerous, due the presence of land mines or booby traps and ambush, invest heavy resources in removing such obstacles before giving seed, or do not give seed at all. Similarly, if insecure or frightened populations are still on the move or reluctant to cultivate, provide them with something other than seed until they are sufficiently settled to harvest what they sow. Social and cultural disruption, marked in parts of contemporary Zimbabwe, Rwanda, and Liberia, suggests that it may take several seasons or even years until some farmers want to set down roots again. As noted for Liberia: 'war is fought in people's heads as much (if not more) than on the ground' (Richards and Ruivenkamp, 1996).

4.1.2 Seed capacity-building after armed conflict

The lack of a functioning government bureaucracy and of agricultural research and extension institutions means that seed capacity-building after armed conflict is likely to need to focus on activities that can be carried out self-sufficiently at the local level. For example, multiplication of material that can be managed easily on-farm by local farmers, rather than multiplication of technically complex material such as hybrids, or reliance on large quantities of external inputs in the seed production and processing process. Farmers may have to take charge of organising various services for which in other circumstances government institutions would take responsibility: seed quality control, extension advice, or arranging contracts with local merchants. Therefore, an agency seeking to build seed capacity in this context may need to invest in training farmers in business organisation and management. However, this needs to be done with great sensitivity to the attitude of local government officials, as they may feel their role is being usurped by outside agencies.

The damage to communications, roads, vehicles, market facilities and much other infrastructure is another reason why seed capacity-building after armed conflict needs to

aim for self-sufficiency. Alternatively, some agencies may feel that an appropriate activity for helping to build seed capacity in this context is to invest in the rehabilitation or reconstruction of some of the destroyed infrastructure, rather than directly in seed activities *per se*.

The physical harm done to local farming families during armed conflict, resulting in shortage of effective labour on-farm, may mean that changes to the traditional farming system are required, to bring in labour-saving techniques or technologies. The psychological harm done to families can also have a potent effect, meaning that agencies may need to invest not only in 'practical' seed-related items but also in social development healing processes, in order to help families back into working their land and travelling to markets, etc.. On the other hand, because seed acquisition and distribution are a central part of rural social life, not merely commercial transactions, some people believe (see Richards and Ruivenkamp, 1996) that seed capacity-building can help to build communities' capacity to parley peace and reconstruction.

The likely destruction of farmers' capital (cattle, draught oxen, tools, granaries, etc.) means that families will tend to be even poorer after armed conflict than after other types of emergencies. Agencies will need to take account of this in their seed capacity-building activities in various ways: for example, they could re-stock farmers with the necessary capital items, in addition to organising conventional seed capacity-building activities; or they could organise seed capacity-building activities that help farmers to modify traditional farming systems to take account of the new resource situation (for example, by researching or developing zero-tillage systems if draught animals have been lost). It is particularly important after armed conflict that there should be *minimal risk* associated with whatever seed capacity-building activities are chosen.

The underlying agro-ecology will probably not have been significantly affected by the armed conflict, so seed capacity-building activities will probably tend to focus on existing crop and variety portfolios, but it is important to remember that stocks of seed for these crops and varieties may have been completely wiped out. Thus large-scale re-stocking can be an early priority for seed capacity-building after armed conflict.

In conclusion, this section suggests that appropriate activities for seed capacity-building

after armed conflict may in many situations be investment not in seeds *per se*, but in resources and training that help to re-build the local economic and social fabric.

4.2 Natural disaster

4.2.1 ESP after natural disaster

There are elements of relative ease in working on ESP after a natural disaster. Government bureaucracies and physical infrastructure retain their pre-disaster levels of functioning: countries such as Bangladesh, Ethiopia and Kenya have even set up special departments to deal with such emergencies. And while local communities may be stressed, they retain a certain degree of coherence, at least in comparison with war-torn or resettled sites. Coordination and logistics present few exceptional challenges: that is, the chaos of a normal emergency situation stands as the status quo. Targeting tends to be the convention, taking the form of blanket distributions in zones defined as agro-ecologically vulnerable. While populations may move during a drought period, mostly in search of food, neighbours generally know each other; so construction of community lists and identification of the most vulnerable is as easy or hard as under 'normal' situations.

