



# The Struggle to Combat Desertification

Guidelines to Good Practices

## *Farmers' Experience for Sustainable Development*

Ch.Errath, FAO

### ***Presented by***

International Federation of Agricultural Producers (IFAP)

Working Group on Desertification (WGD)



### ***With the support of***

French Ministry of Environment and Sustainable  
development (MEDD)



French Ministry of Foreign Affairs (MAE)



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# Guidelines to Good Practices

## *Farmers' Experience*

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The *United Nations Convention to Combat Desertification* reflects the international community's concern over the possible impacts of desertification.

Farmers are among the first victims of soil deterioration. Through their labour, they play a key role in combating desertification and mitigating drought.

These guidelines to good practice capitalize on the experience and observations of farmers from more than 25 countries. The strategies that they propose focus on agriculture and the environment as well as on socio-economic issues.

This widely accessible tool is aimed at raising awareness among farmers since combating desertification means more than fighting the encroachment of deserts.

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# Acknowledgements

## *To Farmers*

We wish to thank everyone who participated in this study. We received contributions from the following farmer's organizations and associations:

Agri South Africa (South Africa)  
Assemblée Permanente des Chambres d'Agriculture du Mali  
Association des Agriculteurs des Caraïbes  
Association FIFATA (Madagascar)  
Association des Agriculteurs du Cambodge pour le Développement Agricole  
Association Nationale des Organisations Professionnelles Agricoles de Côte d'Ivoire  
Centre de Recherche sur le Désert (Arab Republic of Egypt)  
Chambre Nationale d'Agriculture de l'Algérie  
Coalition Paysanne de Madagascar  
Comité Agricole du Liban  
Conseil National de Concertation et de Coopération des Ruraux (Senegal)  
Fédération des Organisations Rurales pour le Cameroun Économique (FORCE)  
Fédération des Chambres d'Agriculture et de l'Élevage de Mauritanie  
Fédération des Coopératives de marché du Sri Lanka  
Fédération des Paysans du Fouta Djallon (Guinea-Conakry)  
Fédération des Unions de Producteurs du Bénin  
Fédération Nationale des Organisations Paysannes du Burkina Faso  
FEKRITAMA (Madagascar)  
Ghana Rural Reconstruction Movement (GhRRM)  
Kissan Board Pakistan  
Mouvement Paysan de Papaye (Haïti)  
PAKISAMA (Philippines)  
Rural Network for the Protection of the Environment (Réseau Paysan pour la Protection de l'Environnement - R.P.E.)  
Union des Chambres d'Agriculture de Turquie  
Union Centrale des Coopératives Agricoles (République Arabe d'Egypte)  
Union Départementale des Producteurs de Mono/ Couffo (Bénin)  
Union Nationale des Coopératives Agricoles et Maraîchères du Burkina Faso  
Union Nationale des Agriculteurs du Kenya  
Union Nationale des Agriculteurs et éleveurs du Nicaragua  
Union Tunisienne d'Agriculture et des Pêches  
Uganda Cooperative Alliance Limited  
Surjamukhi Sangstha (Bangladesh)  
Syndicat des Agri-Eleveurs IMBARAGA (Rwanda)  
Syndicat National des Agriculteurs Comoriens

# Partners...

The International Federation of Agricultural Producers (IFAP), in collaboration with the Groupe de Travail Désertification, the Ministère de l'Aménagement du Territoire et de l'Environnement (France), the Centre d'Actions et de Réalisations Internationales and the Comité Scientifique Français sur la Désertification, has prepared these guidelines to good practices.

## **International Federation of Agricultural Producers (IFAP)**

Established in 1946, IFAP is an international forum for farmers' organizations, and it offers farmers an opportunity to exchange ideas and pool their experience. IFAP advocates joint international policies and initiatives. It represents the interests of its 85 national member organizations comprising approximately 500 million farmers.

## **French Ministry of Environment and Sustainable Development (MEDD)**

### **French Ministry of Foreign Affairs (MAE)**

These ministries support has made the implementation of this project possible.

