Livelihood Options in Refugee Situations

A Handbook for Promoting Sound Agricultural Practices

UNHCR
United Nations High Commissioner for Refugees
Haut Commissariat des Nations Unies pour les Réfugiés

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A HANDBOOK FOR PROMOTING SOUND AGRICULTURAL PRACTISES

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Acknowledgements

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Glossary of Terms

Agro-ecological zone **–** The definition of an area describing its ecology and agricultural potential, that is based on environmental factors including soils, natural vegetation and climate.

Biodiversity **–** The wide variety of plant and animal species.

Degradation **–** Lowered productivity of a natural resource (land, forests, aquifers, etc.) by reference to a selected benchmark.

Ecological function **–** The contribution any single component makes towards the maintenance of the ecosystem.

Environmentally sound **–** Activities which do not compromise, or which restore, the capacity of ecosystems to regenerate themselves in perpetuity and to maintain their biological diversity.

Exotic (species) **–** Species introduced from another ecological zone; usually the opposite of 'indigenous'.

Home gardens **–** Plots of land within, or adjacent to, the household compound, where crops are grown.

Host government **–** Government of the country in which humanitarian assistance takes place.

Integrated pest management **–** Diverse methods for controlling pests and increasing crop yields that are to reduce reliance on external inputs, avoid the build-up of synthetic pesticide problems, minimise environmental threats, and protect the health of farmers.

Kitchen gardens **–** Small areas immediately around the home used for growing a few plants.

Livelihood **–** The basis for an individual's or household's economy.

Local authorities **–** Government or leaders recognised to be in control in the country or region in which refugees will/are located.

Natural resources **–** A broad term encompassing plants, animals and all non human-made assets.

Pests **–** A general term that applies to weeds, insects, nematodes, bacteria, fungi and other organisms that adversely affect crop production.

Plots **–** Land at some distance from the household area used for production.

Participation **–** A process of involving people in the decisions and actions that influence their lives.

Preparedness plans **–** A planning process through which an institution can assess the probability and location of potential disasters that may occur in a particular area, that establishes the type and level of response it will deliver in the face of a disaster.

Refugee setting **–** The ecological, economic and social surroundings in which a refugee operation occurs.

Salination **–** The accumulation of soluble salts in the surface layers of the soil, that leads to soil degradation.

Socio-economic pattern **–** The social relations and the means of livelihood in a community.

Soil erosion **–** The physical loss of soil by wind and rain.

Sustainable use – Widely accepted as meaning the rational management of natural resources that will not make future generations bear the cost of current use/over-use.

Topography – The land forms and surface features of a region.

Water catchment – An area of land with common drainage. It is considered both as a physical-biological unit and as a socio-economic-political unit for planning and management of natural resources.

Acronyms

km	kilometre
m	metre
NGO	non-governmental organisation
PRA	participatory rural appraisal
UNHCR	United Nations High Commissioner for Refugees
WFP	World Food Programme

1 The Handbook Explained

1.1 Introduction

This Handbook is intended to help develop an understanding of what needs to be considered when dealing with agriculture in a refugee or returnee operation. In particular, it clarifies how to promote and maintain sound practices for displaced people in diverse situations, often working with a range of different agencies.

The Handbook presents options and approaches for crop production – exploring opportunities for minimising environmental impact and providing guidelines for developing locally appropriate initiatives. It has been written with a focus on:

- the needs and rights of refugees, returnees **and** the communities among whom they are living, to produce food, ensure adequate nutrition and develop or contribute to their livelihoods; and
- minimising those environmental problems frequently associated with agricultural activities in refugee-related settings.

The Handbook provides, therefore, technical information on food production, guidelines for analysis and planning, notes on training and extension, and considers the legal and regulatory setting in which agricultural activities may occur.

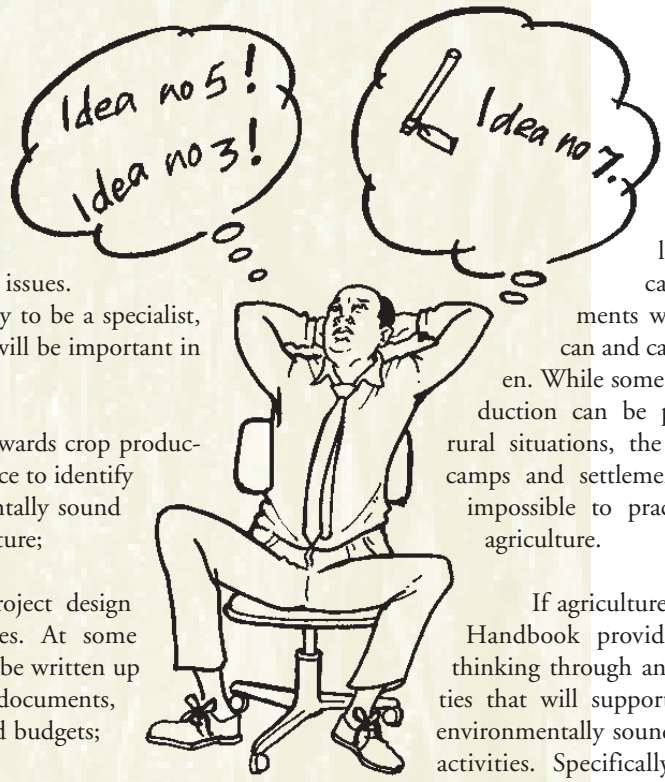
1.2 Using this Handbook

The many implementing agencies (especially humanitarian and development agencies) and donors with whom UNHCR works are the main intended users of this Handbook. In particular it is for project managers, planners and trainers (who may not be specialists in agriculture or natural resource management). The Handbook will also be relevant to individual refugees and local people who practise some form (and scale) of agriculture, but it cannot be expected to reach this level in every case.

Not all of the Handbook will be relevant to all readers. Different parts may be more useful to those with different roles and responsibilities, in particular:

- for **managers and planners** it is a tool to help introduce and co-ordinate agricultural activities within the limitations imposed by the resources they have available to them. Important sections of the Handbook are those describing tools for making decisions and planning (sections 3, 4 and 6);
- for **trainers and extension agents and other field staff** the Handbook will provide ideas, and basic principles for implementation and monitoring (sections 5, 7 and Annex 1); and
- for **practitioners, including refugees and returnees**, who themselves can review possible options and adopt or modify these accordingly when they see a window of opportunity for improving local environmental conditions (Annex 1).

To benefit from this Handbook it will be useful if a number of resources and skills are available, including:



- some knowledge of agriculture and environmental issues. Although it is not necessary to be a specialist, some basic understanding will be important in analysis and planning;
- an open-mind approach towards crop production options. This is a chance to identify innovative and environmentally sound approaches towards agriculture;
- some understanding of project design and development processes. At some stage the ideas will have to be written up and structured as project documents, with justification, plans and budgets;
- resources for accessing Internet and/or obtaining useful publications. The Handbook is not comprehensive, so it identifies other literature and points of reference for more information; and
- funding, or the potential for funding, for specific activities. There will be costs, such as the purchase of tools, seeds and other inputs, payment of extension agents and training materials, which may not be covered within existing humanitarian support budgets.

The Handbook is **relevant to different situations** ranging from pre-emergency/preparedness planning, emergency, through care and maintenance to longer-term resettlement in refugee and returnee operations. It addresses equally the needs of refugees/returnees and the local population, among which the former may be living.

Recognition is given to the fact that in some countries, host governments may allow (to varying extents) refugees to engage in agricultural activities, but in others these are discouraged or may even be illegal. Similarly, the location of refugee camps and settlements will influence what can and cannot be undertaken. While some form of crop production can be practised in most rural situations, the siting of refugee camps and settlements may make it impossible to practise conventional agriculture.

If agriculture is an option, this Handbook provides guidelines for thinking through and planning activities that will support appropriate and environmentally sound crop production activities. Specifically it should help users:

- recognise what policies and regulations exist – what is and is not permitted?
- work out what people want to grow – what are their interests and needs?
- work out what it is possible to grow – how does the climate and ecology of the area influence possibilities?
- decide what techniques can be adopted – which approaches to growing crops are most appropriate?
- identify ways to deliver knowledge and skills, and to motivate the population – how can an initiative be implemented effectively

2 The Issues

2.1 Features of Refugee Agriculture

Some type of crop production exists in most refugee settings – often forming or influencing an important part of community and livelihood activities. Many features and elements influence the form and productivity of refugee agriculture – varying circumstances and conditions lead to different priorities and the adoption of different methods.

Agriculture practised by refugees may take one of the following forms (see also Box 1):

- in and around camps, where vegetable, fruit and food crop production is undertaken if land is available. The purpose is to supplement the food basket and perhaps generate some income through:
  - **kitchen gardens** – small areas immediately around the home used for growing a few plants (fruit or shade trees, but mainly vegetables);
  - **home gardens** – larger areas for crop production within, or adjacent to, the household compound. These are suitable for herbs and vegetables. Gardens are often protected (sometimes using hedges or live fences) and may contain planting beds and composting systems; or
  - **plots** – land at some distance from the household used for legumes, cereals, root and leafy vegetables, as well as trees. Such plots may be rented from local communities by UNHCR on behalf of refugees;

- **in organised rural settlements** where agriculture is practised on land provided by government and/or local authorities for the purpose of food self-sufficiency and income generation; and/or

- **in spontaneous settlement in villages and towns**, where refugees sometimes make their own arrangements with local individuals or communities to gain access to agricultural land, to improve food security and generate income.

Box 1

What May Influence Agriculture in Refugee Settings?

While refugees may be allocated land for farming, in most cases refugee agriculture is:
- **spontaneous;**
- **small-scale;**
- **of low input;**
- **based on traditional experience; and/or**
- **frequently unsustainable.**

These considerations reflect new circumstances and attitudes, an unfamiliar physical environment and climate, different natural resources and altered social and economic circumstances. The relationship that people and households have with land and the resources around them will not be the same as those held in their place of origin. Influencing factors to consider are:
- **lack of suitable land. Refugee situations are often characterised by inadequate land suitable for cultivation (frequently a result of the attitudes, concerns and policies of host governments);**
- **absence of appropriate land tenure arrangements. Without security of formal tenure, the management of soils and natural vegetation is likely to be unsustainable. There is little incentive to invest effort and resources unless there is a basis for long-term commitment;**
- **limited resources. The concentration of large numbers of people over a short period of time leads to excessive demands on natural resources;**
- **limited knowledge and inappropriate skills. Farming relies on accumulated knowledge and experience, the lack of which can lead to inappropriate decisions and poor practice. Understanding rainfall patterns, climatic variations, soils and other local resources takes time or the support of specialists who are able to help communities recognise and appraise the influences upon their livelihoods;**
- **limited access to information. Refugees may tend towards lowest risk production systems for immediate returns;**
- **limited options. For many, agriculture represents one of the few options for establishing a livelihood;**
- **short-term horizons. Short-term gains will over-ride long-term needs and, often, environmental considerations; and**
- **lack of inputs. With inappropriate skills, inadequate tools, unsuitable varieties of crops and a poor basis for commitment, refugee agriculture may be limited to household level efforts to adapt, as best they can, past/traditional practises to the conditions prevailing. Without appropriate inputs the scope for improving practises is limited, and the potential for environmental degradation increased.**

2.2 Supporting Agriculture in Refugee Settings

The reasons for supporting agriculture in a refugee setting may vary from one situation to another, but are likely to include the following:

- to provide for food and nutritional security of refugee and local populations in order to:
  - improve nutrition (and health) among refugees, through access to fresh vegetables and other crops that can contribute to a balanced diet;
  - increase self-reliance and self-respect;
  - increase skills and knowledge to improve and maintain nutrition and food security;

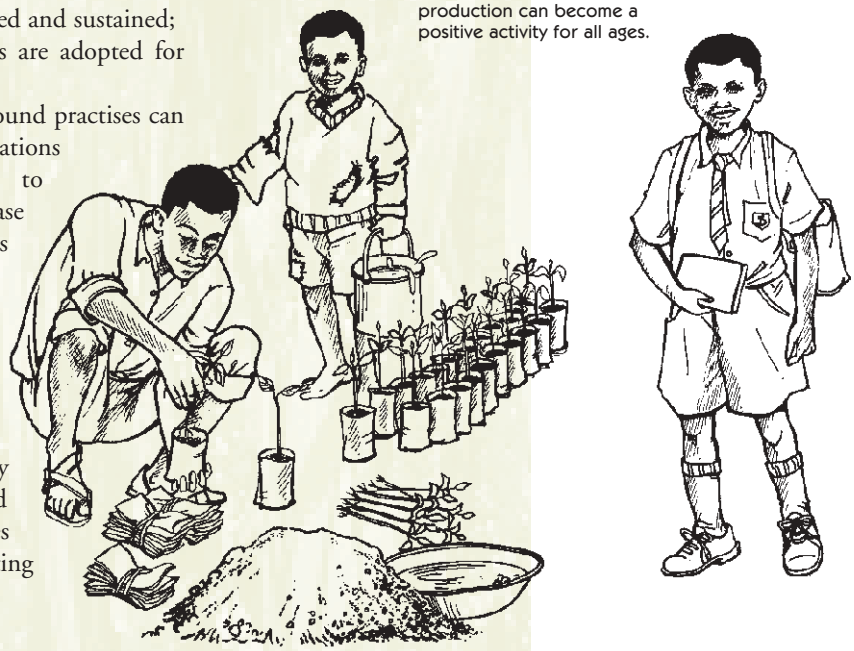
- to provide for livelihoods (i.e. lifestyles based upon agricultural production) in order to:
  - develop self-reliance;
  - reduce operating costs for humanitarian organisations (for relief food, for example);
  - develop skills for the future;
  - develop a refugee "contribution" to local and regional economies (through the sale of produce, provision of labour, and as a basis for trade);

- to conserve natural resources on which food security and livelihoods are based in order that:
  - higher crop yields are achieved and sustained;
  - sustainable agricultural skills are adopted for long-term self-reliance;
  - the value of demonstrated sound practises can provide leverage for negotiations with host governments to improve and further increase support and land allocations for refugees;
  - post-operation environmental rehabilitation costs are decreased;
  - benefits accrue to local populations and sound agricultural practices are widely adopted in hosting areas; and
  - sound agricultural practises are adopted widely in hosting areas.

Interest and attention to agriculture will also change as circumstances evolve. During an emergency phase, for example, production is unlikely but planning processes will usefully address a probable future need for land and resources, e.g. by influencing camp layout, planning and budgeting. As the situation progresses towards exploring opportunities for promoting self-reliance and developing livelihood opportunities, small-scale pilot activities can be encouraged, providing opportunities for influencing attitudes and developing skills. Later phases of operations provide the main opportunities for agriculture. In these instances, preparedness plans (i.e. planning before, or anticipating, a refugee situation) can address basic principles such as location, the amount of land to be made available, and the extent to which agricultural activities may be permitted and encouraged.

Care and maintenance phases may be typified by agricultural production systems that satisfy some refugee household needs without then having a sound understanding of their new environment, and without building a strong attachment or commitment to the locality. Environmental implications may not be severe, or the population may not yet recognise them.

With a little guidance and assistance agricultural production can become a positive activity for all ages.



Settlement, integration and resettlement are processes that are likely to provide opportunities for encouraging change. Productivity of cultivated areas may begin to decline, and erosion and other problems become evident. People may also recognise the need for longer-term commitment to an area, and the need to nurture and sustain the productivity of the land and other resources.

2.3 Some Environmental Concerns

While crop production can improve food and livelihood security in a refugee setting it has, at the same time, the potential to increase environmental risks. The way in which these develop is described in Table 1.

Essentially this translates into effects in two key areas:

- influences on the fertility, structure, stability and productivity of **soils**; and
- influences on **critical ecological functions** (e.g. the impact on an area's function as a water catchment).