The main challenges for ESP after natural disaster centre on the seed technology itself. Pre-disaster practices may not be sustainable in the long-term, without other complements. Drought, for example, tends to be a recurrent phenomenon, therefore ESP has to think about strengthening the resilience of systems, not just replacing what was there before. For example, in the 1984 drought that affected much of central and northern Kenya, UNICEF focused on distributing the drought-tolerant maize variety, *Katumani*. In the Sudan droughts of the early 1990s, CONCERN distributed a mixture of three millet varieties and some sesame and cowpea seed; all were selected for drought-tolerance as well as performance on specific soils. Note that CONCERN place emphasis on having a mix of varieties as they feel it imparts risk minimisation qualities to the final seed package (CONCERN, 1992). In Bangladesh, an FAO-elaborated 'Drought Code' which aimed at improving government response (Brammer, 1980), suggested including not only drought-

tolerant crops (such as sorghum, famine millet and sesame) but also 'famine-reserve' crops such as arum (cocoyam) and cassava. Nonetheless, in ESP, the range of what is given as seed aid should be relatively narrow (see Section 2.3).

In the case of ESP after drought, compared to other scenarios, it important to remember that having advance strategies can help to positively shape the ensuing ESP intervention. Drought onsets can partly be anticipated, and droughts tend to occur in the same regions again and again. As an example of a pro-active strategy, the government of Kenya in 1985 correctly perceived that a serious shortage of maize seed was likely and used irrigated land on the Bura rice irrigation scheme to produce some 720 mt of maize seed in time for use in the 1985 long rains (Borton, 1989).

There are a few special features of ESP specifically related to drought scenarios. Giving aid early, particularly food aid, may help to preserve scarce adapted seed stocks, before the disaster reaches its head. Prevention and preparedness, however, are more important in drought-prone areas. There is a need to strengthen not only the seed sector, but also the resilience of the agricultural system as a whole, as well as expanding opportunities for non-agricultural activity. These are better dealt with as part of longer-term seed capacity-building, rather than as part of ESP.

4.2.2 Seed capacity-building after natural disaster

The functioning of government bureaucracies and government agricultural research and extension institutions is usually not directly affected by the occurrence of a natural disaster such as drought, but there can be a significant indirect impact on their longer-term capacity if a substantial proportion of the government budget has had to be redirected towards providing short-term emergency relief. In this case, ensuing compensating cuts in these institutions' capital and recurrent budgets can leave them critically short of capacity to contribute to longer-term seed capacity-building. Therefore, an important priority for agencies choosing between different seed capacity-building strategies is to

identify the extent to which government institutions will be able to help with executing it: if government capacity is poor, activities that can be carried out independently at the local level – without requiring government provision of inputs, extension advice, seed quality control, etc. – are more likely to be successful.

As well as the *physical capacity* of government institutions to implement longer-term seed capacity-building, agencies need to ascertain a government's *philosophy* towards seed capacity-building. In some countries, the belief is that little can be done to build capacity to better withstand the effect of future droughts, and the only realistic response to drought is to arrange ESP as and when droughts occur. In this situation, agencies may not obtain much support for seed capacity-building activities from government sources.

Physical infrastructure is often not directly harmed by drought, but operating capacity can become diverted and difficult to access for longer-term seed capacity-building. For example, transporters and local traders may be involved in on-going contracts with other aid agencies to deliver food aid – which, as is well known, can often continue for many years after a disaster is over for a mixture of political and other reasons – and thus be unavailable for seed capacity-building purposes. In these circumstances, agencies will have to choose capacity-building activities which capitalise on local self-reliance, rather than those which might have a grander, national-level focus.

The local farming population is of course likely to be physically weakened if the drought was severe or extended, and deaths and severe malnutrition may have reduced the availability of active labour on farms. When drought has made successful farming impossible, other activities – for example, making charcoal, gold-panning, migration to the urban informal sector, prostitution, and sending children to stay with urban relatives – may have assumed greater importance (World Bank, 1994). This reduced emphasis on farming may persist after the drought is over, particularly if agricultural assets such as draught animals and capital equipment were lost or sold to buy food during the drought. Both these factors mean that a return to previous farming systems may not be feasible or appropriate, and seed capacity-building strategies after drought need to take this

into account.

In particular, this means that agencies may need to question whether the range of crops and varieties in use before the drought remains appropriate once it is over. This needs a high level of technical skill, it may challenge official government policy and, where changes are decided upon, it requires high levels of extension input.

An alternative approach pursued by some agencies is to reintroduce well-adapted traditional crops and varieties that have been lost in the drought or due to the pressures of commercialisation and government policies, such as input subsidies for modern varieties. Helping farmers to get hold of stocks of seed to multiply up for their traditional crops and varieties may create a real improvement in seed system sustainability, in areas where modern varieties are not well-suited to the environment and require external inputs like fertiliser.