## **Working group on Desertification (Groupe de Travail Désertification (GTD))**

The Working Group on Desertification was set up in France in 2000 on the initiative of the players involved in the fight against desertification. It is currently composed of NGOs (CEIPAL, EAU VIVE, ENDA, IFAID, STM, SOS Sahel), a federation of agricultural professionals (IFAP), scientists (CSFD, ROSELT/OSS) and AFD. It is also one of the working groups of CRID.

The objective of this Group, for the moment an original one in Europe, is to serve as a platform for sharing information and experiences, transforming them into educational tools, strengthening the participation of civil society, and lobbying in France and at the international negotiations on the United Nations Convention to Combat Desertification (with the aim of ensuring its implementation).

The Working Group on Desertification is a member of eniD, a European network of players from civil society, of different sizes and structures, committed to implementing the CCD. Created in 2001 thanks to the strong impetus of French and German networks, this network now consists of six organisations or consortiums and their operational partners in arid regions and in Europe. They are based in Germany, France, Norway, the Netherlands and Ireland. The United Kingdom and Finland are also involved.

## **Centre d'Actions et de Réalisations Internationales (CARI)**

This non-profit association is active in the realm of international solidarity and the environment, and it relies on intervention methods focusing on participatory research, responsibility and consideration of the cultural factors as well as agroecology.

CARI is the facilitator of the GTD.

## **Comité Scientifique Français sur la Désertification (CSFD)**

The CSFD was established in 1997 and bring together high level scientists who share their knowledge and guidelines in order to effectively combat desertification. It has provided support in the revision of the scientific and technical facets of these guidelines to good practices.

# Introduction

Contrary to preconceived notions, the issue of desertification is not limited to soil deterioration in arid, semi-arid and dry sub-humid zones, but it affects rural development.

**There is an urgent need for action. Over 1 billion people are victims of the effects of desertification. Some of them are facing malnutrition through the declining productivity of the land on which they rely for their livelihood.**

In addition to climatic factors, socio-economic and political issues, such as natural resource management affect desertification, whose effects are apparent with regard to water, forests and agriculture, and in society, e.g. rural exodus.

Therefore, measures to limit the effects of desertification must take into account socio-

economic, political and environmental issues in order to foster sustainable development and poverty eradication.

The ***United Nations Convention to Combat Desertification (CCD)***, adopted in June 1994 and ratified to date by 172 countries, advocates integrated measures to combat desertification, which is caused by “complex interactions among physical, biological, political, social, cultural and economic factors.”

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**Approximately 130 million hectares of land worldwide are now unusable for agricultural production, an area equivalent to France, Italy and Spain combined.**

## Why produce guidelines for good practices?

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As a widely accessible tool, these guidelines for good practices are intended to make known the methods used and the strategies adopted by farmers in response to desertification. Above all, the guidelines are designed to enhance skills, broaden knowledge through the dissemination information on the struggle to combat desertification. All this is part of IFAP development policy.

To combat desertification and drought, the coordinated participation of local communities, farmers' organizations, the public sector, non-governmental and international organizations is essential. We must focus, in particular, on prevention, especially in respect to the owners of land that is likely to deteriorate or which has just started to deteriorate.

This compilation of farmers' experiences seeks to encourage the application of better-adapted, more appropriate techniques in the fight against desertification.