2.3.1 Caring for Soils

A few seasons of mismanagement can lead to the degradation of soils and loss of nutrient content that took thousands of years to develop. Although less conspicuous than the deterioration of other natural resources (deforestation, desertification or loss of

Table 1: Starting to farm – finishing the environment

Activity	*Possible/Anticipated Results*	*Appropriate Impact*
Clearing natural vegetation	Loss of natural vegetation and habitat Reduced shade and shelter Loss of useful local natural resources	Loss of biodiversity Deterioration of water-catchment capacity Change in micro-climate
	Exposure of soils to rain and wind Direct drying of soils by wind and sunlight Exposure of river banks to erosion	Increased vulnerability of soil to erosion Reduced soil-water retention capacity
Draining wetland areas	Loss of natural vegetation and habitat Loss of useful local natural resources	Loss of biodiversity Deterioration of water-catchment capacity Deterioration of filtration quality of soils Change in micro-climate
Cultivating and weeding crops	Deterioration of soil structure Loss of natural vegetation Loss of some plants species	Loss of biodiversity Increased vulnerability of soil to erosion
	Exposure of soils to rain and wind Direct drying of soils by wind and sunlight	Increased vulnerability of soil to erosion Reduced soil-water retention capacity
Adding nutrients (e.g. manure and fertilizer)	Run-off or leaching of nutrients from the soil	Pollution of water resources
Irrigating crops	Change in soil water dynamics	Salination of soils
	Unsustainable demand for water to apply to crops	Drying of water courses and surface water
Controlling pests	Use of pesticides and destruction of pests and other, possible beneficial, organisms	Pollution of water resources Poisoning of wildlife and imbalance in local ecology Build-up of toxic materials in soils Loss of beneficial organisms Pest resistance to pesticides
Harvesting crops	Removal of nutrients soil-plant-soil cycle	Degradation of soils Increased vulnerability of soils to erosion Decrease in soil fertility

biodiversity) the degradation of soils is equally important. Soils can deteriorate, or degrade, in many ways, including:

- **loss of nutrients.** Plants require nutrients that they obtain from the soil. Plants remove nutrients season after season as harvests and residues are taken away, while other losses occur through leaching or erosion. Continual cropping leads to a decline in fertility if sufficient nutrients - in the form of crop residues or fertilizers - are not put back;

- **loss of organic matter.** The production capacity of a soil is not only dependent upon the availability of soil nutrients. Organic matter improves the physical structure of soils, and influences water and nutrient availability to growing plants. Loss of organic matter may contribute to poor productivity, degradation of soils and abandonment of the land. The return or maintenance of organic matter in the soil is an important component of sustainable farming practices;

- **salination.** When the drainage of soils in arid regions is impeded, excessive evaporation of water from the soil surface leads to the accumulation of soluble salts in the surface layers. This has a detrimental effect on plant growth, reducing their capacity to take up and use nutrients;

- **loss of structure.** `Structure' describes the overall way in which the materials that make up the soil are arranged. Soils with poor or deteriorating structure are vulnerable to further degradation through erosion and other influences; and

- **erosion.** This is the loss of soil as a result of physical processes - the effects of water or wind on exposed or poorly covered soils. Soil erosion takes different forms, the most noticeable being the loss of topsoil and formation of gullies. While the most vulnerable areas are slopes, river borders and banks are also particularly sensitive. The removal of vegetation facilitates soil erosion, not only by leaving the surface exposed, but also the loss of roots affects the stability of soils to some considerable depth.

Maintaining the soil structure and nutrient content, through mulching for example, is essential for land that is heavily used.

2.3.2 Critical Ecological Functions

It is important to recognise the way in which the local environment functions, as changes may have effects both locally and further afield. It is also important to recognise that plants, animals, soils, the micro-climate and water all inter-relate to create a particular habitat. Changes in one will influence others; small levels of interference can therefore influence whole habitats.

It is necessary to maintain the broader ecological functions of an area, ensuring that changes most likely to lead to major effects are minimised. The impact of local activities must be understood. In the process of clearing natural vegetation, cultivating the land, planting crops and using field inputs, agriculture can have far-reaching effects. For example:

- water catchments should be protected from extensive loss of vegetation so that they continue to function effectively as areas that collect, retain and release groundwater;

- wetland areas must continue to provide water-sink, filtration and storage functions. The effects and impact of their clearance and drainage must be understood;

- surface water resources (e.g. lakes) must continue to function as stores of unpolluted water that is important to natural resources (and human activity) elsewhere; and

- wildlife dispersal areas, corridors and other places important to wild animals, should be protected to ensure that disruption of migrations and seasonal grazing does not imbalance their habitat and life cycles.

2.4 Supporting/Enabling Agriculture in Refugee and Related Settings

Sound agricultural practises can minimise environmental problems and contribute to ensuring that agriculture is sustainable, limit impact on economic activities elsewhere, and provide a basis for preserving relations with host communities and governments. There are clear benefits to be derived from supporting agriculture, and there are costs associated with doing nothing. Table 2 provides an analysis of costs and benefits of doing nothing/something to address refugee agriculture, that brings together the issues explored in this section.

Table 2: Action or Inaction – The Costs and The Benefits

The Issues/Constraints Associated with Refugee Agriculture	*The Costs of Doing Nothing*	*The Benefits of Doing Something*
Purpose: To provide for food and nutritional security of refugees and local populations		
Refugees have access to inadequate or unsuitable land	continued reliance upon relief food	Improved nutrition (and thus health) among refugees, through access to fresh vegetables.
Rules do not allow for crop production	high health-care costs (associated with poor diets)	increased self-reliance and self-respect
Inadequate skills for crop production	high demand for energy for processing dried foods	skills and knowledge increased to improve and maintain nutrition and food security in the future
Purpose: To provide for livelihoods (i.e. lifestyles based upon agricultural production)		
Insufficient land available to make a significant contribution to livelihood security	continued reliance upon relief food	increased self-reliance and self respect
Inappropriate skills to establish sound and sustainable agricultural activities	social frustration and problems at not being able to pursue livelihood activities	reduced operating costs for humanitarian organisations (for relief food etc.)
Rules do not allow agricultural activities	refugees adopt other less sustainable livelihood activities (e.g. poaching, commercial firewood collection)	skills developed for the future
	unsustainable farming practices adopted, leading to declining yields and decreasing livelihood security	refugee contribution to local and regional economy (through sale of produce, labour and trade)
Purpose: To conserve natural resources on which food security and livelihoods are based		
Unfamiliarity with land and ecological conditions leading to inappropriate skills to establish sustainable agricultural activities	agricultural production not sustainable, declining yields increasing the likelihood of long-term dependence	higher crop yields achieved and sustained
Absence of technical and extension expertise to promote good practice	some aspects of environmental damage may be irreversible	sustainable agricultural skills adopted for long-term self-reliance
Agricultural production is spontaneous and no efforts are made to support it	some environmental damage may have significant health implications for refugees and local populations	PR value of demonstrated sound practises can provide leverage for negotiations with host governments to improve and further increase support and allocations for refugees
Refugees are located on land poorly suited to agricultural activities	environmental problems may result in areas remote from those in which it is practised, influencing other ecosystems and economic activities of other communities	decreased post operation environmental rehabilitation costs
Unclear land tenure arrangements and limited time perspectives	increased resolve of host governments and local population to prevent refugee agriculture	benefits accrue to local populations and sound agricultural practices widely adopted in hosting area
Conflict between local and refugee populations over resource use and management		

3 Gathering Information

This section will help develop an understanding of factors that may influence the extent and type of agriculture that can be proposed, implemented and promoted. It will help:

- identify and interpret various **rules, rights and roles** that are applicable;
- understand the participants **with whom you are working** – refugees and local populations;
- determine the **characteristics of the area** – the environmental factors that will influence the patterns of agriculture;
- assimilate information, i.e. **how to build the profile of the situation, its limitations and possibilities**; and
- identify **who should undertake this work**.

3.1 Rules, Rights and Roles

In order to know what limitations and opportunities exist within locally relevant legislation, and in agreements and rules affecting refugee operations, the legal setting must be considered. What can and cannot be done? Which policies and principles may influence the promotion and adoption of agricultural activities? Among the issues to be considered are:

- does host government legislation address agriculture in refugee settings, and what interpretation can be made for the prevailing circumstances? Also, does legislation provide any opportunity that can help promote sustainable and environmentally sound practices?
- what agreements relating to refugee agriculture exist between the lead refugee agency and the government, and how is this interpreted? What agreements exist between other agencies, the government and the lead agency, and what are their implications?
- which other organisations, institutions or individuals have the right to contribute to debate and decisions, and what are their respective opinions?

3.1.1 Who Should be Consulted?

There are likely to be many organisations, institutions and individuals with responsibilities that include some aspect of agriculture in a refugee setting. An analysis of their involvement is necessary. It is important to determine 'who' has 'what' interest. The most appropriate means for clarifying these issues are:

- institutional mapping - the identification of institutions, their roles, mandates, project interests and geographical scope; and
- stakeholder analysis - determining the nature of interest (and stakes on issues) of those having an interest.

These analyses will involve the UN system as a whole, and UNHCR in particular, other humanitarian organisations, host government organisations, non-governmental organisations (NGOs), local civil society organisations and refugee representatives. (Details on key roles expected of stakeholders are provided in section o 4.2 of the UNHCR *Environmental Guidelines,* 1996.)

3.1.2 What Should the Consultation Address?

Stakeholder and institutional analyses will identify and clarify interests and roles, and begin the process of defining **responsibilities** and **rights**, i.e. the mandated or inferred responsibilities (in the case of

Table 3: A Tool for Analysing Rules, Rights and Roles

	Issue, or Area To Analyse	Stakeholders Rules, Rights and Roles, etc. UNHCR	Host Government	NGOs	Local Community Groups	Others	What Are the Implications or Resuts of This?
A	Which stakeholders have rules (including policy statements, regulations and decrees) that have a bearing on the utilisation of resources and the establishment of agricultural activities? Provide a brief interpretation of rules for each of the stakeholders.						Do they say the same thing; what are the implications?
B	Which organisations, agencies, government departments, etc. have a legal responsibility for the land and or resources of the area, or are affected directly or indirectly by refugees? Provide a brief interpretation of responsibilities for each stakeholder.						How can these interests and responsibilities be taken into account?
C	Which communities have a legal right or acceptable claim on the land and/or resources of the area? How can their rights, interests and needs be reflected? Provide a brief summary of the respective claims of each.						How can any conflicting rights, needs and interests be resolved?
D	Who has formal responsibility for supporting and guiding agriculture (and livelihood development, environment etc.); what is their mandate and are they in a position to pursue this? Provide a brief summary for each.						Where more than one actor has an interest, can the respective interests and resources be combined?
E	Which communities are affected by the use (and misuse) of resources in the refugee affected area? Provide a brief summary of `who' will be affected by `what'.						How can their interests and needs be taken into account?
F	What approaches will each stakeholder take in contributing to the design, planning, support, and monitoring of agricultural activities? Provide a brief summary of each.						Consolidate the interests and needs.
G	(Other issues/areas are likely to be identified when planning and undertaking this analysis.)						

agencies and government entities) and legal or moral rights (in the case of refugee and local populations). Within a refugee situation, this will begin to define what can and may be done at that time (and perhaps in the future) in that location.

Different agencies have varying perspectives, priorities and frameworks within which to work. Sometimes these can be contradictory. It may not be a straightforward situation of finding out 'who' says 'what'. Recognising where contradictions exist and how these can be compromised and used to promote the rights of refugee and hosting populations may lead to finding opportunities, developing solutions, or identifying where continuing difficulties may occur.

When the initial involvement of stakeholders has been established, analysis of rules, rights and roles pertaining to agriculture in refugee settings may be developed to understand the perspectives and potential contributions of each. Table 3 outlines one means of addressing this.

3.1.3 Clarifying rules, rights and roles

Analysis of stakeholder rules, rights and roles will lead to answering specific questions. To clarify the legal setting, in which agriculture will be practised, position statements on each of the key issues/areas (and others identified when planning and undertaking this analysis) may be prepared. The following questions need addressing:

- what level of agricultural activity will (or will not) be acceptable?
- who has legal responsibility for what in the refugee setting?
- what local interests and rights must be taken into account?
- how can the interests and responsibilities of each stakeholder be developed into constructive support and/or involvement in refugee agriculture?
- what agricultural activities may lead to processes that are likely to have an impact elsewhere?

Case Study

Addressing Illegal Farming Activities – Tanzania

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Government policies in Tanzania do not allow refugees to practise agriculture, but in camps they may undertake kitchen garden activities on their small plots (typically areas of 20x20m). When food aid was decreased by 40 per cent, in a number of camps, there was a corresponding increase in agricultural production but much of this was from secret cultivation in nearby forests and protected areas. Some refugees made agreements (illegally) with local people to use public land and worked on and returned from these plots to the camps early in the morning or late in the evening. The farming practises were generally unsustainable – land was deforested, shifting cultivation tended to be adopted, and soil erosion control methods were not practised. Cultivation was frequently near rivers, leading to rapid erosion, siltation, pollution of water resources and reduced water flows.

These problems were tackled by an NGO (CARE Tanzania) by working with environmental committees in villages around the camps. In supporting the preparation of land and natural resource use plans, villagers were trained to manage, control and co-ordinate – with refugee leaders – access to natural resources owned by the villages; and although government policy hasn't changed, forest-related policy does allow villages to own forest resources. This has also been used to establish local involvement in organising, limiting and controlling forest resource use.

- what sources of technical expertise, local knowledge and extension skills are accessible/available, and what processes of appeal, and aspects of monitoring and evaluation, can/must be developed?
- what other issues have a bearing, and how?

3.2 With Whom Are You Working?

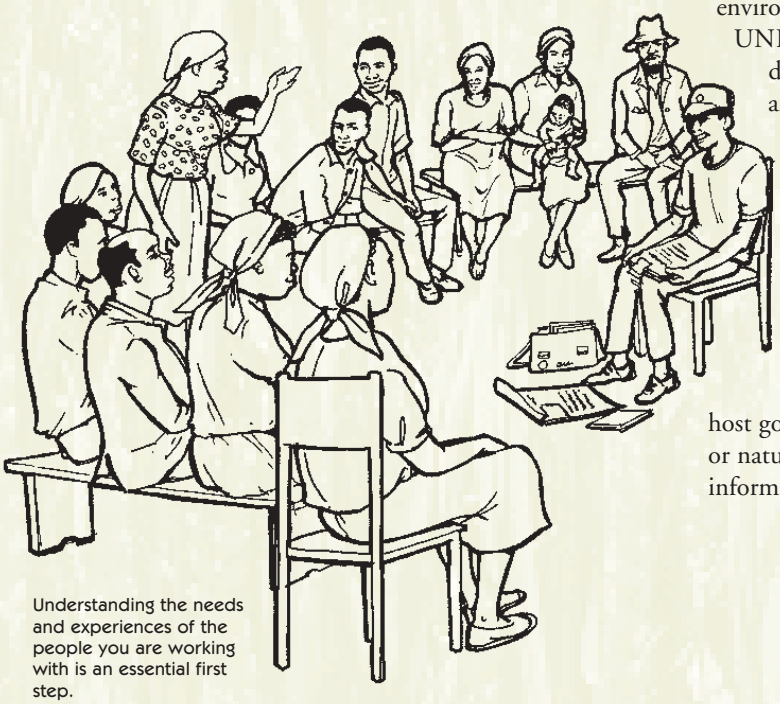
It is vital to understand the people you are trying to help – in particular their backgrounds, needs, knowledge, skills and attitudes. Project activities have to start with what people know, and acknowledge their attitudes and priorities. It is also important to understand decision-making processes at household and community levels, and the factors that influence these decisions – which will be different in refugee and local populations.

Answers to these questions will help build a picture of:

- who makes decisions relating to agricultural activities?
- who within the community, or refugee groups, may influence the decisions of others?
- what do people need to know in order to make decisions about agriculture? What influences their decisions (i.e. their backgrounds, needs, knowledge, skills and attitudes)?
- which local or refugee organisations can be supportive to agricultural activities?

Consolidate this information to identify:

- the present circumstances;
- the intended audience(s);
- how new knowledge might be given, attitudes changed, and new priorities set;
- opportunities and threats; and
- strengths and weaknesses of local communities and refugee groups.



Understanding the needs and experiences of the people you are working with is an essential first step.

3.3 The Characteristics of an Area

In every setting where agriculture is considered, it is essential to:

- understand the local climate, topography, soils, vegetation and other geographical features, including proximity to protected, highly fragile or highly valued areas, rivers, lakes and towns, that will have a direct bearing on the capacity of the area to support crop production. This will indicate what crops, which crop varieties, and what crop production systems can be considered; and
- identify any particular resources or areas locally that are vulnerable, or that should be protected for specific ecological functions, such as water catchments, areas for water infiltration or religious sites – some of which have a bearing on local and more remote processes). This will indicate where cultivation and crop production may best be sited (or should be discouraged), or guide planning to favour low-impact crop production systems that will minimise environmental risk.

If agriculture is planned, rather than allowed to be established without guidance, it is valuable to undertake an environmental assessment. A rapid environmental appraisal is a minimum assessment. UNHCR has guidance on this subject, and documentation is available from the Engineering and Environmental Services Section.

3.3.1 Local Climate

Meteorological station records may not always be required. It may be more appropriate to understand the broad patterns of weather and find out the opportunities these provide, or limitations they create. The local administration, local communities, and host government ministries responsible for agriculture or natural resource management, will have this sort of information **and be able to interpret it**.

It is important to know:

- if the climate is suitable for crop production?
- which crops should do well (and which definitely won't)?
- what varieties of crop will be most suitable?
- when is the growing season, and for how long does it last?
- are there climate-related risks?
- are there particular pest problems in the region?

Analysis of this sort of information will give a broad guide to what the climate may support, and what should not be attempted.

3.3.2 Topography

Flatter land is more easily cultivated and managed. The soils are likely to be deeper and more fertile, with fewer risks of erosion. Flatter areas tend to retain more water; but there is a risk that these might become waterlogged.

Slopes are usually more vulnerable to erosion, but although they may have better natural drainage, they may also dry-out more quickly after rain.

3.3.3 Soils

One does not need to be a soil scientist to know the basics about soils. Most important is identifying areas with soils suited to cultivation, avoiding any that are clearly 'poor' or easily degraded. Learn from the local extensionists, local farmers, and government departments. Essentially, the best soils are deep and well drained. Existing vegetation cover is often indicative of the type/quality of soil. Look for healthy trees (unless the area has been recently disturbed), without large numbers of dying plants, bare patches or eroded areas. It is also important to recognise that:

- soils usually vary through an area with, for example, varying degrees of fertility and different drainage characteristics;
- areas lacking vegetation for no apparent reason may be problematic; and
- saline soils should be avoided as cultivation will lead to salination and, in turn, soil degradation and poor yields.