In some areas, the portfolio of crops and varieties grown before the drought remains appropriate after the drought, but has been lost – either directly as a result of the drought itself, or indirectly as a result of ESP spreading new and inappropriate varieties. In this situation, the appropriate capacity-building strategy may not be to change the old portfolio but to re-stock farmers with seed of their former crops and varieties.

4.3 Resettlement

It may be necessary for farming populations to move in the aftermath of natural disaster or conflict, rather than staying in their original homes and farms. This movement may occur spontaneously, with no outside intervention, or it may be organised by agencies. This scenario presents particular challenges to an ESP programme. In general, it has been noted in a worldwide review, that, 'few governments have the will to plan and implement a credible relocation process. The large majority of refugees and IDPs worldwide are low-income people, often ethnic minorities, with little political clout' (Scudder, 1995) Further, the place to which they move are often available in the first

place because they tend to be problem-prone (*ibid.*), a vivid example being Mount Pinatubo farmers who in 1991 were moved to degraded hillsides and pasture lands in the wake of the infamous volcanic eruption in the Philippines.

4.3.1 ESP for refugees and IDPs

ESP for refugees and IDPs will largely depend on the type of population movement: whether the ecological context is the same as in the communities' home areas; whether the population moved is a cohesive one; whether infrastructure is in place in the new area. The more unlike the new locale is from the old, the greater will be the challenges of an ESP.

There are several constants in conducting ESPs in this situation. First, it is likely that newcomers will have relatively little in terms of agricultural equipment, if the population movement is an involuntary one. They will require significant support services: tools, storage containers, generally full sets of agricultural equipment. Second, agencies may have to elicit extensive information of what constitutes a 'community': households, land arrangements, etc. will have to be explored anew. Third, targeting should be relatively easy among refugees and IDPs: in terms of seed, all households have most probably been reduced to the same common denominator.

As regards seed technology, it cannot be assumed that seed lovingly transported along with moving populations will indeed sprout. Rwandan Tutsi repatriates returning thirty years after the exodus that took place in the early 1960s when the Hutus first came to power, transported seed and cattle hundreds of kilometres, only to see both soon die (Sperling, 1996a). Similarly, the agricultural knowledge of refugees and IDPs may not be relevant in the new locale. For example, displaced farmers in Liberia in the 1990s were confronted with new and unfamiliar soil types, and new pests and diseases (Richards and Ruivenkamp, 1996).

Refugees and IDPs will have significant information needs in terms of any seed given: where is it from, what are its characteristics, does it have special management requirements? In addition, they will also tend to be experimenting

with their soils, plants and other resources. They might not want to invest in agriculture on a normal scale, but rather test a series of options, until they understand what the agricultural outcomes may be. This was certainly the case with the Gwembe Tonga, relocated to build the Kariba Dam in Zambia in the late 1950s (Colson, 1971). Finally, it is important to remember that newcomers may be among the more vulnerable of populations: they have left everything 'back home' – homes, fields, history, local knowledge – and may have few fall-back options. ESP crop and varietal choices should be extremely conservative. If necessary, move more slowly than in other ESP situations, and with greater precision.

One should not underestimate the political and ecological dimensions in distributing ESP to refugees and IDPs. They often move to areas where populations already exist. If land tenure arrangements are unclear, distribution of seed can aggravate already hostile relationships with the host population. Distribution of seed can also intensify production on low-capacity lands, creating settlement-induced land pressure and environmental degradation. One observer in Zambia noted that in the Lusitu area, where 6,000 people were resettled in 1958, the carrying capacity of the land under the displaced people's system was exceeded by a factor of two to three at the time of resettlement (Scudder, 1995).

An agency working on ESP with refugees and IDPs has to be clear that these people have their own land to farm, that the locale can support agricultural intensification, and that the agency has the financial resources to follow through on a long re-adjustment process. Otherwise, in this situation aid other than ESP should be considered.

4.3.2 Seed capacity-building for refugees and IDPs

Seed capacity-building activities in this situation may need to aim for local self-sufficiency. It is important to recognise that if local government institutions have been established in the area for some time, they may be deeply suspicious of incoming refugees and IDPs, who may have a very different culture and way of life.

Alternatively, some areas (for example, the land onto which the victims of the

Philippines' 1991 Mount Pinatubo eruption were resettled) may not have been previously inhabited or cultivated. This will place even higher demands on local self-sufficiency in seed capacity-building, until government institutions, transport and market infrastructure are working effectively in the area.