## Desertification worldwide

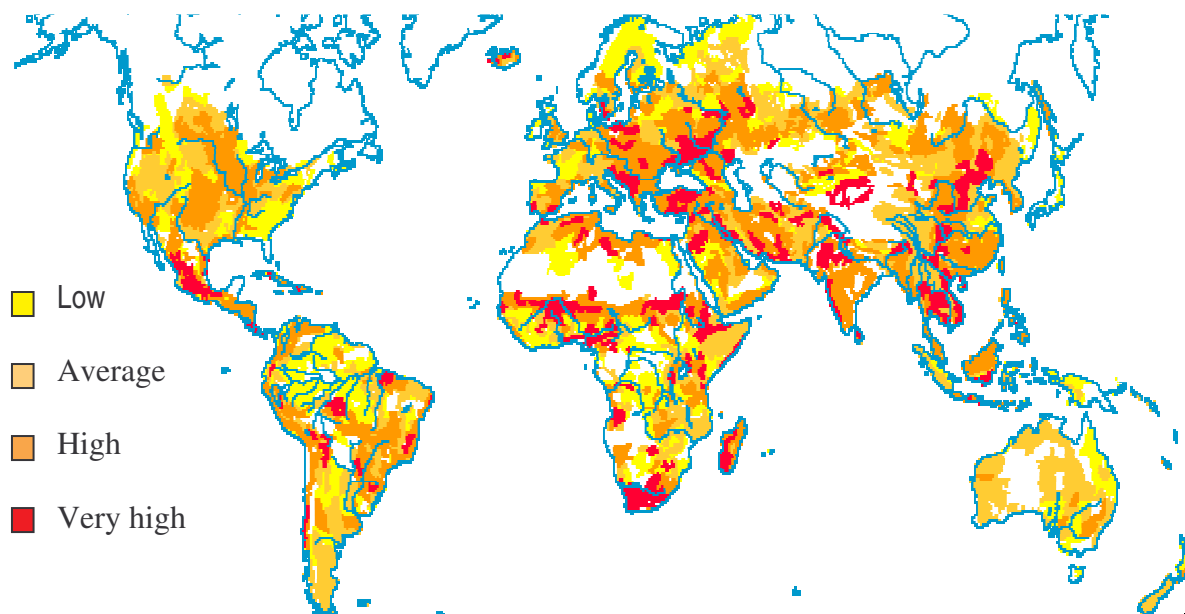
The victims of desertification include some of 20 developed nations, e.g. Canada, China and Brazil. However, the most extensively affected zones are found in developing countries, particularly in Africa. Most soil are poor and saline, and precipitation is low and irregular. Each year, erosion and poor soil management, often due to overexploitation, render sterile farmland with an area equivalent to that of Ireland.

**Desertification affects 20% of the world's population and 25% of the earth's land area. The desertification process is accelerating.**

Desertification is not confined to the expansion of deserts but also concerns soil impoverishment, erosion and the loss of water from land. The destruction of land leads to a reduction in animal and plant production and exacerbates poverty.

**Over 40% of Africans, i.e. approximately 200 million people, are living on land that is likely to deteriorate.**

## Soil deterioration



Source: UNEP, *World Atlas of Desertification*, Map 10: "Sévérité des zones de dégradation du sol." London: Arnold, 1992.



# Overview of the United Nations Convention to Combat Desertification (CCD)

Adopted in Paris on June 17, 1994 and ratified by 172 countries, the *United Nations Convention to Combat Desertification* includes more than a purely technical dimension related to soil protection. It focuses on sustainable social development as well. Desertification must not be regarded as the advancement of the desert but instead as the result of climatic change, and an array of inappropriate practices such as deforestation, overgrazing, overexploitation of land, inadequate irrigation methods, and brush fires whose size is exacerbated by drought.

The complexity of desertification calls for the development of synergies between the *UN Convention to Combat Desertification*, the *UN Convention on Bio-Diversity* and the *UN Framework Convention on Climate Change*. There is also a need for a comprehensive approach that is closely aligned with development policies. The environmental and economic consequences of desertification, such as the reduction of biodiversity and carbon fixation, as well as water pollution, are felt worldwide.

The CCD encourages the countries affected to elaborate and implement a National Action Program to Combat Desertification (NAP) that calls for the active participation of communities and civil society. Since rural communities and, in particular farmers, live on and from the land, they play a leading role in this regard. Therefore, their mobilization is of utmost importance in order to coordinate actions to combat desertification..

## Desertification or Soil Deterioration?

The United Nations Convention to Combat Desertification (UNCCD) establishes the following.

### Desertification

Desertification is the process by which land in arid, semi-arid or dry sub-humid zones is deteriorated as a result of various factors, including climate change and human activity. **The struggle to combat desertification** seeks to:

- prevent or limit soil deterioration, and
- regenerate deteriorated soil.

### Drought

Drought is a natural phenomenon that contributes to desertification and exacerbates its effects.

**Drought mitigation measures** are intended to reduce society's and natural systems' vulnerability to the impact of desertification.

### Soil deterioration

Soil deterioration is the reduction in or disappearance of the biological or economic productivity of farmland or woodland stemming, in particular, from:

- soil erosion caused by precipitation and wind
- the deterioration of the soil's physical, chemical and biological properties
- the gradual disappearance of natural vegetation, and deforestation.