If concerns such as those outlined above are identified, assistance should be sought from agronomists and soils specialists to assess opportunities and constraints.

3.3.4 Vegetation

Local knowledge may provide guidance on important issues relating to the existing vegetation – its importance in protecting soils, its value as habitat, and the local biodiversity values it provides. It will be useful to review questions such as:

- can it be used to indicate variations in soil fertility and soil moisture?
- what are the implications of (further) loss of natural vegetation in the area? How will this affect critical ecological functions, the soils, local weather, or water resources, in particular?
- will it be useful/important to replace the natural vegetation with crops and cultivated trees that provide good ground cover throughout the seasons?
- how can areas for agriculture be allocated to provide pockets of natural vegetation that can increase and help enable the area to recover once refugees have departed?
- which trees should be protected in order that they may serve as 'mother trees' – providing a basis for re-colonising an area with indigenous vegetation?
- what uses by local people may be affected (including foods, ornaments, and plants of religious significance)?
- are there any additional cultural, social or economic points of concern?

3.3.5 Other Geographical Features

What else is there in a location that can affect, or be affected by, crop production activities? Some features are particularly vulnerable and others indicate existing problems:

- avoid and discourage cultivation on steep slopes;
- avoid and discourage cultivation of riverbanks;
- avoid and discourage the draining and cultivation of swamps/wetlands. (These areas are often highly productive if drained, but their loss may have severe implications on the area, influencing local climate, or ground water and its quality; and
- are there existing gullies – and how will they affect cropping?

3.3.6 Traditional Uses of Refugee Hosting Areas

How did local people use the area before the influx of refugees (and how will cultivation affect their current and future use of the local resources)? In addition to local populations, distant communities may have traditional patterns of use that are not necessarily apparent, or documented and understood. For example, pastoralists graze livestock in areas far from their usual ranges during dry-seasons and periods of drought - forests being particularly important. The clearance of land for cultivation and the channelling of watercourses for irrigation, for example, may limit these uses and have severe implications on the economies of such groups. These uses need to be identified and addressed.

Case Study

The Impact of Refugees on Local Economies
Shagarab-Gurba, Sudan

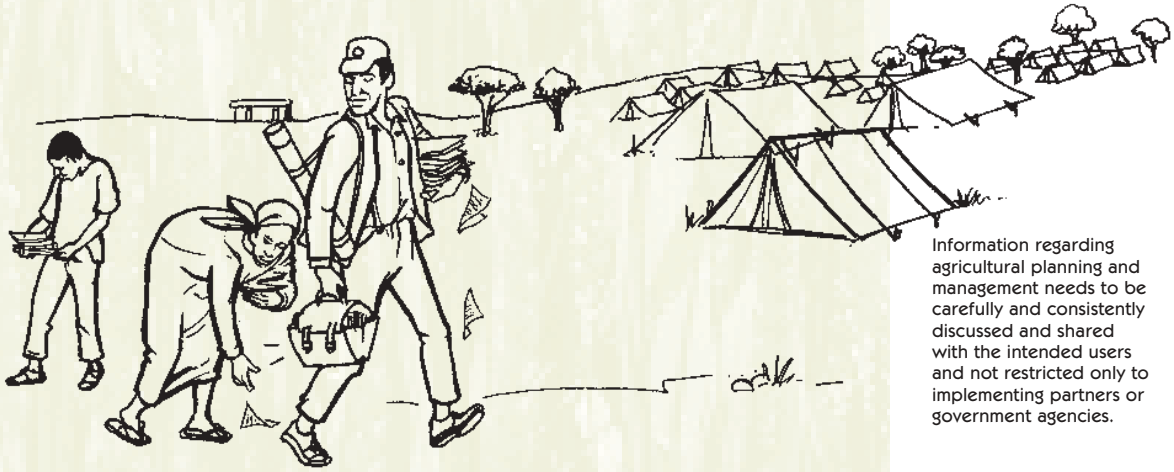
Bushra el-Amin Mohamad Ali
Environment Co-ordinator, COR

The Kwahala and Rwashda nomadic people of eastern Sudan traditionally move into the Shagarab-Gurba area for a season each year to graze/browse their livestock, and to cultivate small areas of land. For the last 17 years there have been three reception centres here, accommodating up to 30,000 Eritrean refugees. Policies, rules and funding limitations have meant that there is no opportunity for refugee settlement and agriculture, and there are few other possibilities for developing a livelihood except satisfying the demand for firewood, and keeping goats. But the sustained cutting and browsing has had a dramatic impact on the riverine woodlands of Shagarab-Gurba, and has also affected the economy of the nomadic families. The progressive loss of vegetation has led to erosion. The woodland and vegetation is virtually cleared up to 10km wide along almost 100km of the river, and the area is now so denuded that rehabilitation programmes have had to be established. The Kwahala and Rwashda nomads have lost a significant area and their livelihoods have suffered.

3.4 How to Build The Picture

It is easy to gather large amounts of information on rules, rights and roles, the population and the environment. Experience will help users limit the gathering of information to a minimum, focusing on what is most useful and important.

The purpose of this exercise is to clarify the situation and gain a better understanding of key features and influencing factors. It also provides an opportunity for working with local people and other stakeholders – addressing the need for integrating

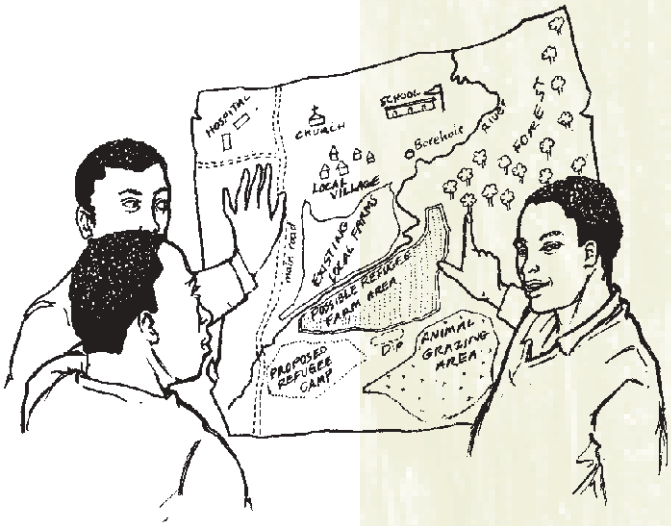


Information regarding agricultural planning and management needs to be carefully and consistently discussed and shared with the intended users and not restricted only to implementing partners or government agencies.

work with the refugee populations, with the needs and changing circumstances of local communities. When this information has been obtained it can be used to build a bigger picture. Various tools will be appropriate for this.

3.4.1 Mapping and Land Use Planning

Maps are one of the most effective ways of bringing together diverse sets of information relating to the environment. This exercise helps focus attention on resources, stakeholders, functions, uses, needs and other critical issues, and shows where they are in relation to each other and to other features (e.g. housing, rivers and roads).



Participatory planning and mapping is an excellent tool for agricultural management in refugee situations.

Further develop the mapping process by adding as much information as possible to build a picture for determining where agriculture can be undertaken, with what conditions and provisions, and where these activities may have an impact, and how. The map should extend beyond the area that refugees do/might occupy. The following should be considered:

- information on rules, rights and roles:
  - areas (and sites) in which rules forbid agriculture;
  - areas that may be used where limitations and restrictions reflect the jurisdiction of particular agencies and other entities;
  - areas where traditional and local users have rights that preclude use by refugees;

- information about the population:
  - areas occupied by refugees and areas occupied by local people (if this is delineated in any way);
  - areas where particular cultural, social and socio-economic groups are located;
  - areas falling under the jurisdiction of different agencies and extension providers, and the influence of local/opinion leaders; and

- information about the environment
  - areas most suitable for cultivation in terms of soils, topography;
  - areas to avoid for environmental reasons;
  - areas protected for their biodiversity or on account of the ecological services they provide;
  - areas that can be used, but with particular care in order to avoid problems that can be anticipated if appropriate husbandry skills are not maintained;
  - sensitive features that may be affected by agricultural activities;
  - areas where activities may impact on communities and resources further afield.

The process of developing maps is not only to provide information for agriculture, but also to map the conditions that must be imposed on, or principles to be applied to, agricultural activities in each part of the refugee affected area.

3.4.2 Written Plans

As a strategy to promote or support agriculture develops it can be written down – providing part of what will become a plan (see also Box 2). This can include:

- What will be addressed?

- Which opportunities can be taken and what vulnerabilities must be addressed?

- What is the purpose of undertaking agriculture?

- What are the achievements that will be attained along the way?

Box 2

Possible Headings for a Plan

Typically a written plan will consist of descriptions under the following headings:

- **Background to the project, describing the situation and its origins.**
- **Justification for the project, i.e. why it is important to develop the initiative, how many people it will benefit.**
- **What the goal, or long-term purpose of the intervention will be (probably describing the impact of activities beyond the life of the project.**
- **The objectives of the project – what will have been achieved by the end of the project.**
- **What the results of project activities will be. These are the achievements that contribute to the process of implementing the project.**
- **How the project will be implemented – what the specific activities are.**

3.5 Who Should Do This Work?

One person working on their own cannot undertake all of the above tasks effectively. Not only is input required from many sources, but the process can provide more than just information. The involvement of people drawn from various groups and organisations (including refugee representatives, representatives from the local communities, humanitarian agencies, NGOs and the administration) will spread the workload and create potential for:

- sharing information – creating greater understanding, and wider involvement and commitment to an initiative, among those who may be able to provide technical, financial and political support;
- building confidence among those participating – developing skills and understanding, identifying opportunities and recognising constraints; and
- developing local ownership – leading to commitment and capacity to contribute to project development and implementation.

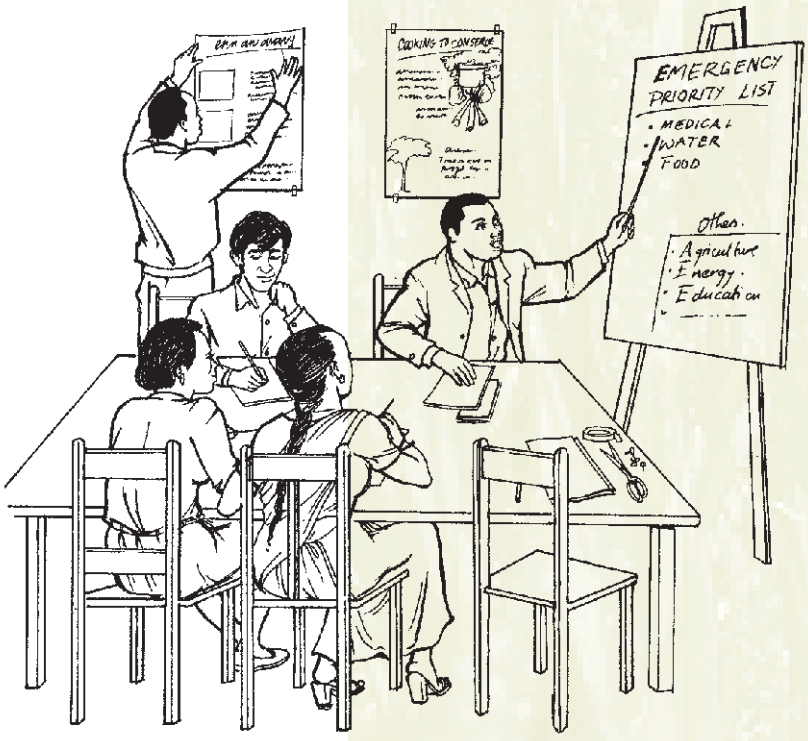
3.6 Next Steps

This section should have helped develop an understanding of some factors that may influence the extent and type of agriculture that can be planned. Next, the process of responding to these findings, considering the options that are available and appropriate, can be considered. There are two strategies:

- ensuring that the response to any emerging refugee situation includes adequate attention to future needs for agriculture in the refugee setting (see section 4); and/or
- selecting appropriate technical options, and adopting extension and training approaches, which are suited to the prevailing circumstances (see sections 5.1, 5.2 and Annex 1).

4 Getting Started

Many of the decisions made prior to, or during, an emergency phase will have a direct impact on what can be achieved during subsequent phases of care and maintenance. The response to any emerging refugee situation must therefore include adequate attention to potential needs for agriculture. Preparedness planning and policy level work should aim to provide an environment that supports and encourages sustainable agriculture in refugee and hosting populations.



While agriculture may not be an obvious option at the outset of an emergency its potential should not be overlooked even at this stage.

Some basic considerations need to be considered in all situations, some of the most important being outlined below.

4.1 What Needs To Be Addressed?

A number of factors will influence support for agricultural activities as a refugee situation develops.

These may include:

- the policy environment (i.e. the established legislation and regulations of the host government and the local administration);
- agreements between agencies working with refugees and the host government, and any limitations imposed by operational partnerships within the relief response;
- the host government preparedness and actual response to refugees;
- preparedness of relief agencies to respond constructively to agriculture in refugee situations;
- preparedness of relief agencies to respond to changing aspirations and needs of refugees as the situation evolves; and
- potential relationships between hosting and refugee populations.

These amount to four basic issues:

- **whether agriculture is allowed**. If some form of crop growing is inevitable, supporting agriculture, rather than ignoring or discouraging it, may contain or limit environmental implications. This may need to be addressed at policy and planning levels;

- **whether agriculture is possible**. The priorities of host governments are with national populations. Allocation of 'good' land may be sensitive, especially if the interests, needs and rights of the national population are seen as secondary to those of refugees. Yet, locating refugees in areas that are less productive may place them on land that is more susceptible to degradation and most likely to result in extensive environmental problems both locally and further afield;

- **whether agencies have the capacity to respond constructively**. Humanitarian agencies have many priorities during emergency phases. Preparedness and early planning reduce longer-term problems and reduce costs, but preparedness must translate into implementation. Without action, spontaneous agricultural activities are likely to develop, with related environmental, economic, social and eventual political problems; and

- **whether relationships with local communities are conducive to agriculture**. The relationships that may arise/exist between local people and refugees must be recognised and understood. In the short-term, local communities are unlikely to benefit from rapid population growth associated with the arrival of refugees. This may lead to animosity and resentment. Some implications may reflect long-term losses (e.g. competition for land and natural resources) while others, including diversion of technical assistance, deterioration of infrastructure and reduction in services may, in the short-term, be addressed or even enhanced through the work of humanitarian programmes. Similarly, farmers who develop relationships with refugees may benefit from the availability of increased (and perhaps cheaper) labour, or by renting land for cultivation to refugees. Communities may also benefit from, and encourage, refugee agriculture when local people and their economies benefit from increased agricultural support that addresses improved production in the wider refugee setting.

4.2 Establishing an Enabling Environment

Issues to bear in mind include:

- **working with the host government**. Preparedness will focus on ensuring refugees have the right to practise agriculture, and have access to adequate suitable land with which to develop and maintain their livelihoods. These are issues to be explored with host governments during pre-disaster preparation - building on the processes considered in section 3. Preparedness plans will clarify what needs to be addressed, and specify by whom, and how, these issues will be explored with government representatives;

- **ensuring relief agencies are prepared**. Within the periodic reviews of preparedness plans, humanitarian agencies should ensure access to the skills and resources necessary for timely planning and implementation of agricultural initiatives, and that medium- and long-term needs for support to agriculture remain in perspective during emergency phases; and

- **ensuring relief agencies can modify approaches**. The needs of, and opportunities for, support to agriculture in refugee settings will change over time. Those in an emergency phase are clearly different to those in a care and maintenance phase, as well as those in settlement, integration or resettlement situations. Established programmes and projects will evolve, and objectives and approaches may need to change over relatively short periods of time. Similarly, relief agencies may need to recognise they are working in a wider setting that does, or is likely to, include local people and their institutions.

Table 4 outlines a simple analysis based upon this type of framework, which may be useful in preparedness planning. This information can then be used to further develop a written strategy for promoting and supporting agriculture, as described in section 3.4.

Table 4: Analysing Responsibilities

The issues, including ...	*What needs to be done?*	*Who should take the lead in this work?*	*What is the justification for this?*	*What strategies can be adopted?*
How to keep agriculture on the agenda - how to establish an enabling environment for developing sound agricultural activities				
How to ensure refugees are located in areas suitable for agricultural activities				
How to provide refugees with adequate land (in terms of size, quality and tenure)				
How to provide the technical expertise necessary for planning agricultural activities				
How to undertake reviews of agricultural activities and amend plans and approaches				

5 Practical Interventions

There are two key components to the interventions that support or promote sound agricultural production in refugee settings:

- identifying appropriate **agricultural techniques**; and
- adopting suitable **training and extension systems** for promoting the selected techniques.