Refugees and IDPs will almost certainly have been stressed by moving, and old social and cultural patterns will have been disrupted. In this case, agencies may need to invest not only in 'practical' seed-related items but also in helping refugees and IDPs to work out ways of living and working together in their new environment.

It is most unlikely that refugees and IDPs will have been able to bring large capital items with them to the new areas; on the contrary, families are likely to be nearly destitute on arrival. In any case, the items will often not be appropriate in the new areas (for example, different soils may require a different type of hoe; presence of tsetse fly may preclude the use of ox-drawn ploughs). Therefore, there is a need for agencies to re-stock farmers with the necessary capital items as part of any seed capacity-building activity for refugees and IDPs.

However, it must also be recognised that, in a number of cases (for example, the temporary movement of southern Sudanese into Northern Uganda in the 1980s, movement of Mozambicans into Southern Malawi in late 1980s, resettlement of families in Sri Lanka affected by the decision to flood the Upper Mahaweli valleys) it is families with more formal education that form a significant proportion of the refugee and IDP population. Thus, there may be many teachers, former bureaucrats, and even doctors, but relatively few people who have the experience and inclination needed to farm. In this kind of situation, it may not be appropriate to consider seed capacity-building activities at least until the more fundamental problem of basic agricultural eduction has been tackled.

The unsuitability of the refugees' and IDPs' traditional crops and varieties to the new area points to one seed capacity-building activity in which agencies could very usefully get involved for such groups – if they have sufficient technical expertise, or access to it. This is testing the performance of alternative crops and varieties for

the new area, and rapid bulking up of material that performs well, in order to ensure that refugees and IDPs have fast access to suitable material. This situation is one in which it may be legitimate to consider operating an agency-run seed farm, at least in the short-term, rather than something more participatory. It is also a situation which requires a long-term commitment by agencies: crop and variety testing, and diffusion of new material, are not things which can be done to any useful extent within one or two seasons alone.

5. Future Directions

The number of situations around the world requiring a seed intervention has increased over the past decade, and this has led donor agencies, NGOs, and national governments to think about emergency seed issues in more proactive terms than in the past. Effective seed provision during and after emergencies requires preparation: the implementing agency has to find the right seed, possibly multiply it, and deliver it to target beneficiaries well in advance of planting time. Effective seed provision during and after emergencies also has to take into account and to support local seed and farming systems.

Preparedness for seed provision during and after emergencies can take several forms and the experiences documented in this Review have brought to light several areas where improvements could be made in the future. This Chapter outlines these areas.

5.1 National and regional government planning

Individual governments could consider the development of contingency plans and coordinating mechanisms to provide a more coherent response to future seed emergencies. This is especially the case when a country regularly faces natural disasters: many countries can anticipate either the imminent occurrence of conflict or drought, or existing conflict or drought continuing in some shape or form. A partial inventory of types and varieties of the most important crops may already be available through the national agricultural research service. Alternative seed sources could be identified and preliminary plans for seed transport and storage could be discussed. A government agency or office could be assigned coordination responsibilities for seed provision during and after emergencies.

To the extent that seed provision during and after emergencies involves the movement of seed across national boundaries, countries could work to simplify their regulations concerning import and export of seed and to harmonise them with other countries in the region. This would lower the probability that seed shipments are delayed because of legal uncertainties or over-complex requirements regarding the certification or phytosanitary inspection of emergency seed.

5.2 International collaboration

There are several international efforts underway to help promote more effective response to seed emergencies. In June 1996, the FAO Fourth Technical Conference on Plant Genetic Resources agreed on a *Global Plan of Action for the Conservation and Sustainable Utilisation of Plant Genetic Resources for Food and Agriculture (FAO, 1996)*. This Plan is likely to have significant influence on international and national policies in the area of plant genetic resources, and it is the official follow-up to the UN Conference on the Environment and Development (UNCED) that was held in 1992. One of the 20 Priority Activities within the Global Plan is to 'assist farmers in disaster situations to restore agricultural systems'. The objective is to establish capacity to provide seed of adapted local varieties to help re-establish indigenous agricultural systems in areas affected by emergencies, including the duplication of planting material in neighbouring countries' gene banks in case of disaster.

Seeds of Hope II (SOH II) is a proposed programme affiliated with African national agricultural research systems. It is focused on the Greater Horn of Africa, where every country has experienced significant seed emergencies since 1980. SOH II concentrates on three technical activities. First, Crop Environment Domain (CED) maps are to be developed which match up crops and varieties to different agro-climatic zones. The rationale for the mapping is to increase the possibility of moving seed of adapted varieties from one area to another, based on indicators such as temperature, rainfall, and soil type. Second, strategically located seed banks will be established to provide adequate storage for adapted varietal materials. Third, national research programmes, NGOs, and intergovernmental agencies will take primary responsibility for providing high quality planting material to replenish these seed banks (ASARECA, 1996).