# Global Mechanism



The Global Mechanism (GM) is an organization created to mobilize and manage financial resources for assisting in the implementation of the Convention in affected countries. Established under the authority of the *First Conference of Parties (COP1)* in Rome, September 1997, the GM's mandate is "to promote actions leading to the mobilization of substantial financial resources, including for the transfer of technology, on a grant basis, and/or on concessional or other terms, to affected developing country Parties". The International Fund for Agricultural Development (IFAD) was selected to house the administration of the GM, which also

receives support and advice from a Facilitation Committee (FC). The FC is comprised of representatives of multilateral institutions such as the World Bank, the United Nations Development Programme (UNDP), the Secretariat of the UNCCD, the United Nations Environment Programme (UNEP), the Secretariat of the Global Environment Facility (GEF), the Food and Agriculture Organization of the United Nations (FAO) and the regional development banks of Africa, Asia, and Inter-America.

**The Conference of Parties (COP)** is a supreme decision making body, composed of all ratifying countries, and created to oversee the implementation of the convention.

## The Role of the GM

The GM's role in the implementation of the Convention is to act as an honest broker of financial resources. By building partnerships between parties with financial resources and parties who are in need of them, the GM facilitates the supply and demand of global funds for desertification. The GM also has command of its own resources, and funding is made available to the GM through the COP and voluntary contributions and catalytic resources from bilateral and multilateral sources. These funds are used to create favourable conditions for other development partners to contribute, and they are considered catalytic investments because they mobilize greater resource flows and lead to a multiplier effect on GM projects.

### The GM and National Action Programmes

The GM also supports affected countries in the formulation and implementation of National Action Programs (NAP). Some countries that have benefited from this funding include: Algeria, Argentina, Burkina Faso, China, the Democratic Republic of the Congo, Cuba, the Dominican Republic, Egypt, Ethiopia, Haiti, India, Iran, Kazakhstan, Kyrgyzstan, Mali, Mauritania, Mongolia, Morocco, Pakistan, Senegal, Tajikistan, Tunisia, Turkmenistan, Uganda, Uzbekistan, and Zimbabwe.



Since it began its operations in 1998, the GM has given money to governments, intergovernmental organizations, and non-governmental organizations mainly in the form of facilitation grants or technical assistance.

Along with its role in the mobilization of financial resources, the GM serves as a hub where the parties committed to combating desertification can focus their energies and resources and exchange their knowledge and experience. The GM is interested in promoting a broader involvement of government and non-governmental organizations, and works actively to foster relationships between the two groups in combating desertification. Other objectives of the GM include the integration of desertification and land degradation into existing government programs and the development of National Action Programs.

# Study Framework

## *of the Guidelines to Good Practices*

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The struggle to combat desertification is based on the determination of the level of **soil deterioration** and, above all, on an assessment of the **socio-economic** consequences of desertification in local communities.

Moreover, this struggle is part of a comprehensive sustainable development process. Consequently, the survey grid elaborated in respect of this study focuses on agro-environmental as well as on socio-economic issues.

This survey is intended, first and foremost, to pinpoint farmers' perceptions of desertification. To this end, we have recorded the experiences of various agricultural stakeholders, i.e. farmers, members of national farmers' organizations, and researchers in the tropical agricultural sector.

### ▪ **Geographic zones**

In the framework of its policy governing public assistance for cooperation, the French Ministère des Affaires Étrangères pinpointed in 1998 a zone comprising 55 countries, called the priority solidarity zone (ZPS). Experience pertaining to good practices is drawn primarily from the countries in this zone.

### ▪ **Structure of the survey**

The structure of the survey of farmers is indicated below.

1. Describe agricultural conditions at the national or regional level.
2. Pinpoint the extent of desertification's effects from the standpoint of:
  - a) agro-environmental issues (biotope, soil and water), and
  - b) socio-economic issues.
3. Identify the initiatives undertaken to remedy the problems.
4. Collect quantifiable data and record farmers' perceptions of the effects of desertification.

### ▪ **Classification of data**

Once the questionnaires had been processed, a general classification centred on two levels of aridity was adopted. Farmers chose the aridity zone proposed in the questionnaire that most closely resembles their own environmental conditions. The two aridity zones are:

- the arid and semi-arid zone; and
- the dry sub-humid zone.