5.1 Agricultural Techniques

5.1.1 Agricultural production systems

It is difficult to provide useful classifications of agricultural production systems, but the following terms should be noted:

- **Slash-and-burn** is a form of agriculture in which land is cultivated for a limited period of time, and then left for an extended period to recover. It tends to be practised where people can move, where population densities for available land are very low, and where the natural vegetation can re-establish fairly rapidly. The system does not involve the addition of inputs apart from nutrients released by the trees and bushes that are cut and burned on the area cultivated. Soils are quickly exhausted of available plant nutrients, and yields decline over a few seasons. In traditional use, however, this system is very often sound, the process of abandoning a cleared area once crop-production levels are poor is, effectively, a fallow, where natural processes replenish the fertility of the soil.
- **Traditional agriculture** is a broad term that tends to mean low input, low yielding agriculture, often practised by small-scale and subsistence farmers. Many systems have evolved, reflecting innovation and adaptation, and a balance between production and input built upon the conditions prevailing, and the skills and knowledge of farmers over many generations.
- **Modern agriculture** is based on science-based agriculture that has permitted higher productivity through the use of high-yielding varieties, fertilizers and pesticides, on good soils with reliable water. It is usually dependent upon external inputs and close links with a market economy. The impact of modern agriculture has been considerable in terms of increased *per capita* food production. However, figures hide the poor distribution of benefits – the beneficiaries tending to be those who are better off. It has also brought adverse environmental and social effects.
- **Sustainable agriculture** is characterised by the use of local resources and local knowledge, encompassing a range of alternatives to modern agriculture that places less reliance on external inputs. The principle is making better use of existing resources, building upon natural processes and biological potential, minimal use of non-renewable resources, more equitable access to resources and opportunities, respect for local practises, and cropping within the constraints of climate, soils and water availability to ensure sustainability of production, resources and livelihoods. Contrary to some misconceptions, sustainable agriculture is not a form of low technology 'back-to-basics' farming, but rather it builds on conventional practices by incorporating recent innovations.

These descriptions might seem academic, but they help to focus on the broad principles that can underlie agricultural production. Humanitarian organisations working with agriculture in refugee settings need to consider not only immediate food and livelihood security issues, but also the wider implications of adopting specific practices. The relevance of the different systems to refugee settings is examined in Table 5.

Table 5: The Relevance of Agricultural Systems

System /variable	*Slash-and-burn Agriculture*	*Traditional Agriculture*	*Modern Agriculture*	*Sustainable Agriculture*
Knowledge and skills needed	Basic skills.	Only basic skills. A pattern of production likely to be practised where commitment and knowledge are lacking.	Modest skills needed. External inputs substitute for detailed husbandry knowledge, but knowledge of effective use, and implications of misuse of inputs, are essential. Largely based upon knowledge brought in from specialists.	High level of skills needed to nurture crop production – understanding and working within the constraints of the environment, and managing resources and processes. Builds on local/traditional knowledge.
Land and other local resources needed	There is unlikely to be land adequate to sustain this form of crop production, in a refugee setting.	Almost wholly reliant on local resources. Characterised by increasing demand for land as yields decline, and no significant attachment to the land and soil.	Good soils and water. External inputs substitute for nurturing and utilising local inputs (including recycling of nutrients). Maximises use of limited areas of land. No significant attachment to land needed.	High reliance on local resources, utilising and adapting to what is available. High commitment to land and its fertility needed.
Contribution to yield/ productivity and impact on livelihood	Declining yields and no basis for livelihood security.	Typically poor and falling yields and low and reducing productivity. Food and livelihood security unlikely to be sustained long-term.	High yields probable. Food and livelihood security unlikely to sustained long-term.	High yields possible. Food and livelihood likely to be sustained long-term.
Effort and time horizon	High effort in terms of clearing land.	Limited time horizons – maximising output with minimum effort and low input, until the causes of declining yields etc. are addressed.	External inputs substitute for considerable degree of effort and limited time horizon.	Labour/effort likely to be high, especially when setting up systems. Long time horizon important.
External inputs needed, and costs incurred	None.	Few external inputs used – little financial costs.	Heavy and continuing reliance upon external inputs. Reliance on inputs makes this a high cost option in terms of both direct cost and the need for infrastructure support (for farm input supply systems, training, etc.).	Low reliance on external inputs, but some are required.
Implications for environment	As the system is highly unlikely to be operated effectively, the implications are considerable – soil degradation leading to erosion, etc.	Poor soil fertility leads to increased loss of natural vegetation to agriculture as more land is brought into cultivation. Degraded soils subject to erosion, poor soil moisture retention, etc.	Poor practices or inadequate management can lead to major problems, e.g. contamination of water resources with fertilizers and pesticides.	Addresses the need for agriculture to regenerate rather than degrade the natural resources used – environmental considerations are a high priority.

There can be little justification for promoting **slash-and-burn** or **traditional agriculture** in a refugee setting. Poor crop yields and an increasing demand for land as productivity declines, cannot be realistic options. Any significant and conspicuous degree of environmental degradation will be politically unacceptable, and the implications of environmental problems for local and long-term refugee populations pose a threat to the development/maintenance of livelihood security. However, refugee populations are likely to adopt this approach to agriculture, unless tenure issues, time horizons, and/or accountabilities are addressed.

Similarly, there is likely to be little justification for adopting **modern agricultural** approaches. Clearly, high yields are desirable, but the resources of the area may not suit this form of intensive use, and continued reliance on external inputs is unlikely to be realistic in terms of cost and the logistics of supply.

The most appropriate techniques are likely to be based on **sustainable agriculture** – developing the potential for high production from small areas of land, with minimal reliance on external resources and measured consideration of environmental problems. There are likely to be constraints and limitations including lack of relevant knowledge and skills, the implications of tenure and use-rights, and effort in relation to time horizons, but these can be addressed.

5.1.2 Approaches toward agricultural production

Before looking at some of the specific techniques that may be useful to consider in a refugee setting, some key approaches to crop husbandry need to be described:

- **organic agriculture** aims to improve conventional farming practices (whether traditional or modern) by adopting more environmentally friendly processes – not using synthetic pesticides or fertilizers. Production problems are addressed through crop rotations, natural sprays, the application of manure and the use of compost;
- **permaculture** goes further than replacing synthetic inputs with organics, relying on skills to nurture plants, animals and their relationship with the landscape, to discourage pests and diseases and to maintain soil fertility. Permaculture relies on 'prevention' before 'cure' and builds a planned environment with different zones having various functions, needs and products (see *Permaculture in Refugee Situations; a Refugee Handbook for Sustainable Land Management*, SAFIRE/UNHCR, 2001);
- **bio-intensive farming** focuses on managing the soil, relying on the intensive use of well-prepared areas to grow plants that are planted closely to each other. It also makes considerable use of compost and other organic inputs but is based chiefly on growing vegetables and other food crops sustainably in raised beds. Bio-intensive systems tolerate some weeds and insects and encourage natural control systems; and
- **agroforestry** is a system that integrates tree growing and the production of woody biomass with other perennial and annual cropping practices. It has a number of potential specific benefits in refugee and returnee settings as trees may provide windbreaks, barriers to the spread of pests, controls to soil erosion, mulch and nutrients to improve soil fertility and nutrients from the deeper layers of the soil, whilst providing a source of fuelwood, building poles, fruit, livestock and fodder.

Within these systems there are various approaches to controlling pests – weeds, insects, fungal and bacterial diseases and other organisms that affect crop growth and production – one of the main problems encountered in all agricultural systems. Recent approaches are tending to focus on an integrated approach. **Integrated pest management** (IPM) is a term that refers to the integration of diverse methods of managing pests while maintaining crop yields, protecting the health of farmers (from the effects of synthetic products), reducing reliance on external inputs (and reducing production costs), avoiding the build-up of synthetic pesticide problems, and minimising environmental threats. IPM is particularly useful for small- and medium-scale producers where

farmers have the capacity for observation, and knowledge of the productive environment.

5.1.3 Identifying suitable agricultural techniques

Annex 1 provides descriptions of various agricultural techniques, including what inputs might be needed, possible management issues, and environmental implications. The general applicability of the techniques to different stages of a refugee operation – emergency, care and maintenance, and settlement, integration and resettlement – is summarised in Table 6.

5.1.4 Crop storage

Case Study

Being Creative – Finding Ways to Grow Vegetables in Daadab, Northern Kenya

Barnabus Okumu
Programme Manager, GTZ Kenya

Our extension team used their imagination and came up with a number of interesting ideas that helped people grow fresh vegetables in the arid environment at Daadab camp in northern Kenya. One idea was to make use of waste water from tap-stands used to supply fresh water for household use. By channelling the spilled water from each tap-stand into a small garden, groups could water a few plants. People shared both the work and the results of their effort, either by consuming or selling the vegetables. Some even grow fruit trees.

Another extensionist found ways of making water last longer. Areas that can catch up to 50 litres of rainwater were dug, and vegetables were grown in and around them. These areas were lined with plastic sheeting, and soil and compost were put back to improve production. These areas acted as micro-catchments that could hold water for a long period of time. The use of plastic further reduced seepage and kept the soil moist for longer. Small amounts of water could be added during the dry season, if needed.

A further idea was to make multi-story container gardens out of old polyethylene sacks provided by the World Food Programme. Local soil and animal dropping were mixed together and put into the sacks; small holes were then cut in the sides and seeds and seedlings planted in the top of the sacks and also in the slits in the sides. The whole sack looked as if was growing: each produced up to US$5 worth of vegetables in a season.

Crop storage is an area that requires careful attention as losses in storage from pests, damp, vermin and mould can be considerable – possibly accounting for a significant proportion of the crop harvested. By keeping storage losses to a minimum, food security and household nutrition can be improved, areas cultivated for household crops reduced, and additional produce used for barter or trade, or for coping during periods of acute shortage.

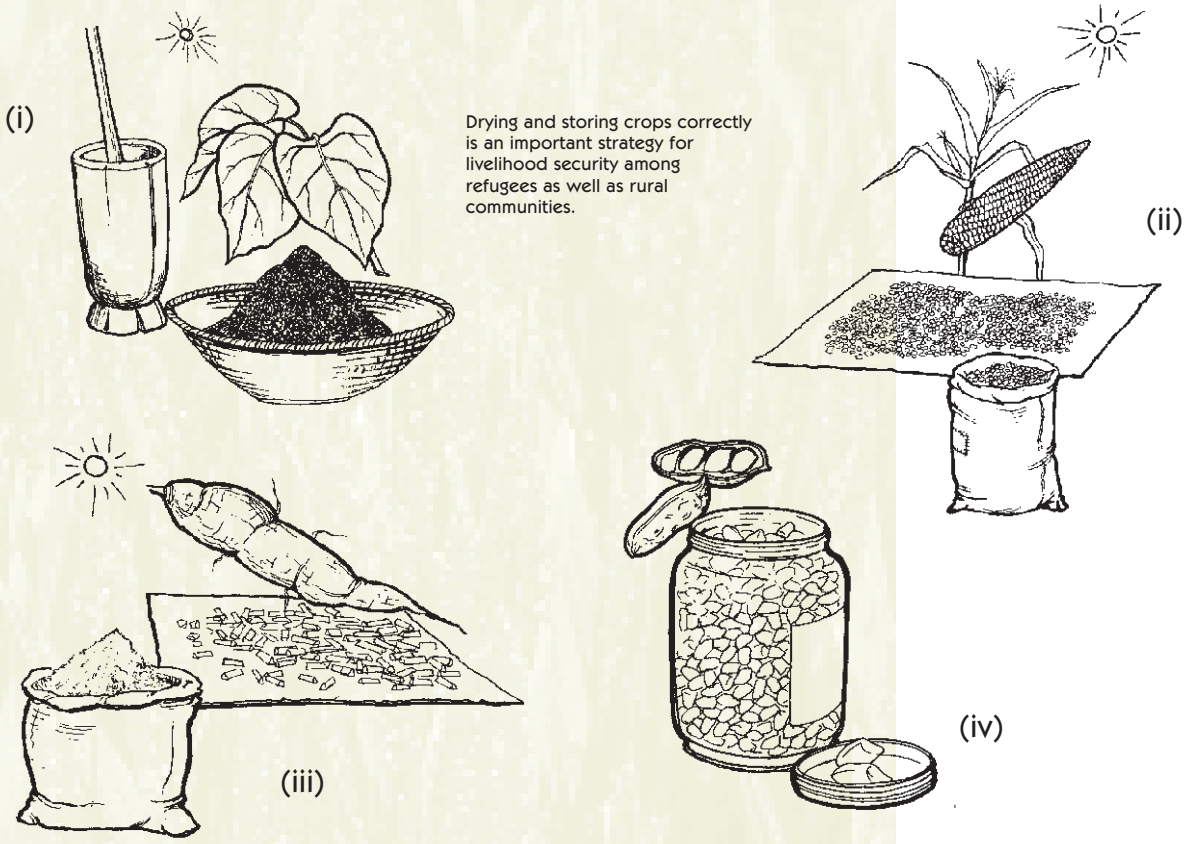
Crop storage does not necessarily mean the construction of crop stores (which are major investments of effort and materials, and serious commitments to medium-term settlement). These can be used but, for small-scale production, storage should be seen as preserving and protecting whatever surpluses are remaining at the end of a period of harvesting, much of which may be kept within the home.

There are many techniques and technologies for preserving and storing harvested crops – not only cereals and pulses, but also vegetables and fruits. These include:

- drying of leafy vegetables and most fruits;
- drying of cereals and pulses;
- storage of dried produce in airtight containers;
- 'bottling', i.e. the simple processing of fruit and some vegetables, and their storage in sealed containers such as bottles, plastic containers, gourds and pots; and
- processing into finished foods.

The use of materials to prevent attack by pests (e.g. of stored maize) is also varied, and includes:

- treatment of stored crops with proprietary chemicals (but these chemicals are generally poisonous);
- the preparation of pest repellents made from local materials, such as ash, chilli peppers and various herbs, which are mixed with the stored crop; and



Drying and storing crops correctly is an important strategy for livelihood security among refugees as well as rural communities.

- the use of smoke – smoke from a kitchen fire will deter pests, if grains are stored on racks or in the roof high above a fire.

Some knowledge and specific skills are needed to effectively store crops but this is often found among local people/communities. The use of pest repellents made from local materials, and the use of smoke, are widespread traditional practices.

5.1.5 Required Inputs

A range of items is needed for growing crops, such as seeds, tools and materials for specific purposes, e.g. controlling pests. Ensuring that all households have access to digging tools and sufficient suitable quality seed at the right time can be a major undertaking. The use of varieties that can be saved and or multiplied for replanting, rather than relying on external supplies, may also be important. This, however, should exclude the use of hybrid varieties, as yields from seed saved from hybrid crops will decline very rapidly. Seed

Case Study

The Introduction of Hybrid Maize
Northern Uganda

Kizza Wandira
Environmental Co-ordinator, UNHCR Uganda

Sudanese refugees in northern Uganda were allocated land by the Government of Uganda, as a step towards developing self-reliance. Using traditional, locally available, crop varieties the refugees established initial agricultural activities, but seed and planting materials were in short supply. Supplies were augmented by aid organisations, but included hybrid varieties of maize. Refugees realised that the hybrid gave good yields, but were warned not to use the harvested crop as seed for planting in subsequent seasons. (Seed from hybrid crops should not be used for planting as the resulting plants grow poorly and productivity declines. If hybrids are used, new seed must be obtained from certified sources each year.) But refugees did use the hybrid crop for replanting, and yields did decline. Refugees demanded more of the original hybrid seed, but the aid organisation would not supply it, wishing to avoid developing a situation of dependency. Yields continued to decline.

If the organisation had recognised these dangers from the outset, the Sudanese refugees might have moved more quickly towards self-sufficiency. The project was well intentioned and had a good short-term impact, but the longer-term implications were not considered at the outset.

Table 6: Suggested Techniques for Various Stages of a Refugee Operation

Techniques	*Relevance at various stages of an operation*		
	Emergency	Care and maintenance	Settlement, integration...
Growing Plants			
Alley cropping			✔
Double dug beds		✔	
Container gardens	✔		
Growing beds		✔	✔
Inter-cropping		✔	✔
Monocropping	✔		
Multi-storey gardens		✔	✔
Rotations		✔	✔
Row planting		✔	
Conserving Soil and Water			
Conservation structures			✔
Contour planting		✔	✔
Minimum tillage		✔	✔
Mulching	✔	✔	✔
Plant Nutrient Management			
Composting		✔	✔
Composting toilets			✔
Green manuring		✔	✔
Liquid manure	✔	✔	✔
Manure	✔	✔	✔
Pest and Disease Control			
Integrated pest management		✔	✔
Attracting predators			✔
Natural repellents	✔	✔	✔
Decoy traps		✔	✔
Managing Water			
Bottle watering	✔		✔
Irrigation			✔
Using grey water			✔
Using muddy pits			✔
Road water harvesting			✔
Roof water harvesting	✔	✔	✔
Tap stand gardens	✔	✔	✔
Micro-catchments			✔

The relevance of each technique may also change according to the availability of land for crop production. Table 7 provides a broad guideline on the suitability of different techniques.