A similar approach is being taken by DESFIL's *Seeds for Disaster Mitigation and Recovery* (SDMR). The programme will operate in several regions of Africa. SDMR advocates screening varieties (local and modern), enhancing seed multiplication capacity, and using Geographic Information Systems (GIS) to promote and facilitate emergency preparedness. Additionally, SDMR recommends the establishment of national councils to monitor seed security. SDMR is taking the lead in liaising with NGOs to determine their requirements for a comprehensive approach to restoring food security following emergencies (DESFIL, 1996).

5.3 Strengthening agency seed capacity

While most collaborative efforts focus on defining *international* guidelines and mapping variety use, an equally important challenge is presented by the need to understand seed systems at the *local* level. No amount of high level planning can substitute for thorough knowledge of local seed systems. Many agencies that find themselves involved in seed provision during and after emergencies do not have extensive experience in seed issues. There are several things that agencies can do *before* an emergency arises, in order to strengthen their capacity in this field.

First, agency staff can seek training in technical seed production. Additional experience in the basics of seed production, management and storage would make a valuable contribution to future capacities to manage seed provision during and after emergencies. Alternatively, agencies can seek to hire staff who have more of a background in seed production.

In addition, agency field staff involved in agricultural endeavours must try to learn more about local seed systems and the farming environment in which they are working. However, there is surprisingly little literature available on the subject (although see for example Sperling *et al*, 1992, Almekinders *et al*, 1994 and Cromwell, 1990). Field workers should spend time with farmers and learn about the range of crop varieties that farmers use, the characteristics of each, and the rationale for their use. They should also learn about the sources that farmers use when their household seed stores are inadequate: the organisation of local markets and the role of local traders are particularly important in this regard.

Finally, organisations working with farmers can become more involved in experimental programmes to broaden the range of varietal choices available. There are a number of ways of contributing to the identification, preservation, and enhancement of local varieties, often in conjunction with organisations who specialise in these activities, or by collaborating with government gene bank activities. There are also possibilities for establishing community-level adaptive research capacity, perhaps in conjunction with government research or extension organisations, in order to strengthen farmers' capacities to evaluate, and to gain access to, a wider range of varieties.

Annex 1

Data Checklist for Planning and Implementing Emergency Seed Provision

This Annex lists some of the central questions which agencies need to answer to ensure that an ESP is successfully implemented and completed. The questions should be asked separately for each seed of each variety being provided .

1. Pre-planning Questions (see also Section 2.2)

Assessment of the need for ESP

How will the need for ESP seed be verified?
What conditions signal that farmers can make use of ESP seed?
Is it clear that farmers themselves cannot access more seed without ESP?

Assessment of agency capacity to undertake ESP

Do the time and financial commitments of your agency correspond to those needed to complete all steps of an ESP (as described in Box 1.1)?
How will you draw in the wide-ranging personnel skills needed (seed expertise, knowledge of local agriculture, good logistical skills, ability to develop local links)?

2. Organisational Issues

How do other donors' seed quantity assumptions, varietal types and timing strategies compare with your own?
What mechanisms are in place to ensure that duplication of ESP seed efforts has been avoided?
Is coordination with local authorities necessary? If so, how will this be achieved?
What has been agreed among agencies in terms of coordinating ESP evaluation procedures?

3. Deciding Which Type of Seed

On what basis are priority crops and varieties for the ESP to be chosen?

Are the same selected crops important for all target groups and target areas of intervention?
Will the farming community be consulted in the choice of crop/variety for ESP distribution? Which members?
How might the varietal choice of the ESP enhance/detract from the current available diversity on-farm?

4. Source of Seed

What aspects of seed quality require particular attention for the ESP and how do they relate to the seed sources which can be accessed?
Similarly, in terms of time needs, quantities desired, and cost, how does one potential seed source compare with another?
Will you do an inventory of the possibilities for accessing seed for ESP locally or from neighbouring countries with similar ecologies?
How does the seed for ESP from various potential sources measure up to what farmers normally use?
If seed is to be imported, what are the legal requirements?

5. Supporting Services

Will those receiving seed aid receive any supporting inputs? If not, why not?
If yes, how will the timing of the different kinds of aid be sequenced?
How will you ensure that the lead time among the different input distributions is sufficient?
If both food and seed aid are to be distributed, how will each be distinctively marked?