The three components of the "agro-environmental" section - biotope, soil and water, and the components of the "socio-economic" section were all analysed in terms of this general classification of aridity zones.

## Objectives

These guidelines to good practices are intended to heighten awareness among and inform stakeholders in the agricultural sector with respect to the strategies and techniques used to combat the effects of desertification.

## Multifunctional use of land

- Aside from the encroachment of the desert, desertification aggravates environmental problems whose consequences extend beyond the borders of the countries affected. Land in arid, semi-arid and dry sub-humid zones is subject to recurring drought, which often triggers desertification, which in turn is exacerbated by inappropriate management of natural resources. For example:
  - **over-cropping**  
depletes nutrients and reduces the soil's fertility;
  - **over-grazing and deforestation**  
destroy plant cover, thus leading to erosion;
  - **improper drainage in irrigation systems**  
causes salinization, which makes soil sterile.

■ **Desertification has many causes.** Climate is partly responsible, but the type of soil and the nature of the land can also make the soil more vulnerable. However, the main cause of desertification is improper use of land due to human activities.

**Land is a finite resource.** Once soil has deteriorated, the regeneration process is very costly. In order to meet the requirements of sustainable agriculture and rural development, land management and planning must take into account interaction with other natural resources such as water, air and plants, not to mention human activity. Integrated natural resource management makes it possible to effectively combat desertification.

**Adopt preventive measures and detection systems.** Systems to detect and prevent soil deterioration are necessary to avert irreversible damage. Once such deterioration is detected, it is often too late to recover and regenerate soil quality, since the natural capacity of land to absorb and filter pollutants has been exhausted.

## Poverty and Food insecurity

### Effects of desertification in the agriculture sector

Land is a key factor in agricultural production. In developing countries, poverty mainly affects rural populations. Soil deterioration creates or aggravates poverty by hitting the foundation of food security. Although there are many other factors, the migration of populations stem from the abandonment of depleted or sterile land. The search for more fertile land may be a source of conflicts, crises or even wars.

**Food security** is defined as access at all times to sufficient food to maintain a healthy, active life.

**Sustainable land management and fair access to natural resources go hand in hand with active participation and the assumption by institutions of responsibility for people who live from and on the land.**

# Strategies to combat desertification

## *Technical means*

In order to combat the deterioration of natural resources and desertification, farmers rely on various techniques, the most widespread of which are discussed below.

## Combat silting of sand and erosion



The struggle to combat silting of sand relies on various means, and the most commonly used methods include the use of hedges or inert matter. In regions with a water deficit, barriers made of inert matter are both efficient and cost effective. Fences made of woven branches arranged in grids are an effective way of stabilizing sand dunes. In Benin and Burkina Faso, stone barriers have been built to prevent silting of sand. When annual precipitation is sufficient, reforestation provides sustainable protection against silting of sand and erosion.

Trees or shrubs reduce wind erosion and rainwater runoff. This method has the advantage of being financially and socio-economically viable. Fast-growing hedges such as the cajanus planted in Benin or the eucalyptus in Egypt have the additional advantage of providing a source of firewood. Other species provide agricultural products, e.g. tea plants in Kenya and fruit trees in the dry sub-humid region of Cambodia. Planting trees on the edge of the desert creates a green belt that delays the encroachment of sand dunes. A program in Benin supports this preventive approach adjacent to fertile land.

## Composting and recycling

Compost is an organic fertilizer that makes it possible to increase soil fertility and organic matter. It can be obtained using local organic matter, thus helping producers become more autonomous. Given its advantages, training workshops are offered in Bangladesh and the Comoros to teach farmers to make their own

compost. Livestock manure, biological waste and tree leaves can all be composted. Biological residues from cities can be incorporated into agricultural waste, as is the case in Egypt. Some fruit growers in South Africa use tree bark and sawdust.

## Agro-ecological approaches

The agro-ecological approach seeks to achieve sustainable agricultural development by means of adapted techniques that take into account the environment and cultural aspects.

It encompasses agricultural techniques such as limited or zero-tillage, the cultivation of plant cover, the incorporation of plant residues in soil, and the direct seeding of plants through plant cover.