Table 7: The Suitability of Various Techniques According to Land Availability

Techniques	*Availability of land for growing crops*			
	Plenty	**Some**	**Limited**	**None**
Growing Plants				
Alley cropping	✔	✔		
Double dug beds		✔	✔	
Container gardens			✔	✔
Growing beds		✔	✔	
Inter-cropping	✔	✔		
Monocropping	✔	✔	✔	
Multi-storey gardens			✔	✔
Rotations	✔	✔	✔	✔
Row planting	✔	✔	✔	
Conserving Soil and Water				
Contour planting	✔	✔	✔	
Minimum tillage	✔	✔	✔	
Mulching	✔	✔	✔	✔
Soil conservation structures	✔	✔		
Plant Nutrient Management				
Artificial fertilizers	✔	✔	✔	✔
Composting		✔	✔	✔
Composting toilets		✔	✔	
Fallow	✔	✔		
Green manuring			✔	
Liquid manure		✔	✔	✔
Manure	✔	✔	✔	✔
Pest and Disease Control				
Attracting predators	✔	✔	✔	
Natural repellents		✔	✔	✔
Decoy traps	✔	✔	✔	
Pesticides	✔	✔	✔	✔
Managing Water				
Bottle watering			✔	✔
Irrigation	✔	✔	✔	
Using grey water			✔	✔
Using muddy pits		✔	✔	
Road water harvesting			✔	
Roof water harvesting		✔	✔	
Tap stand gardens		✔	✔	
Micro-catchments	✔	✔		

Note: **Plenty** means no real limitation on the availability of suitable land; **Some** means adequate suitable land is available for each household; **Limited** indicates inadequate suitable land is available for cropping; **None** reflects a severe shortage of available suitable land.

should be collected from the healthiest, most vigorous plants that are yielding well - particularly those in the middle, rather than the edge, of a planting area.

The storage of home-produced seed and the production of sufficient quantities of locally grown planting materials (e.g. cassava and sweet potatoes) should also be addressed to reduce losses and ensure reliable sources of supply. Local varieties are more likely to be adapted to immediate agro-ecological and socio-economic conditions, and be more readily available, than introduced varieties.

Seed stored for planting in subsequent seasons must also be protected from pests. The most effective way to avoid pest problems is to store dried seed in airtight waterproof containers. Ash and other local mixtures can also be used, but seed for planting should not be kept in smoky conditions. Most communities will have traditional approaches to seed storage, varying in effectiveness and relevance to their present situation. It is appropriate to build upon these, rather than introducing systems that are totally new.

The supply of seeds, pesticides and fertilizers requires the existence of distribution networks. Where agriculture is to depend upon external inputs, the logistics of supply will not only consider their physical distribution, but also how the inputs are to be paid for. If a humanitarian organisation covers these costs, the practicalities of long-term dependence and funding must be considered.

5.1.6 Nutrition and Diet

Crop production, and therefore the planning of agriculture and extension activities, must consider the nutritional and dietary needs of the population, particularly for children and nursing mothers. In some phases of a refugee situation, the diet may not include meat, milk, fish, eggs or similar sources of protein; nor minerals and vitamin supplements. The need to balance diets must contribute to the selection of crops.

There are six types of nutrients, all of which are present in the diet of healthy people, providing material for growth and repair, supplying the body with energy, and controlling the body's activities. These are: fats, carbohydrates, proteins, water, mineral elements, and vitamins.

Case Study

Balancing Food Availability and Nutrition
Angola

Alain Mourey
ICRC Geneva

Even kitchen garden production of a small number of vegetables can make a major difference to a family's diet and health.

It is often impossible to balance the relief food ration intended for general food distribution as it will lack micro-nutrients. In Angola, to address this, populations affected by armed conflict were provided with seeds for planting around homes. The seed package provided onions, tomatoes, salad vegetables and sunflowers. Household surpluses generated income.

The nutritional value of dried foodstuffs is affected by milling. The finer that maize is milled, the poorer the Vitamin B complex (thiamine and niacin) content. When a high extraction rate is used, the flour is brown in colour and has a higher nutrient content. Whiter flours are produced by a lower extraction rate and have a poorer nutritional value. Niacin deficiency, known as pellagra, can be addressed by complementing diets that are high in a maize staple with legumes such as beans and groundnuts.

The relation between nutrients, their functions in the body and the major crops that supply them are shown in Table 8. It demonstrates that, in order to be able to provide a diet that contains all types of nutrients, agriculture must provide a range of crops, i.e. it should include roots, tubers and/or cereals; and pulses; plus vegetables and fruits, if other sources of food are limited, unreliable or reducing.

5.2 Training and Extension systems

5.2.1 What Needs To Be Addressed?

To develop effective systems to support sound agricultural activities it is necessary to understand:

- what will people have to do, and what training and extension approaches will best introduce these?
- where will the facilitators, extensionists and other resource people come from?

Table 8: The Function of Nutrients in the Body

Nutrients	*Providing energy*	*Supporting growth and repair*	*Suppoprting control of body processes*
Carbohydrates Cassava, potatoes, sweet potatoes and other root and tuber crops; bananas and plantains; cereals including maize, rice, millet, sorghum and wheat.	✔		
Fats Some oil crops including sunflower and groundnuts.	✔		
Proteins Pulses including beans, chickpeas, cowpeas, garden peas, grams and groundnuts. Meats, milk and eggs.	✔	✔	✔
Mineral Elements Vegetables including brinjals, courgettes, cabbage, chilli peppers, kales, onion, spinach, tomatoes; and most fruit.		✔	✔
Water Most fruit and vegetables.		✔	✔
Vitamins Most fruit and vegetables.			✔

- what field inputs will be needed, where will they come from and how will they be distributed?
- how will the activities continue after the period of support has come to an end, and how will new problems and opportunities be addressed without external assistance?

By whatever means these issues are addressed, project support must ensure that refugees and returnees are:

- **committed** to adopting crop production systems that are locally appropriate, i.e. that are suitable for the agro-ecological conditions prevailing, and acceptable in terms of their environmental implications;
- given, if they do not exist, the necessary **knowledge and skills** to practise the selected crop production techniques;
- able to access the **resources** necessary for selected production systems, e.g. planting materials, seeds and tools; and
- willing and able to **commit the physical effort** to establishing and maintaining production systems adopted.

Table 9 illustrates how the needs vary from one agricultural technique to another.

Many refugees or returnees, however, may have little experience of, or commitment to, their present location. They may have little knowledge and few skills for locally appropriate crop production, and have only limited resources available. Furthermore, they may be unwilling to commit major effort to sound production systems. Some, or all, of the basics may be lacking among the refugees. Extension systems are designed to address this.

Table 9: Adopting Better Skills

Technique	*Requirement in terms of* Commitment	Knowledge/ skills	Resources	Effort
Growing Plants				
Alley cropping	●●	●●	●●	●●
Double dug beds	●●●	●●●	●	●●●
Container gardens	●	●	●	●
Growing beds	●●	●	●	●●
Inter-cropping	●●	●●	●●	●
Monocropping	●	●	●	●
Multi-storey gardens	●●●	●	●●	●●
Rotations	●●	●●●	●	●
Row planting	●	●	●	●●
Conserving Soil and Water				
Contour planting	●●	●●	●	●
Minimum tillage	●●●	●●●	●●	●●
Mulching	●●	●	●●●	●●
Soil conservation structures	●●●	●●●	●●	●●●
Plant Nutrient Management				
Artificial fertilizers	●	●	●●●	●
Composting	●●●	●●	●●	●●●
Composting toilets	●●●	●●	●●●	●●●
Green manuring	●●●	●	●●	●●●
Liquid manure	●●●	●●	●	●●
Manure	●	●	●●	●●●
Pest and Disease Control				
Attracting predators	●●●	●●●	●●	●●
Natural repellents	●●	●●	●●	●●
Decoy traps	●●●	●●●	●●●	●●
Pesticides	●	●	●●●	●●
Managing Water				
Bottle watering	●●	●	●	●●
Irrigation	●●●	●●	●●●	●●
Using grey water	●●	●	●	●
Road water harvesting	●●●	●●	●●	●●
Roof water harvesting	●●	●	●	●
Tap stand gardens	●	●	●	●
Micro-catchments	●●●	●●	●	●●●

●●● high ●● medium ● low

Case Study

Setting Up Sustainable Extension Systems

Nuwa Senkebe
Project Co-ordinator, LWF

The mind-set of refugee workers is 'funding and the provision of external resources'. There is a continual demand for financing refugee projects in Africa, but funds are always limited, and donors do not like to fund activities indefinitely. Either they favour projects that are completed quickly but have a long-term impact, or they support initiatives that are sustainable, i.e. that can be continued beyond the period that funding is provided, by other mechanisms identified during planning, and developed during the implementation period.

In Zambia, the UN and NGOs involved in relief work developed partnerships with the government's extension services. The technical staff of these partnerships advise refugees on improved crop production and sustainable agriculture practices. The result? Refugees are not only feeding themselves, but are also contributing to the local economy.

Agricultural activities in refugee settlements are therefore developing with the input of various stakeholders, and provide the core of an income base for refugees.

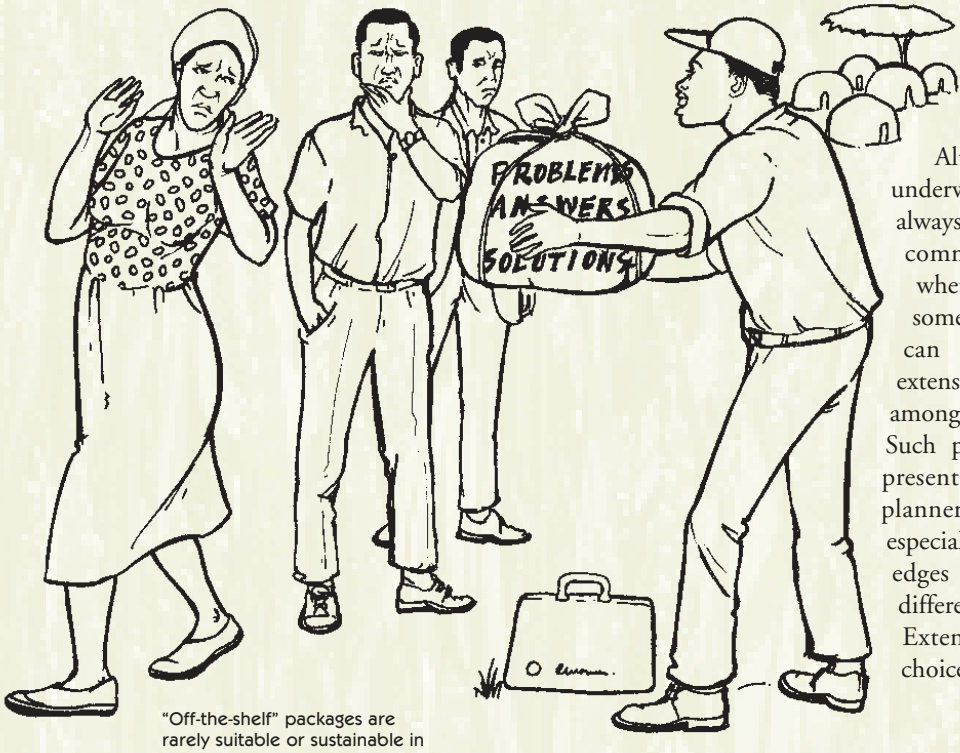
5.2.2 Agricultural Extension Systems

There are two broad approaches towards extension and training, the traditional extension approach and the community-based approach.

Traditional Extension Systems

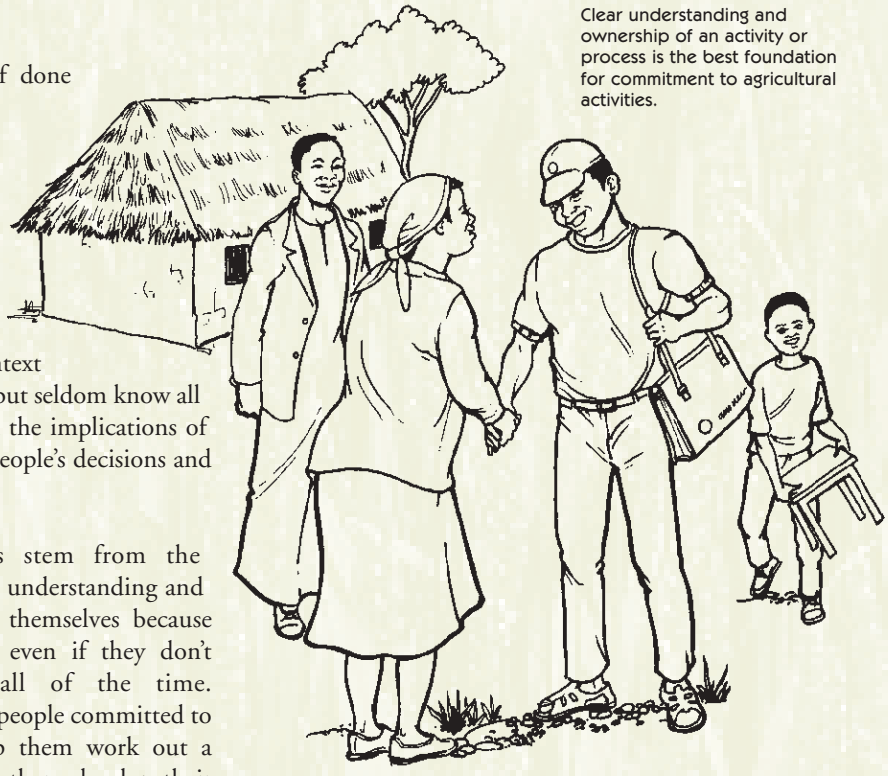
Traditional extension systems attempt to build local production capacity by providing things – chiefly by providing answers, plans, advice, training and inputs. Answers and plans are likely to be prepared by specialists, and implementation is based upon the technical, training and social skills of individual, or groups of, extension workers. Usually these extension workers are employed by an external entity – often the government or a NGO. They provide advice to individual farmers and to community groups (either formal or informal). The approach is often identified with a top-down approach. Within this there are a number of strategies.

Traditional extension systems may usefully fast-track the introduction of knowledge, skills and resources in certain situations, but probably rely on the 'knowledge' component of what is delivered to drive commitment and effort. Although they can get things underway, these methods are not always particularly responsive to community sensitivities, whether cultural or social. To some extent these constraints can be offset by involving extension workers recruited from among the refugee communities. Such personnel will be able to present the interests of both planners and the community, especially if recruitment acknowledges gender, wealth and age differences among the refugees. Extension messages and the choice of technologies adopted



"Off-the-shelf" packages are rarely suitable or sustainable in refugee and related situations.

can also be more appropriate if done with these extensionists.



Clear understanding and ownership of an activity or process is the best foundation for commitment to agricultural activities.

Community-based Extension Systems

Community-based extension systems attempt to turn the process around. External experts provide advice in the context of local knowledge and interests, but seldom know all the facts, and cannot understand the implications of the many factors that influence people's decisions and actions.

Community-based systems stem from the principle that the best people for understanding and planning action are the people themselves because they are living with the facts, even if they don't necessarily recognise them all of the time. Furthermore, the best way to get people committed to an idea or a process is to help them work out a problem or issue, and then help them develop their own responses. **Ownership of an idea or a process is the best basis for commitment.**

Participation therefore has two fundamental purposes – recognising and getting-to-grips with the **real** situation, and planning **workable** responses.

Various mechanisms are used. Community members are encouraged to see themselves as having knowledge and skills that, through group-analysis and decision-making, can provide a basis for taking the initiative and further developing skills. A wide range of techniques and processes are used to maximise the involvement of communities, e.g. participatory rural assessments (PRAs).

There are, however, some limitations to this approach. Participatory processes are time-consuming. The process of achieving genuine and effective participation, and then helping it to work and give results, takes a lot of time, effort and skill, even in a development situation where the population is established, settled and stable. A refugee setting provides further difficulties. The knowledge needed may not exist among the refugee population – the knowledge and skills may not be adequate for the new situation and conditions. Community-based extension systems also build upon local relationships and local institutions. In refugee settings these local relationships and institutions are likely to have been disrupted. People do not necessarily know each other, there may be few community structures, and values (e.g. trust) have yet to recover.

Project implementation processes are moving away from conventional training and extension approaches. More participatory methods that support communities to identify, express and address their needs are being adopted – providing far more opportunity for learning and responding to socio-cultural values, local aspirations and existing knowledge. However, conventional training and extension systems have their place. The limitations of community-based systems may preclude their adoption, especially if time is limited, and communities are fragmented. As opportunities and demands change, a responsive approach to changing circumstances may be best, taking components from each.

Case Study

Solving More Than One Problem – Coping With Gully Erosion
Mtendeli and Mtabila Camps, Western Tanzania

Gabriel Weishike Batulaine
Project Manager, CARE International – Tanzania

The Tanzania government has been reluctant to accept refugee agriculture because refugee camps were considered temporary. Accordingly, refugees were allocated only small plots, averaging 20x15m.

When the road network was improved at Mtendeli camp in Kibondo district, the drainage system caused serious levels of soil erosion. Gullies were forming. Similar problems were identified at Mtambila camp in Kasulu, and gully erosion threatened adjacent areas. Refugees were abandoning the small garden plots that had been allocated, there were a number of reports that children had drowned, and families wanted to move away. The CARE team decided to tackle this by making use of the problem.