6. Targeting Recipients for ESP

How will priority groups be identified:

Will this be a 'blanket distribution'? why? (e.g. lack of information or conscious strategy?)

Will only the most vulnerable group be targeted? If so, on what basis will the

'needy' be designated?

How will priority regions be identified:

What makes these selected zones particularly vulnerable?

Are the different zones vulnerable in the same way? (Will they need the same overall ESP strategies?)

How much time will be needed to identify priority groups and regions?

Will all seed be distributed free, or will some groups (eg less vulnerable farmers) be asked to pay?

7. Calculating Seed Needs

What information can you obtain on 'normal' quantities sown or how can you access it?

Is it adequate to use the same standard calculation of seed need across farmers and across zones, why or why not?

Is resowing in the target areas common? If so, how will this figure in your seed calculations?

8. Distribution and Logistics

How will the target groups be notified that ESP is arriving, so that field preparation is completed in good time?

What kinds of local storage facilities will be arranged and how long can seed safely be kept on site?

How will the different varieties of seeds being distributed be distinguished all along the transport chain? (from central depot, to driver, to local storage shed...)

What procedures need to be in place to ensure that distribution of ESP seed proceeds in an orderly fashion?

9. Tracking Seed Provision

Will monitoring forms have been designed and distributed to those who have to

track seed material?
Data should be recorded separately for each type of seed being distributed.

Overview :
For which season seed was distributed
Total seed distributed
List of zones in which distribution took place

Seed distributed per zone (geographic or ecological) :
Total seed distributed in zone
Total number of households reached
Quantity of seed distributed per household
Period of distribution

Description of material distributed per zone :
Procurement source
Name of variety(ies)
Any distinguishing characteristics (colour, seed pattern, labelling..)
Any salient management parameters (e.g. only for altitudes > 1800m)

Means by which local distribution took place :
Through whom
Immediate comments on distribution process (e.g. not all seed from stores was distributed; population not adequately advised on distribution dates)

10. Evaluating Seed Provision (see also Annex 2)

What different kinds of evaluations have been scheduled in the overall ESP plan?
Have financial resources been allotted and qualified personnel identified to complete the tasks?
Are any longer-term evaluations envisioned? (This will be a pre-requisite for those moving towards longer-term seed capacity-building.)

What arrangements have been made to involve local authorities?

11. Knowing When to Stop

Has attention to 'cut-off' points for ESP been built into the evaluation process? What kinds of signals might indicate that the ESP should stop?

Annex 2

Data Checklist for Evaluating Emergency Seed Provision

This Annex lists some of the questions that agencies can usefully ask when evaluating ESP programmes. Further details on evaluation are given in Section 2.11.

1. Internal Evaluation by the Implementing Agency

Seed quantities

The total quantity of seed planned and requested for the ESP;
The total quantity of seed actually acquired by the agency;
The quantities of seed delivered to each intermediary distribution point;
The quantities of seed delivered to farmers.

The analysis should be done separately for each crop in the ESP, and perhaps for each variety as well. The analysis (in very simplistic terms) should compare the total quantities of seed in each category and explain any discrepancies.

Timing of ESP operations

Dates when the initial consignments of seed were received.
When they reached the individual intermediate distribution points.
When seed was delivered to farmers in individual zones and locations.
Actual planting date (range) and the optimum date (range).

Any delays, especially in getting the seed to farmers in time for the optimum planting date, should be explained.

Seed characteristics

Extent to which the varieties that were originally identified as appropriate for ESP were actually acquired and distributed to farmers.
Results of assessments of germination percentage, insect damage, and other physical parameters. If these problems caused some seed to be discarded at any stage in the process, an explanation for the cause of the problems should be

offered.

Targeting of seed distribution
Compare original delineation of targets to receive particular types of seed (specific numbers of households in different zones), with the final results. Explain major discrepancies.

2. The Farmers' Point of View

Proportion of ESP seed planted
What quantity of seed come from each source (home saved, market, ESP, etc.)? How much seed did farmers plant? If possible, get the names of all varieties of the target crop planted by the household.

How much and what type(s) of emergency seed did the household receive? (If there were several ESP programmes operating in the area, make sure these are distinguished in the questions.) What proportion of the emergency seed was used as seed, as food, exchanged for other seed, stored, lost, etc.? If emergency seed was used for purposes other than planting, why?