First, an awareness-raising programme was started. Refugee community representatives adjacent to the gullies, refugee leaders, camp management agencies (those responsible for the road network), UNHCR (at the camp level) and government staff in the camps, worked together and asked people if they were just going to keep running away from gullies. Eventually people agreed to address the problem if they could get a little support. Twice-weekly meetings were held just to work on this. The meetings led to forming one committee for each gully, and people were encouraged to find a solution themselves. They had already learned that check-dams and gabions would not work (having seen cases where soil erosion continued around these structures). They considered many ideas, but eventually decided to try cultivating and growing crops right inside the gullies. This turned out to be a good idea.

Creeping crops such as sweet potato vines were planted on the gully sides to stabilise these zones. Simple wooden check-dams were constructed made of intertwined withies on tree stumps that sprouted (using *ficus* species), supported from behind by rows of stones. Maize stover (stems) were used as a mulch on the gully bed, while consideration was given to planting crops that would spread quickly - including bananas, sisal, elephant grass and sugar cane. These were to reduce the speed of flowing water, arrest soil erosion and accelerate soil deposition. The gullies were made shallower and wider, and the amount of land that could be cultivated was increased. Further crops were planted, including pigeon peas and selected tree species, to improve soil fertility.

Refugees undertook these activities in the dry season, collecting water for the crops, as needed. Crops became quickly established and broke the fall of the first rains on what would have otherwise been bare soil.

Overall this work was found to have been very effective. Refugees with plots far from the gullies started to negotiate with those close to gullies - for sharing cultivation. A little imagination, some training, a few planting materials and the encouragement to organise and think through an issue has not only solved an important and growing local environmental and safety problem, but also contributed to food production and convinced local government staff that refugee agriculture should be permitted.

5.2.3 Some Agricultural Extension Approaches

These approaches are not exclusive of each other, but may be used in conjunction with each other.

The general applicability of the extension approaches to different stages of a refugee operation – emergency, care and maintenance, and settlement, integration and resettlement is summarised in Table 10.

Extension Workers	How it works	Extension workers advise individuals, or groups of farmers, through visits to gardens and plots to provide specific advice and training, and respond to needs and circumstances among those visited. Specialists usually train extension workers.
	What is needed	People skilled in the various techniques and systems being promoted, who are effective communicators, and respected and trusted by the population.
	What planners and managers need to consider	• The number of extension workers needed relates to the number of households, gardens or plots that can be visited by each on a regular basis. In a situation where women are those chiefly responsible for crop production, female extensionists may be appropriate. • The most effective extensionists are likely to be those drawn from the refugee population, i.e. people having the same background of language, culture and circumstances. • The training and employment of a large number of extensionists is costly, and can be difficult to manage. • Community-based extension systems attempt to rely on local accountability, and local arrangements for satisfying remuneration or reward for work. • Community-based systems may not be options until refugee populations have developed local institutions, and people know and trust one another.
	Where can it be useful	• In most refugee settings where local relationships and institutions are yet to be established. • Where straightforward messages are presented. • Where information is to be disseminated fairly rapidly.
Farmer Experimentation	How it works	Farmers are encouraged to devise their own experiments on their gardens and plots. Some experiments will try out already proven practices, while others will reflect their own ideas and innovations. All build commitment to improving agricultural practises.
	What is needed	Farmers who are skilled and innovative, who are willing to experiment. Extension staff/systems who encourage and support the initiatives of such farmers.
	What planners and managers need to consider	Farmers are less likely to take risks experimenting with new methods when the land available for cropping is limited, and where food production is barely adequate for household needs.
	Where can it be useful	Relevant in most refugee settings.
Contact Farmers	How it works	Community members, usually selected by the community itself, provide a focal point for training and meetings. Their gardens and plots may provide sites for local demonstrations.
	What is needed	Respected community members willing to become focal points.

	What planners and managers need to consider	Contact farmers tend to be more progressive farmers. Their role may or may not include giving advice locally to other growers. In some community-based development projects communities prefer to encourage wider support among neighbours in a group, rather than encouraging one or a small number to assume a sense of leadership (that may lead to their eventual alienation).
	Where can it be useful	Unlikely to be relevant until settlement, integration and resettlement phases have stabilised and people know and trust one another; and local institutions are established.
Farmer to Farmer Extension	How it works	Progressive farmers provide extension advice to local people for modest fees, or payment in kind by groups, e.g. in the form of labour. If well planned and established carefully, this approach is likely to be fairly sustainable, as it requires little or no external input to maintain it.
	What is needed	Respected community members with good agricultural skills who are good communicators.
	What planners and managers need to consider	Farmer extensionists must be remunerated to offset the time that they spend away from their own farms. Guiding the development of a system that provides income or services that keep the farmer extensionists' motivated, which is affordable by farmers wishing to receive advice and training is critical.
	Where can it be useful	Unlikely to be relevant until settlement, integration and resettlement phases have stabilised and people know and trust one another.
Demonstration Gardens	How it works	Sites on, or among gardens and plots, designed to provide comparisons and opportunities for demonstrating specific skills.
	What is needed	A range of simple trials, examples and practices; and farm inputs.
	What planners and managers need to consider	Ensuring demonstrations are relevant and understandable. Keeping the demonstrations simple, and ensuring that comparisons (control plots, for example) are effective.
	Where can it be useful	In most situations.

Table 10: Relevance of Extension Approaches in Different Phases of Refugee Operations

Extension approach	*Emergency phase*	*Self reliance*	*Settlement, integration...*
Extension workers	●●●	●●●	●●●
Conserving Soil and Water	●	●	●●●
Plant Nutrient Management		●●	●●●
Pest and Disease Control	●●●	●●●	●●

●●● high ●● medium ● low

6

Planning a Project — *Steps to Address*

The process of planning a project will involve a number of inter-related steps. This checklist is intended to help in planning initiatives, in making decisions to develop support for agricultural activities and in monitoring the effectiveness of the work. References are made to other parts of the Handbook for further assistance. Attention is also drawn to a number of principles for agriculture in refugee and related settings: recognition and adoption of these may contribute to project effectiveness and impact. Further principles may also be developed and adopted as required.

Key principles relating to access to land ensure that:

- ✔ *all people have access to land that is suitable for crop production;*
- ✔ *people have adequate land to grow sufficient crops to supplement diets and contribute to, or maintain, livelihoods;*
- ✔ *people have sufficient tenure over land to establish commitment and provide a basis for its sustainable management;*
- ✔ *land allocated for cultivation is subject to land use planning and zoning to exclude areas at risk, or that lead to risk elsewhere.*

Step 1. Preparation

Even before a plan might be conceived, it is essential that managers/practitioners inform themselves of some basic facts. These will help provide a basis for sound agricultural activities in any developing refugee situation by quickly pointing out what is, might be or clearly is not an option for a particular setting. Questions such as the following need to be addressed:

- ➤ What is the probability of any (likely) refugees attempting some form of crop growing in the recipient country?
- ➤ What is the recipient country's position on agriculture in refugee camps, and what scope is there for interpretation, negotiation or reform of relevant agreements, legislation and understandings? If negotiation and/or reform is an option, who is best placed to undertake this and on what basis?
- ➤ What is the recipient country's position on locating refugees, in terms of access to land that is suitable for some form of crop production, and what room for negotiation, trade-offs and compromise might be found? If negotiation is feasible, who is best placed to undertake this, and on what basis?
- ➤ What capacity do the relevant agencies have for responding to refugee interest in agricultural production, and what further resources and expertise may be needed? Where might this come from? How can the response evolve as the situation evolves?
- ➤ What funding can be made available to support such initiatives?

STEP 2. Initial Planning

Determine who the project is intended for and what is it to address.

- ➤ What factors need to be taken into account when first considering this?
- ➤ Do host government policies, and their agreements with relief agencies, allow agricultural activities?

Key principles relating to project planning processes ensure that:

- ✔ *agencies have the necessary organisational and technical capacity to design and manage effective, sustainable and environmentally sound agricultural activities;*
- ✔ *project decisions are based on understanding the refugee setting, with clear analysis of people's needs, the agro-ecological conditions, and the policy and legal environment;*
- ✔ *all stakeholders are identified and have the opportunity to contribute to appraisal and planning;*
- ✔ *the needs and interests of the local (hosting) population are integral to the identification, design and implementation of a response;*
- ✔ *planning and training involves those people most actively involved in agricultural activities;*
- ✔ *agricultural projects are planned and implemented to provide support for, and improve the conditions of, the widest populations (in terms of, for example, interest and wealth groups, gender and age);*
- ✔ *project decisions contribute to meting the nutritional needs of the population, and cropping addresses these needs; and*
- ✔ *crops are secure from wildlife damage and theft.*

- ➤ If not, can some small-scale, sustainable and environmentally friendly activities be implemented?
- ➤ Does the agency (or do other organisations) have the capacity to respond (in terms of expertise, time, priorities, resources)?
- ➤ If not, can you 'partner' with an organisation that does?
- ➤ Is funding support available (i.e. who is likely to pay for a project or activity, and what is the maximum budget likely to be)?

Identify the key factors that have a bearing on planning a project or response.

- ➤ Is the area suitable for cultivation? Will crops grow in the area without significant resources and training?
- ➤ What are likely to be the broad environmental implications if cropping is practised?
- ➤ In terms of agriculture, ecology and climate, what sort of area are you in?
- ➤ What is the general background of the refugees, i.e. are they essentially cultivators, pastoralists or urban people?

Answers to the above should provide an initial picture that focuses attention on what to do, and whether circumstances are likely to allow anything to be tackled.

STEP 3. Develop a More Detailed Strategy

Know the intended users/beneficiaries.

- ➤ What don't you know about the people? What else must be learned before this process can be pursued further?
- ➤ What agricultural skills exist among the refugee and local populations, i.e. what crops did/do they grow, and which production systems and inputs did/do they use?
- ➤ Who, within a household and the population, has what responsibility – who makes decisions about farm work, and who does the work?
- ➤ Which crops are the most important and why – to supplement humanitarian food, to improve nutrition, to generate surpluses for barter or trade?
- ➤ Are local resources used and managed effectively and sustainably? How might this be enhanced/improved?

- What resources, in terms of training skills, social work and technical expertise, exist among the refugee population?

Resources available.

- What is the topography of the area? For example, are there steep slopes that need particular consideration?
- What other surface features are there, e.g. springs, swamps, marshes, streams or other surface water, roads, towns and other settlements?
- What are the soils like - are they light and loose or heavy and clayey - or is the ground rocky or sandy?
- What is the vegetation and to what extent does it cover the soil?
- Which areas, or what specific resources, should be protected?

Principles relating to environmental risks ensure that:

- ✔ *project decisions reflect understanding of circumstances and activities that can create environmental risks;*
- ✔ *refugees, local hosting populations and other stakeholders have the opportunity to participate in appraising environmental implications and contributing to project decisions; and*
- ✔ *project monitoring and evaluation systems include environmental issues including soil erosion, pollution risks and the protection of mother trees.*

Principles relating to access to inputs ensure that:

- ✔ *people have access to tools and inputs to prepare land, and plant and nurture crops; and*
- ✔ *all inputs provided reflect the need to establish local sustainability - reducing reliance on external resources and assistance.*

- Can the area be zoned to locate farming on land that is most suitable for agricultural activities, and where environmental problems can be minimised?

Competing needs.

- What competing uses exist for the same resource? For example, is land a scarce resource and are there many uses for it? How can the various needs and problems be balanced in the refugee setting?

Accounting for needs.

- How to be sure that the interests and needs of the wider population will be taken into account?
- Who are most likely to be marginalised in the implementation process and what will be the social and environmental implications of their marginalisation?
- What will be the role of women and can greater attention to their needs and concerns increase the overall impact of what is intended?

Identify a monitoring system.

- What indicators will demonstrate successes and failures?
- Who will choose these indicators?
- How will indicators be used?

STEP 4. Making Decisions

Have all considerations been addressed?

- Prepare a brief statement on how each of the following will remain in focus:
  - maintaining the interest and commitment of the population;
  - the needs and priorities of women and children;
  - the needs of special interest groups, e.g. those more marginalised or less able to participate due to status, disability, lack of resources;

- avoiding further refugee dependence on relief and other external organisations for resources, training and motivation as a result of the agricultural activities;
- avoiding conflict and building constructive relationships between refugee and local populations.

➤ Identify what other cross-cutting areas require thinking through, and prepare brief statements on how these will be achieved.

Appropriate technology options.

➤ What is appropriate given the climate, soils, rainfall/water, pest problems, knowledge, priorities and preferences, skills, resources, time commitment?

➤ Have the widest range of options been considered?

➤ Have the technologies selected been justified on environmental as well as social and cultural grounds?

➤ Have the particular environmental needs of areas and resources around the affected area been considered?

➤ Have the most suitable and more environmentally benign opportunities been selected?

➤ Have the selected technical options been tailored to the specific situation and environmental conditions? There is no off-the-shelf-package, and the area is unlikely to the same throughout.

Implementation approaches.

➤ How will an initiative encourage households to adopt the technologies that have been selected?

➤ Where will the trainers come from?

➤ What will happen if the selected implementation approaches are ignored or abandoned, and can this lead to environmental problems?

Principles relating to knowledge and skills ensure that:

✔ *extension and training is provided by staff who have skills and knowledge relevant to the prevailing circumstances, the culture and needs of the people, and the techniques that are appropriate;*

✔ *all sections of the population are aware of particular practises, and activities in specific areas, which create the greatest risks to the environment;*

✔ *people develop knowledge and adopt skills for land- and crop-husbandry appropriate to local conditions and circumstances;*

✔ *local capacity in hosting areas is used to support agricultural programmes;*

✔ *skills and knowledge of local populations are used to enhance refugee agricultural activities;*

✔ *people have knowledge and the means to protect their crops from pests by methods that minimise risks of pollution and contamination, or the use of unsustainable external inputs;*

✔ *people manage the soil and resources to maintain soil fertility;*

✔ *people practise agriculture that is free from risks of soil erosion; and*

✔ *crop surpluses are stored in sufficient quantity and in conditions that ensure they are adequately preserved and fit for consumption, and contribute to household security; or contribute effectively to household income.*

➤ How will the initiative ensure that everyone who is to participate has a chance to learn and the opportunity to put things into practise?

➤ Where will the (farm) inputs come from?

➤ How to ensure that things keep going if UNHCR or the implementing partners pulls out, or the money stops?

STEP 5. Managing the Project

Project management.

- What are the project management responsibilities?
- Which organisation is to lead the project?
- Who will manage the project, and to whom is that person accountable?
- Will there be a project advisory body; and will this body include refugee and local community representatives?
- What will be the mandate of the advisory body; and how often will it meet?

Opportunities for developing partnerships.

- Consider why partnerships would be useful.
- Identify sources of technical expertise.
- Decide what other groups should be able to bring to a project or activity.
- Clarify who will do what.
- Decide where the funding will go.

Funding needs and opportunities.

- What must be done to obtain funding?
- Once funding is provided, what accounting and other financing requirements will be required; who will ensure this is addressed satisfactorily?

STEP 6. Monitoring and Evaluating the Project

The need for a meaningful monitoring system has been addressed at earlier stages (Planning and Implementation) but will need clear and continuous follow-up if it is to prove effective.

Is the project effective?

- Who needs to be convinced that it is working?
- How is feedback information being conveyed to those that need to know?
- How is the initiative responding to what has been found?
- What, if any, actions need to be re-orientated, supported further without change, or dropped?
- Don't collect more information than is needed. Make a distinction between information that looks at the implementation processes of the project, i.e. for monitoring, and information that assesses the impact of the project, i.e. for evaluation.

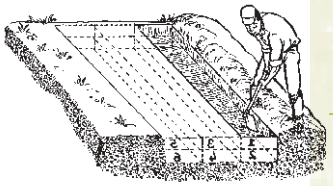
Annex A

Dictionary of Agricultural Production Techniques

Below are descriptions of various techniques, covering purpose, the inputs needed, possible management issues, and environmental implications. The techniques are listed in alphabetic order under the following headings:

- growing plants;
- soil and water conservation;
- plant nutrient management;
- pest control; and
- systems for managing water.

Topic	*Issue*	*Description*
Growing Plants		
Alley Cropping **(Also known as avenue cropping)**	What is it for?	One of the techniques central to agroforestry - a means of balancing the cultivation of land with a degree of more permanent vegetation-cover that protects soils and plants from the wind and sun. It also provides plant nutrients (drawing nutrients from deeper levels in the soil), and limits the spread of pests. It is suitable for a range of vegetables, legumes and grains.
	How is it done?	Crops are grown between rows of leguminous trees, some of which fix atmospheric nitrogen in the soil. The trees are pruned regularly, their leaves providing mulch and nutrients for the soil as they decompose.
	What inputs are needed?	Seed or seedlings of tree species that tolerate frequent pruning, support rather than suppress food crops, and have a distinct purpose within a production system, e.g. for fuel, building materials, livestock fodder, fruits. These tree species must be straight and deep rooting.
	What planners and managers need to consider?	Cultural and gender issues on household responsibilities and ownership relating to the planting and managing of trees, may need to be recognised. Establishment can take time, but the impact of the trees is evident from a fairly early stage of their growth. Wildlife and livestock may cause problems - young fodder trees being browsed before they can attain a height that cannot be reached by goats and wildlife. Some form of protection may be necessary. Initial cropping can be planned to incorporate this technique at a later date.
	What are the environmental implications?	Good techniques go some way to mimicking natural vegetation cover. Essentially the implications are positive, but users and extensionists often tend to favour exotic tree species. This need not be the case - there are indigenous species in most regions that can be used.

Topic	Issue	Description
	Where can it be useful?	Useful in a wide range of circumstances. Tends to be a medium– to larger-scale production system. Highly suited to most refugee settings where local and refugee populations are living in close proximity, and/or where refugee populations are expected to remain for long periods. Long-term benefits will accrue to local people when refugees depart.
Container Gardens	What are they for?	Good for growing green vegetables, especially where space is limited, where the climate is dry, or the ground is unsuitable for cropping, e.g. it is hard, stony or sandy. In temperate areas, deeper containers can be used for growing root vegetables and potatoes. Containers are watered easily, and concentrate plant nutrients.
	How is it done?	Local soil is collected, mixed with compost and put into old containers such as plastic bags, baskets, sacks, stacked car tyres, half oil drums etc. (Sealed containers like bags need holes poked in them to allow excess water to escape.) Seedlings are planted in the top as well as in slits cut into the sides so that plants are grown all over the container.
	What inputs are needed?	Regular watering of the growing plants is essential, plus basic skills, elementary materials, a few seeds and a little imagination. Plastic bags, baskets, sacks, stacked car tyres, half oil drums and similar containers are required.
	What planners and managers need to consider?	There are likely to be few limitations except water.
	What are the environmental implications?	Sourcing the soil and water will be the most critical in some marginal areas.
	Where can they be useful?	For very small-scale production – useful where land is either not available or where soils or climate make cultivation unlikely or very difficult. The technique is appropriate in almost any situation including fairly short-term and emergency conditions given that there is no commitment to cultivation and the development of structures.
Double-dug Beds	What is it for?	Double digging increases aeration and fertility, the well-prepared loose soil also allowing roots to grow evenly and provide a steady supply of nutrients to the rest of the plant. The quality and texture of the soil therefore allows more plants to grow in a given area, producing more food from a smaller plot. The system is suitable for growing almost any annual crop - from cereals to fruit and vegetables.
	How is it done?	Beds are dug twice – turning the top layer, and loosing the lower layer – so that the soil is prepared to a considerable depth. The liberal use of compost, green manure and other organic matter is a key element.
	What inputs are needed?	Initial work to set up this production system is fairly labour intensive, but, subsequently, close attention and good skills substitute for effort. The production of compost is essential.
	What planners and managers need to consider?	Given the high labour input required during initial preparations, and the fairly high skills-level needed subsequently, considerable effort may be invested in convincing and motivating communities. Because the quality of the soil develops over a number of seasons, the results are not immediate.

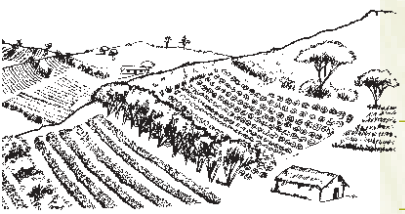
Topic	Issue	Description
	What are the environmental implications?	Double-dug beds are probably most appropriate in temperate climates. Well-developed and well-maintained beds can have few negative implications, but in tropical and arid regions heavy rainfall can be damaging to the soils because they are loose. This is likely to occur when beds are poorly protected, i.e. during the earlier stages of establishing crops, at the end of dry seasons, and where the system is practised poorly.
	Where can it be useful?	A small-scale technique central to bio-intensive farming, which is well suited to refugee settings where local and/or refugee populations can make a long-term commitment to soils, the development of skills, and physical effort. It is appropriate where land availability is severely limited. Inadequate rainfall or lack of irrigation water will become serious constraints to sustained production.
Growing Beds (... other than double-dug beds – but including mound beds, pit beds, fertility trench beds, keyhole beds, crescent beds and spiral beds)	What are they for?	Suitable for growing a wide range of fruits and vegetables, the design of beds is based upon the need for regular attention – easy access to the growing plants for watering, tending and harvesting. They make good use of limited space.
	How is it done?	In wet areas beds are mounded to shed water; in dry areas they are raised around a central hollow that is used for disposing waste material (to increase fertility), and to catch and retain moisture.
	What inputs are needed?	Basic skills and understanding are needed, with modest initial labour for preparing the selected type of bed.
	What planners and managers need to consider?	There are few limitations given the relative ease and immediate benefits of these techniques, i.e. few resources, basic skills and no major investment of effort. They represent something of a progression from a simple patch of vegetables towards more bio-intensive systems, and can demonstrate advantages very quickly through increased productivity.
	What are the environmental implications?	Only positive as long as the appropriate bed is selected for conditions prevailing in an area.
	Where can they be useful?	For small-scale production, the construction and shape of these narrow planting beds vary according to climate, soils and the space available. Useful at any stage, and in most refugee settings. More advanced techniques can build upon these systems.
Inter-cropping (Also known as companion planting, with further variations including relay cropping, strip cropping, and mixed inter-cropping)	What is it for?	Some field, fruit and vegetable crops show increased yield when placed with other crops. The mutual benefits vary, and may include soil improvement or increased fertility (e.g. maize inter-cropped with beans) and pest control (e.g. tomatoes grown with cabbages). Inter-cropping also reduces the risk of total crop failure and limits soil erosion.
	How is it done?	Crops are planted in alternate groups of rows that vary in width according to various needs and other factors.
	What inputs are needed?	The critical input is knowledge. As some crops compete with each other it is necessary for growers and advisors to have a good understanding of specific combinations of plants for the conditions prevailing.

Topic	Issue	Description
	What planners and managers need to consider?	Most communities have knowledge of inter-cropping, and the synergy between plants and crops with which they are familiar. This can be developed to include crops that are new to them. The principles are not difficult to understand, and are easy to adopt or adapt.
	What are the environmental implications?	This is a distinct improvement on monocropping (see below), contributing to the improvement of soil fertility and crop yields, and reducing the incidence of pest attack.
	Where can it be useful?	Suitable for the small–, medium– or larger-scale production of a wide range of crops. It is therefore useful in almost all situations where there is space for cultivating more than just a few vegetables.
MonoCropping (... and monoculture)	What is it for?	The planting of larger areas of land to a single crop makes mechanised production easier – dealing with the needs and characteristics of one crop rather than the needs of different crops.
	How is it done?	Monocropping refers to the planting of an area with just one crop type. Monoculture is the continuous planting of the same crop on the same land, season after season.
	What inputs are needed?	For sustained production there is heavy reliance on external (often synthetic) inputs, such as hybrid seeds, and synthetic fertilizers and pesticides.
	What planners and managers need to consider?	Assumes that larger areas of land will be cultivated, and that inputs are available. The method is used for large-scale production where ease of production substitutes for individual skills, and takes little account of many environmental concerns.
	What are the environmental implications?	The environmental implications of monoculture systems and mono-cropping are considerable, including: • Leaving the soil exposed for considerable periods. • The concentration of one species of plant in one area which increases its vulnerability to attack by pests. • A heavy reliance on external inputs (often synthetic) for pest control. • Heavy reliance on artificial fertilizers to maintain soil fertility.
	Where can it be useful?	Given the environmental implications and, usually, the need to maximise production from limited areas of land, there can be little justification for monocropping, and no justification for monoculture, in refugee settings.
Multi-storey Gardens	What is it for?	A very effective way of growing a variety of crops in small areas.
	How is it done?	Different plants grow to different heights and require varying amounts of sunlight, shade and other protection. Tree crops like pawpaw (papaya) are mixed in with bushes and bananas, and ground-loving crops are planted among these. The result is a garden that uses the height of different plants to increase production from an area where the amount of land cannot be increased.
	What inputs are needed?	Good skills, and access to a range of planting materials.

Topic	Issue	Description
	What planners and managers need to consider?	These systems require a longer-term commitment to land, as multi-storey gardens take time to develop and yield. They also tend to require moderate rainfall and fairly good soils.
	What are the environmental implications?	These gardens mimic woodland/forest, with diverse plants growing together with different canopies.
	Where can it be useful?	Useful in situations where communities anticipate a longer-term presence, and land availability is limited.
Rotation	What is it for?	One of the most effective means of controlling insect pests, crop diseases and weeds, and maintaining a nutrient balance in the soil in a system that tends towards some degree of monocropping. It is suitable, therefore, in any system that involves the production of a variety of crops.
	How is it done?	Successive crops (season to season) are chosen to avoid similar demands on nutrients, and to reduce the carry-over of diseases and insects pests in the soil.
	What inputs are needed?	Demand for, and access to, seeds and planting material for diverse crops.
	What planners and managers need to consider?	The critical factor in this system is the need for a range of crops from which to build an effective rotation. This reflects both household preferences and diets, the opportunities and constraints of the area where production is taking place, and access to seeds and planting materials.
	What are the environmental implications?	Essentially positive within the limitations of what may be a monocropping based system.
	Where can it be useful?	Suitable for all scales of production, and in all refugee settings.
Row Planting	What is it for?	To make it easier to plant the most appropriate number of seeds and seedlings for a given area, i.e. getting the plant population right, and to make weeding/pest control and other husbandry activities easier.
	How is it done?	Planting information – often provided on seed packets - gives details of the space to leave between plants in a row, and how far apart the rows should be. Rows do not need to be straight but are often parallel for ease of weeding and cropping.
	What inputs are needed?	Information on optimum spacing within, and between rows, according the crop, the variety and the growing conditions.
	What planners and managers need to consider?	Nothing in particular.

Topic	Issue	Description
	What are the environmental implications?	Optimum plant spacing ensures best soil protection within a mono-crop planting – reducing the potential for soil erosion once plants are reaching maturity. Row planting can increase the potential for erosion if it runs up and down a slope.
	Where can it be useful?	In any cropping situation.

Soil and Water Conservation

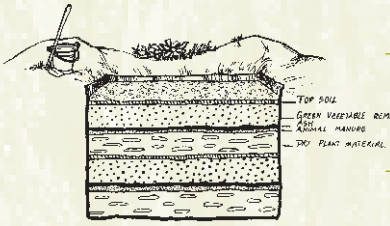
Contour Planting	What is it for?	To stabilise soils on sloping land, without moving soil to develop physical structures such as terraces. The technique is appropriate for all types of crops.
	How is it done?	Rows of crops are planted across the direction of slope, rather than in lines up and down the slope. Plants are closer to each other within rows, rather than between rows, so their stems and roots are better able to reduce the movement of surface water and trap particles of soil being carried by this water.
	What inputs are needed?	The basic skill of following a contour (which does not need to be particularly accurate).
	What planners and managers need to consider?	The planting of rows across, rather than along slopes, does not take any additional time or effort. The technique is simple to adopt. More important is recognising where cultivation of a slope presents a serious risk of erosion – indicating that the area should not be cultivated, or soil conservation structures are necessary.
	What are the environmental implications?	Contributes to controlling soil erosion on moderate slopes, but must be considered carefully on more severe slopes.
	Where can it be useful?	Useful in all crop production systems in almost any refugee setting where small- to larger-scale production is being undertaken.
Minimum Tillage **(Also zero tillage or low tillage)**	What is it for?	By minimising the disturbance of the soil, the potential for soil erosion is reduced and higher levels of water penetration, soil organic matter and plant nutrients can be maintained. Minimum tillage is mostly suitable for cereals and other crops planted as seed.
	How is it done?	The soil is not cultivated. Crops are planted by broadcasting directly onto the soil surface or drilled in simple furrows.
	What inputs are needed?	These techniques should not be used in isolation, but should be part of a comprehensive system that includes maintaining plant cover of the soil, and mulching.
	What do planners and managers need to consider?	Getting started is the problem. If the soils are good then there will be plants and seeds there already. Once the rains begin there is massive competition for light, nutrients and for root space. There is a lot to know about how to embark on this before attempting it. Weed control may be a problem and if not properly dealt with may lead to increased use of herbicides, and related environmental problems.

Topic	Issue	Description
	What are the environmental implications?	If this is practised badly, there are potential environmental implications. Zero tillage can lead to the development of hard pans that can eventually lead to erosion problems.
	Where can it be useful?	Suitable for medium– to large-scale production, and could be used in a refugee setting. However, probably inappropriate given the difficulties in controlling the growth of weeds unless used with well-managed mulching systems (see below).
Mulching	What is it for?	Mulching conserves soil moisture, adds plant nutrients, suppresses the growth of weeds, reduces the risk of soil erosion and encourages the build-up of humus.
	How is it done?	This is a key strategy for taking care of the soil, most easily undertaken at small– and medium-scale levels of production. The surface of the soil is protected with any of a wide range of materials including leaves, well-rotted manure, cardboard, newspaper or stones.
	What inputs are needed?	Not a difficult activity in terms of having access to suitable materials; and the principles are easy to understand.
	What do planners and managers need to consider?	None, but the growth of some crops are suppressed through exposure to the residues of certain plants.
	What are the environmental implications?	Almost wholly positive, but some mulching materials can attract pests and termites, especially in dryland areas.
	Where can it be useful?	Mulching is a technique that can be encouraged in almost any planting situation.
Soil Conservation Sturctures	What are they for?	This refers to a range of physical structures - modifications to the surface of the ground that are made to influence the run-off and infiltration of rain or surface water. They are usually associated with steeper ground, but are suitable for any area where long dry seasons are followed by periods of intense rainfall, i.e. where there may be a lot of water on dry, hard, poorly protected soil. Poorly controlled run-off frequently leads to soil erosion; and inadequate infiltration will contribute to low soil moisture levels, limiting plant growth.
	How is it done?	Structures include terraces (where the land is dug to make a series of level steps on a slope), swales (a level excavation across a slope with the soil thrown evenly along the lower edge) and infiltration pits dug at regular intervals to increase the amount of water retained. Structures tend to be adopted in medium– and large-scale production systems, but where a large number of smaller plots are adjacent to each other, these structures will also be relevant.
	What inputs are needed?	Construction requires skill, rudimentary tools and physical effort. They involve a significant investment of time and labour.
	What do planners and managers need to consider?	The undertaking is a major one, and motivating human labour is often difficult (unless within food-for-work type schemes). They also represent significant changes on the landscape, and reflect a degree of permanence of the refugee population and/or provide benefits for local populations as refugees depart.

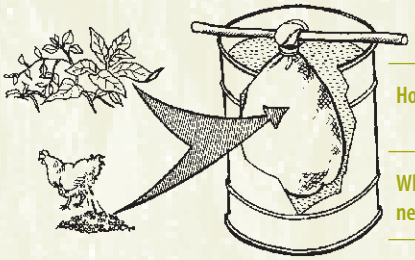
Topic	Issue	Description
	What are the environmental implications?	The building of soil conservation structures can have dramatic effects on protecting soils from erosion, but unless constructed properly they may increase erosion problems. They also change the topography of an area, involve the removal of all (or most vegetation) and influence water retention and surface water flows (which may have implications elsewhere).
	Where can they be useful?	As the construction of soil conserving structures requires high labour input, and will have a long-term impact on the landscape, these are more likely to be adopted in long-term settings involving settlement, integration and resettlement of refugees – when agencies are more able to promote refugee livelihoods.
Strip Cropping	What is it for?	To reduce soil erosion on sloping land, without moving soil to develop physical structures. The technique is appropriate among all types of crops.
	How is it done?	The process of providing permanent/semi-permanent grass strips to control erosion on cultivated slopes, between the cultivated crops. The grasses are planted along the contour. Other plants that produce thick ground-level growth can also be used. They slow the movement of any surface water, and trap particles of any soil that is being carried.
	What inputs are needed?	Grasses and other plants that do not self-seed, do not spread rapidly and which are not invasive.
	What planners and managers need to consider?	The use of grass strips anticipates the existence of livestock that will use it. In areas of severe land shortage where livestock are absent, or can gaze elsewhere, strip crops are likely to take land out of food crop production, and therefore be unpopular. Alternative methods based on soil conservation structures may be more appropriate under such circumstances.
	What are the environmental implications?	Effective in controlling soil erosion on moderate slopes, but on more severe slopes the desirability of clearing and cultivating land, constructing soil conservation structures and adopting anything except permaculture-based systems of production, must be questionable.
	Where can it be useful?	Useful in all crop production systems in almost any refugee setting where small– to larger-scale production is being undertaken.

Plant Nutrient Management

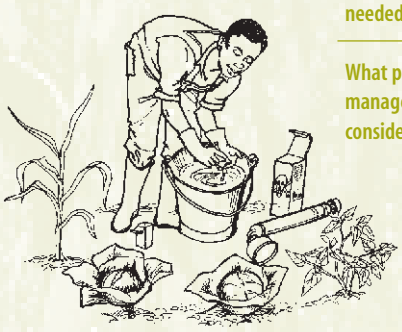
Artificial/Inorganic Fertilizer	What is it for?	Replacing or increasing the nutrients available to growing crops, to maintain or increase yields.
	How is it done?	Artificial fertilizer is applied by spreading it on, or mixing it into, the soils. It can be placed next to growing plants where it will have the greatest effect on growth.
	What inputs are needed?	Artificial fertilizers.
	What planners and managers need to consider?	Good knowledge of fertilizer types and composition. While the use of artificial fertilizers can greatly increase crop yields, they are costly to buy and, being bulky, expensive to transport. Farmers are not always able or willing to consider paying for fertilizers themselves, and dependence situations can develop if humanitarian agencies provide these, even initially, at no cost.