Farmers' opinion on timing of ESP
When did the farmer receive the ESP seed? When was the ESP seed planted? When was other seed of the same crop planted? When was the optimum planting period for that season? (Relative rather than absolute dates are sufficient for this analysis.) If actual planting time was different from the optimum, why?

Seed quality
What are farmers' observations on the physical quality (cleanliness, insect damage, etc.) of the emergency seed? Did the farmers have to clean or select seed before planting it?

Was the germination acceptable? If there were germination problems, is it clear they were due to seed quality, or were there other problems such as lack of soil moisture, soil insects, etc.? (If possible, compare the germination performance of

ESP seed with that of other seed the farmers planted.)

Varietal adequacy

Estimate the yield of the ESP seed. In most assessment surveys, it will only be possible to obtain farmers' reported estimates of yield. These will only be approximate, but the important thing is to seek comparisons: ask the farmer to compare the yield with that of other seed of the same crop planted this season. Compare the yield with that of varieties planted in previous seasons. More precise yield measures, obtained from careful crop cutting in farmers' fields, are rarely necessary and in any case are beyond the logistical and technical capacities of most impact assessment teams. If it is felt that crop cuts would be useful, experienced advice should be sought. A useful reference is Poate and Casley (1985).

What characteristics of this crop season (e.g., rainfall or labour availability) may have affected yields? Were there any differences in the management of different varieties of the same crop this season?

For each variety distributed as ESP seed, what are farmers' observations on pest or disease resistance, maturity, food preparation qualities, marketability, etc.?

What variety(ies) will the farmer plant next season? If the farmer does not plan to plant the ESP variety, why not?

Management of the ESP

Farmers will have a unique and valuable perspective on the management of the ESP seed distribution process itself, which will complement the evaluation of agency records.

Do farmers feel that the correct crops were chosen for the ESP? Were the quantities of seed distributed sufficient? Was the distribution process well managed and adequately publicised? Did the process cause any undue hardship (i.e., by requiring farmers to walk long distances)? Do farmers feel that all those in need were reached by the ESP?

3. The Longer-Term Impact of ESP

A longer-term analysis of the impact of ESP is useful, and any agency implementing ESP should consider this possibility. The impact assessment would be done 3 to 5 years after the initiation of an ESP. A long-term evaluation is most useful if it can be compared to baseline data. Possible sources of such data include the primary and secondary information on varietal and seed practices collected at the planning stage of ESP (see Annex 1), as well as the initial evaluation survey after the first season (see Section 2 above). The exact nature of the evaluation would depend upon the activities included in the ESP.

If the ESP was simply a distribution of seed of new varieties during one or a few seasons, the longer term evaluation might focus on assessing the utilisation and impact of those varieties several years later. This would include an understanding of whether the new varieties have contributed to diversity or, on the other hand, have replaced local varieties that are no longer available.

If more complex ESP activities have been initiated, that strengthen local seed capacity, then a long-term evaluation might include more elements, such as an examination of changes in patterns of seed acquisition, access to a range of varieties, and observed changes in production patterns (see also Annex 4).

Annex 3

Data Checklist for Planning Seed Capacity-Building

The aim of a pre-planning survey for seed capacity-building should be to obtain all the information necessary to plan the elements of seed capacity-building outlined in Chapter 3.

Agro-ecosystem
Rainfall: amount and variability
Local cropping pattern, including varieties used
Seasonal calendar of planting, crop management and harvesting
Yields, and factors influencing them
Traditional seed care practices: seed selection, seed treatment, seed storage
Seasonal calendar of field and store disease and pest occurrence

Farm household economy
Economic function of different crops within the farming system (food, other domestic use, cash, etc.)
Sufficiency of domestically-produced crops for household food and seed needs
Principal needs for better standard of living and improved agricultural production
Seed sources, including use made of modern varieties compared to traditional varieties, and qualitative assessment of the various sources of seed
Returns to household resources, especially labour, in off-farm activities

Farmers' seed needs
Varieties of seed required
Quality of seed desired
Quantity of seed required
Time of year when seed is required
Preferred source of seed
Price prepared to pay for seed

For each of these questions, information should be obtained about what farmers want compared to what is currently available, and about distinctions in this

between households.

Organisational opportunities
Current seed sources
Existing community self-help structures, traditional or introduced
Existing links with outside agencies, including agricultural research and extension services, input supply agencies, marketing authorities, other development agencies
Farmers' suggestions for the organisation of the seed capacity-building activities (committees, records, accounts, procurement of buildings/ equipment, etc.)