Topic	Issue	Description
	What are the environmental implications?	As they are soluble, the nutrients in artificial fertilizers are immediately available to plants . Their use can lead to pollution of water resources, and negatively impact natural vegetation and biodiversity if leaching and surface run-off removes them to other areas.
	Where can it be useful?	Artificial fertilizers may be appropriate in very intensive systems where high quality seed of varieties that respond to fertilizer applications are used. Not all crops, however, show increases of yield when fertilizers are applied.
Composting	What is it for?	Compost is a natural fertilizer – a valuable source of nutrients for growing plants that also helps increase the soil's capacity to retain water. It improves the structure, stability and general health of soil. The process of composting waste material recycles some of the nutrients harvested from the soil as crops.
	How is it done?	Plants (including weeds, prunings, crop residues), animal droppings, household and other organic wastes are heaped together so that they decompose. The heap should be protected to keep it moist and compacted.
	What inputs are needed?	The main inputs are organic wastes and a little effort.
	What planners and managers need to consider?	It takes time for compost to mature, and this may be a limitation in some situations. When well managed, compost can be prepared in surprisingly short periods of time – the key factors being temperature and water content of the composting materials – preferably warmer temperatures and moist (but not wet) conditions.
	What are the environmental implications?	The implications are wholly positive. This is a key step toward recycling nutrients back to the soil, and also reduces the likelihood of poor waste disposal – discarded rotting materials that can lead to health and pollution risks.
	Where can it be useful?	Important in small– and medium-sized levels of production. Compost-making is generally recognised as an important activity, but the need for labour/effort often precludes its practice.
Composting Toilets	What are they for?	Composting toilets are a means of recycling plant nutrients – collecting and composting human waste (excreta and urine) under safe conditions. It is most practical at the household level.
	How is it done?	The disposal of human waste in a pit latrine is undesirable and potentially polluting – it can, for example, impact water tables. Very simple techniques, combined with processing kitchen wastes and other composting materials in a specially constructed latrine, can result in an excellent clean and odourless fertilizer.
	What inputs are needed?	Simple designs and materials for building composting toilets, the raw materials, and management skills to operate the system properly.
	What planners and managers need to consider?	Social taboos are likely to be considerable in most situations. The cost of building composting toilets that can be managed easily is high. Furthermore, a fairly long-term and stable situation is needed to ensure commitment to the processes.

Topic	Issue	Description
	What are the environmental implications?	Almost wholly positive. Human waste is a potential health and environmental hazard, especially in large quantities. The establishment of household level systems that compost the wastes – producing an odourless material that can be spread safely on gardens – is clearly favourable to traditional pit latrines.
	Where can they be useful?	More appropriate among populations that are settled and permanent, or have a longer-term outlook. Within any refugee setting the local population will benefit from this technology and the techniques it involves.
Fallow	What is it for?	Soils contain various levels of nutrients, but not all of these are in a form that can be used by plants. As plants grow they remove nutrients from the soil, but some remain 'locked up' in forms that plants cannot utilise. The compounds in which they are 'locked up' do break down over time, but this can be a slow process. A fallow period rests the soil, allowing more nutrients to be released, replenishing those used by crops in previous seasons.
	How is it done?	Leaving the land without crops for a season allows nutrients, that are 'locked up' in the soil, to be released – replenishing nutrients which are then available for plants to use.
	What inputs are needed?	None. This is a natural process that requires time.
	What planners and managers need to consider?	Fallow should not be considered as abandoning an area of cropping land for a season. Good fallow involves cultivation to remove weeds, and retain or increase soil-moisture. In a situation where land availability is an issue, leaving a proportion of cultivated land fallow is a difficult process to encourage. Alternatives include green mulching, not only allowing the soil to rest and recover, but assisting and enhancing the process (see Green Manuring and Rotation).
	What are the environmental implications?	Leaving soils without crops may expose them to wind, rain and the sun. Without careful management these can contribute to soil degradation. (Green manuring can help reduce these problems.)
	Where can it be useful?	Only to be considered where land availability is not an issue.
Green Manuring	What is this for?	Important in regenerating and conserving the soil – providing cover to otherwise exposed soils, adding organic matter, drawing nutrients from the subsoil and the atmosphere. It also reduces soil moisture loss.
	How is it done?	Specific crops are planted on an area of land, and then ploughed or dug back into the ground, or cut as mulch, or removed and composted. Ideally these crops will be nitrogen fixing.
	What inputs are needed?	The key inputs are the seeds of suitable crops (usually legumes) and a will/commitment to break from growing food to devote areas to regenerative planting for a part of, or a whole season.

Topic	Issue	Description
	What do planners and managers need to consider?	The latter input will be the greatest constraint – encouraging growers not to plant food crops in a given plot (or proportion of a plot) in order to devote it to a green manure crop. This may be difficult in a refugee situation where limited time-horizons lead to pressure to address short-term needs, even though the potential returns on taking a plot out of production for two or three months are considerable. Land availability may be an issue or a limitation.
	What are the environmental implications?	A very positive step towards soil conservation if a monoculture-based system is operated, but equally useful in other systems.
	Where can it be useful?	Suitable for small–, medium– and larger-scale crop production in almost any circumstances.
Liquid Manure	What is it for?	A useful means of providing plant nutrients, replacing those removed through harvesting. Liquid manure is a natural material which releases most nutrients more quickly than ordinary manure, and which is less likely to 'burn' crops with a concentration of nutrients.
	How is it done?	This is made-up by mixing fleshy leaves with water, (adding livestock droppings if available).
	What inputs are needed?	Suitable plants, animal droppings and basic items for soaking and mixing.
	What planners and managers need to consider?	Valuable for small-scale crop production.
	What are the environmental implications?	Liquid manure is a concentration of plant nutrients, and its storage and use must consider the risks of polluting water resources.
	Where can it be useful?	Suitable for small–, and medium-scale crop production. This is not particularly time-consuming, involving minimal effort and resources, and is something that can be undertaken in any situation.
Manure	What is it for?	An important source of plant nutrients, replacing those removed through harvesting. Manure is a natural material which is fairly balanced (when fresh) in plant nutrients, though rather concentrated.
	How is it done?	This is the addition of animal droppings to the soil. The quality and effectiveness is greatest when either composted or processed to produce liquid manure (see respective notes on these techniques).
	What inputs are needed?	Animal dropping and time for composting/rotting it down.
	What planners and managers need to consider?	The greatest problem is likely to be access to sufficient volumes of the raw material – i.e. are there enough livestock – and the implications of livestock keeping (socially, politically, environmentally etc.) in the prevailing situation? There may also be competitive uses of the manure, e.g. for energy.

Topic	Issue	Description
	What are the environmental implications?	Manure can be toxic, especially in watercourses and other water resources, in relatively small volumes. There are clearly management issues to consider relating to siting of any livestock pens and the accumulation of raw manure.
	Where can it be useful?	Suitable for all levels of production.
Pest Control		
Attracting Useful Predators	What is it for?	A biological control method that encourages predators to prey on unwanted pests. There are few costs and the techniques avoid the use of poisonous chemicals.
	How is it done?	A number of plants attract creatures that prey upon harmful insects that may invade crops. Farmers can encourage these by placing and nurturing the plants that they need and favour.
	What inputs are needed?	The methods rely on considerable levels of knowledge – on the pests that attack various crops, and the predators that in turn can help get rid of these pests. Frequent field inspections are necessary.
	What planners and managers need to consider?	This approach towards pest control builds skills and knowledge, and requires a longer-term commitment to production within an area.
	What are the environmental implications?	These are very sound approaches to pest control that have to be favoured (see Section 5.1.3) over the general use of poisons. There should be some consideration over the introduction of these plants to areas where they are not naturally occurring vis-a-vis their potential invasiveness.
	Where can it be useful?	In most situations, but most effective when dealing with a few crops and a few key pests.
Natural Insect Pest Repellents and Killers	What is it for?	A biological control method using extracts from plants (and some insects) to deter insect pests. These are usually inexpensive (or have no direct cost) to produce. They are often effective, and often easy to learn.
	How is it done?	Specific plants or insects are crushed and mixed with water, and the strained solution then sprayed on the crop.
	What inputs are needed?	The main needs are knowledge on what can be done, and the plants, insects and skills to do it.
	What planners and managers need to consider?	The 'recipes' are fairly straightforward and generally utilise locally available materials.
	What are the environmental implications?	Some plant extracts may be even more toxic than synthetic pesticides and exposure to these extracts may lead to health problems among those using the materials (and their families). The toxicity of plant extracts should, ideally, be known prior to the development and/or promotion of a programme based on these products.

Topic	Issue	Description
	Where can it be useful?	Suitable for small– and medium scale crop production. This can be introduced very early in the process of developing crop production but caution should be exercised regarding the type of product promoted and the method of application.
Synthetic Pesticides	What are they for?	Proprietary products for controlling weeds, insects, fungal and bacterial diseases, and other organisms that affect crop growth and production. These chemicals are applied to crops at specific stages of their growth (to prevent attack or infestation), or in response to the appearance of the pest (to control attack or infestation).
	How is it done?	Usually applied as liquids (in the form of sprays) or powders (by dusting crops).
	What inputs are needed?	Chemicals are manufactured under controlled conditions, and distributed through input-supply systems.
	What planners and managers need to consider?	• These products are generally costly and their introduction requires not only the funds to purchase them, but also the resources to maintain a supply pattern beyond the life of any project. As they have a direct cost, farmers will eventually need to find a means for purchasing these themselves, or will give up their use (leading to an increase in pest problems, reduced yields, or the adoption of alternative pest control methods). • Pesticide use can have very serious health and environment implications. • Their safe use requires good training and/or good literacy skills (for reading labels for instructions). The safe use of pesticides may also have further costs (for protective equipmentand training). • Supply is controlled by private agencies, with a fixed and normally high costs.
	What are the environmental implications?	• Pesticides are, by definition, poisonous. They are often toxic to those handling them; and toxic to those consuming crops if fruits and vegetables are harvested without adequate attention to the instructions provided by manufacturers. They can also be harmful in the wider environment as pollutants in water resources (including ground water), toxic to wildlife and non-targeted plants and animals, and some can build up harmful residues in the soil. • The use of chemicals presents many concerns, and the disposal of pesticide containers, the protection of users and the washing of applicators/equipment and the disposal of cleaning water etc. may also present very considerable problems, or lead to further threats of contamination and poisoning.
	Where can they be useful?	The use of pesticides should be considered very carefully, and alternatives encouraged (i.e. reviewing the options within IPM).
Pest Repellent and Decoy Plants **(Also known as trap plants)**	What is it for?	Biological control methods based on repelling, or attracting, plant pests, without using poisonous materials (whether artificial or natural).
	How is it done?	Decoy plants are attractive to certain pests. Once attracted the infested decoy plants are then composted or burned. Other decoy plants actively restrict some of the functions of the pest itself. Repellent plants deter pests.
	What inputs are needed?	Specific knowledge is needed on plants, and the pests attracted, plus access to sources of the known repellent/decoy/trap plants. Not all of these plants will grow in all conditions.

Topic	Issue	Description
	What planners and managers need to consider?	The method requires more advanced skills and knowledge that can be developed if improved agricultural techniques have been adopted readily.
	What are the environmental implications?	These are very sound approaches to pest control that are favoured over the use of synthetic chemicals and other poisons. There should be some appraisal of implications of introducing these plants to areas where they are not naturally occurring vis-à-vis their potential invasiveness.
	Where can it be useful?	Suitable for small-scale and medium-scale production systems.

Systems for Managing Water

Bottle Watering

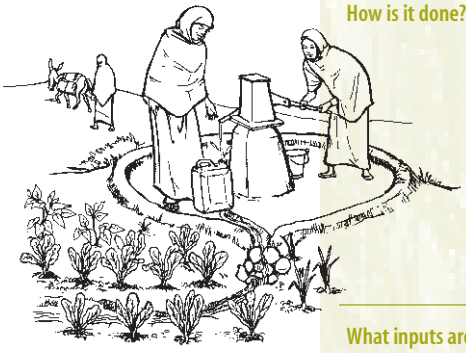
	What is it for?	A method for reducing water use and watering needs for crops in dry areas – placing the water where it is needed, i.e. next to the roots. The method controls where the water goes, watering only the plants that are desired. Commonly used on tree seedlings but can be used with vegetable crops as well.
	How is it done?	A filled bottle of water is turned upside-down and buried to half its depth in the soil next to a plant or group of plants. It is refilled every 2-4 days. Alternatively, plastic containers or ceramic pots with holes drilled in the base (with caps and flat stones placed over the mouth to stop evaporation) can be used.
	What inputs are needed?	Water, very basic skills and knowledge, and bottles, containers etc.
	What planners and managers need to consider?	None.
	What are the environmental implications?	There appear to be none.
	Where can it be useful?	For small-scale production in dry areas. Suitable in almost any situation.

Irrigation

	What is it for?	Replacing or augmenting rainfall with water from other sources.
	How is it done?	There are many different systems that vary according to water availability, and the resources and technologies available. The simplest, guide and provide water to the growing crops along hand-dug channels. More complex are the systems that deliver water through pipes and to sprinklers.
	What inputs are needed?	Different systems require different inputs, but the most fundamental is water. Generally, the lower investment in the system, the greater the volume of water required.

Topic	Issue	Description
	What planners and managers need to consider?	The decision to adopt irrigation requires considerable analysis. Expertise should be sought on a wide range of issues including environmental impact, the suitability and management needs of soils, the design of systems, and their establishment, operation and maintenance.
	What are the environmental implications?	The extraction of water, whatever the source, is likely to have implications elsewhere – reducing water availability in other areas, affecting natural resources, and impacting on the production systems of other farmers. Irrigation can lead to salination, and the degradation of soils.
	Where can it be useful?	May be appropriate in settlement, integration and resettlement phases where self-reliance can be addressed, where suitable soils and adequate water resources are available, and local economies will provide farmers with adequate income to offset costs associated with operating and maintaining irrigation systems.
Water Harvesting Systems	What are they for?	Methods for collecting and keeping water for use in gardens and plots.
	How is it done?	There are various methods, including: • Road-water harvesting – collecting water from roads and road edges. The hard surfaces can make good collection areas. Run-off is channelled into collection pits or small surface dams. • Roof-water harvesting – collecting water from the roofs of homes and other buildings. If there is guttering this can feed water into tanks/containers. Without guttering, shallow trenches around a structure will collect a roof's rainwater and direct it to ground pits and other collection structures, or direct to a garden. • Rock-catchments – the use of simple low walls to guide water on rock outcrops towards a collection point.
	What inputs are needed?	They vary considerably. Rock catchments need cement and sand as well as rocks to build the walls. All are likely to require some sort of water holding structure – from drums and other manufactured or recycled containers, to concrete tanks and surface-water dams (both of which are expensive). The latter, larger structures will require specialist technical expertise.
	What planners and managers need to consider?	Not all soils will effectively 'hold' water. Clay soils are best. Where soil is scooped out to make hollows, pits or dams, exposed subsoil should be covered with clayey topsoil to provide a layer that will prevent the water soaking away. Sandy soils are unsuitable. Costs can be high where structures are to be prepared. The collection of large volumes of water can be problematic, leading to erosion (see below), can be dangerous (if close to settlement areas), can become areas where mosquitoes breed, and sources of water-borne diseases. Careful planning is important.
	What are the environmental implications?	The management and control of collected water can, where rainfall is very heavy at the end of dry seasons, lead to erosion problems through failure of surface water dams, poorly controlled overflow from dams and channels etc.
	Where can they be useful?	In most situations where land is available, and soils and topography permit.

Topic	Issue	Description
Simple Wastewater-using Systems	What are they for?	Methods of catching and using water for growing crops, which might otherwise be wasted.
	How is it done?	Methods include: • Grey-water use – water used in households for washing and cleaning that is reused by channelling it to fruit trees, into vegetable gardens, or left to infiltrate around an area of creepers and other plants that require a lot of water. • Tap-stand gardens – the process of using water that runs-off from a water collection point, channelling it to growing crops. (Often a benefit of the job of managing a tap-stand.) • Trapedoipodal bunds and half-moon catchments – methods of concentrating limited amounts of rainwater around trees in dryland areas. Small bunds channel and increase infiltration of surface water to individual trees, or clusters of plants.
	What inputs are needed?	Imagination and a little skill to reduce wastage and maximise benefits.
	What planners and managers need to consider?	Most appropriate in dryland areas.
	What are the environmental implications?	These should not have any environmental implications.
	Where can it be useful?	In almost any refugee setting, particularly in dryland areas.



Annex B

Further Reading

Crop Production:

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Environmental Guidelines:

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UNHCR's environmental activities are designed to prevent, mitigate and, when necessary, rehabilitate the negative effects of refugee settlements on the environment so as to secure the welfare of refugees and local populations, and foster good relations with host governments who provide asylum to refugees.

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