The aim is to make an accurate assessment of how support for local seed capacity can be organised in a way that improves access to seed while building on existing community strengths.

Sources: Cromwell, Friis-Hansen and Turner, 1992; Cromwell and Zambezi, 1993; Sperling et al, 1992.

Annex 4

Data Checklist for Evaluating Seed Capacity-Building

This Annex provides a brief guide to the type of questions that need to be asked when evaluating the performance of seed capacity-building activities.

1. Underlying conditions

Have the underlying conditions (agro-ecosystem and organisational opportunities – see Annex 3) remained the same during the life of the seed capacity-building activity? If not, were changes to the planned seed capacity-building activities required in order to take account of the changed conditions? Were these changes implemented? If not, why not?

2. Organisation

Has the organisation of the seed capacity-building activity (see Section 3.4) been as planned? Specifically, have agency organisation, community organisation and links with external agencies been as planned? If not, give reasons.

3. Quantitative performance

Variety
Has seed of the necessary varieties been made available for multiplication and/or distribution? If not, why not?

Quantity
Has the seed capacity-building activity resulted in a greater quantity of seed being available locally? If not, why not?

Quality
Has the chosen seed capacity-building activity been able to make seed available to appropriate quality standards? If not, why not?

Access
Has the seed capacity-building activity produced and/or distributed seed at the time that it is needed by farmers, and made it available at locations that are accessible to farmers? If not, why not?

Cost
How much did the seed that was produced and/or distributed cost, how much were purchasers asked to pay for it, and by what means? How did the cost and price compare to plans? What were the reasons for any divergence?

Advice
Was the necessary technical and/or business advice given to seed producers and/or seed purchasers? If not, why not?

4. Distribution

Did the seed capacity-building activity involve the intended target groups, as seed producers, or recipients of seed, or both? If not, why not?
Was the seed produced used as seed or not (was it, for example, eaten or fed to animals?). If not, why not?

5. Timespan

For how long did the seed capacity-building activity receive agency support? Was this longer or shorter than planned? Why?

6. Summing up

With hindsight, was building local seed capacity an appropriate development priority, or were other activities (for example, rehabilitation of infrastructure, off-farm income-generating activities) valued more highly by local communities?

With hindsight, was the chosen seed capacity-building activity suitable for the underlying conditions?

Did it make a measurable difference to local seed capacity during its lifespan?

What remains to be done, and which are the organisations (community, government, international) that can or should do it?

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Acronyms

CED	Crop Environment Domain
CESA	Ecuadorean Centre for Agricultural Services
CIAT	International Centre for Tropical Agriculture
CIMMYT	International Maize and Wheat Improvement Centre
CIP	International Potato Centre
ESP	Emergency Seed Provision
FAO	Food and Agriculture Organisation
GRAIN	Genetic Resources Action International
IARC	International Agriculture Research Centre
ICRISAT	International Centre for Research in the Semi-Arid Tropics
IDPs	Internally Displaced Persons
MNR	Mozambique National Resistance (RENAMO)
NGO	Non-governmental Organisation
OFPEP	On-Farm Productivity Enhancement Programme
OFSP	On-Farm Seed Project
PA	Peasant Association
PMV 1	Pearl Millet Variety 1
RAFI	Rural Advancement Fund International
SADC	Southern Africa Development Community
SOH	*Seeds of Hope*
SV 2	Sorghum Variety 2
UNCED	UN Conference on Environment and Development
USAID	US Agency for International Development

Relief and Rehabilitation Network

The objective of the Relief and Rehabilitation Network (RRN) is to facilitate the exchange of professional information and experience between the personnel of NGOs and other agencies involved in the provision of relief and rehabilitation assistance. Members of the Network are either nominated by their agency or may apply on an individual basis. Each year, RRN members receive four mailings in either English or French. A Newsletter and Network Papers are mailed to members every March and September and Good Practice Reviews on topics in the relief and rehabilitation field every June and December. In addition, RRN members are able to obtain advice on technical and operational problems they are facing from the RRN staff in London. A modest charge is made for membership with rates varying in the case of agency-nominated members depending on the type of agency.

The RRN is operated by the Overseas Development Institute (ODI) in conjunction with the European Association of Non-Governmental Organisations for Food Aid and Emergency Relief (EuronAid). ODI is an independent centre for development research and a forum for policy discussion on issues affecting economic relations between the North and South and social and economic policies within developing countries. EuronAid provides logistics and financing services to NGOs using EC food aid in their relief and development programmes. It has 25 member agencies and four with observer status. Its offices are located in the Hague.

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