Through these conservation techniques, it is possible to:

- restore soil fertility
- reduce water sources pollution
- increase the proportion of carbon retained in the soil
- slow water and wind erosion

Farmers often adopt one or more of these techniques for environmental and economic reasons. The zero-tillage technique has been tested in Cameroon and Haiti for its potential to reduce tillage. A number of farmers, including certain wine producers in South Africa, use legumes to enrich and protect the soil. Intercropping is becoming more widespread and is used extensively in orchards and around other fruit trees, especially in Pakistan and Egypt when the trees are young. In Guinea, peanuts and green beans are grown with potatoes. Corn is often grown with other types of crops, in particular in Madagascar, Benin, the Comoros and Ivory Coast.

## Organic farming



Organic farming calls for integrated management. It emphasizes crop, biological and mechanical methods suited

to the agro-ecosystem and adapted to local conditions instead of relying on chemical products and other agricultural inputs.

Crop rotation, intercropping, symbiotic association, cover crops and nitrogen-fixing legumes, organic fertilizer, minimum tillage, and the reintegration into the soil of plant residues are some of the main organic farming methods.

These practices stimulate soil fauna and flora, thereby enhancing the soil's

composition and structure and enabling it to better retain nutrients, carbon and water. It is sometimes necessary to enrich organic soil with potassium, phosphate, calcium, magnesium and trace minerals. Organic farming does not rely on synthetic fertilizer and pesticides. In Egypt, where organic farming is carried out on a small scale, an effort has been made to broaden the use by farmers of compost and manure in order to reduce the use of chemical inputs. Properly managed organic farming can considerably reduce the risk of polluting water tables with phytosanitary products.

Interest in organic farming is growing. For example, the Lebanese government is working in collaboration with the private sector on pilot projects to assess the benefits of introducing organic farming in Lebanon.

## Conservation farming

Unlike organic farming, conservation farming relies on chemical products to satisfy the needs of agricultural production. In particular, it fosters the maintenance of a permanent or semi-permanent cover of organic matter on soil. The cover can be obtained through the cultivation of plants such as legumes or the use of mulch and other plant residues. Instead of incorporating into the soil biomass or green fertilizer, conservation farming allows for biomass or green fertilizer to be left on top of the ground.

In order for this method to achieve good results, it must be accompanied by zero-tillage or minimum tillage and the appropriate crop rotation.

Mulching is used in Ivory Coast to cultivate cotton and sugar cane and to produce tea and coffee in Kenya. Mulch physically protects the soil from the sun, precipitation and wind in addition to nurturing the soil biotope.

## Agroforestry



Photo FAO

Agroforestry combines and integrates agricultural and forestry methods to form an agro-ecosystem. Planting crops in woodlands where even livestock can graze allows for the optimum use of resources. Vegetation in forested areas thrives next to banana trees in the Comoros and cacao trees in Cameroon. Agroforestry is aimed at the integrated, sustainable, productive, profitable management of soil resources. In addition to contributing to soil amendment and the preservation of moisture, trees or bushes represent a source of energy providing firewood. In Bangladesh, for example, farmers plant turmeric in between trees and, like farmers in the Caribbean, they plant young trees along roads and rivers. Agroforestry is a method favoured by many farmers. In order to make known this practice and encourage its implementation, demonstrations and on-site visits are being organized in Kenya.

## Advanced technologies

### Laser levelling and natural resource cartography

Levelling land ensures uniform water distribution and controls erosion. This technology enhances the efficiency of irrigation systems by minimizing the risk of over- or under-irrigation. Moreover, levelling helps prevent the accumulation of salts in the soil and avoids local droughts or floods. Pakistan, Egypt, Turkey and South Africa are among the countries that use this technique.



New satellite-assisted technologies make it possible to characterize and quantify natural resources such as soil, vegetation and water. While they do not replace on-site investigations, the technologies do provide data that facilitate project planning and management.

In Egypt, for example, a network has been set up to establish a data bank to ensure the integrated management of littoral zones. The geographic information system creates maps that present soil properties such as composition, depth, texture, acidity

and certain climatic parameters, including annual rainfall rates. In South Africa, these technologies provide genuine technical support in respect of the elaboration, for example, of strategies to prevent climatic disasters such as drought or infestations of pests. This environmental risk-detection and protection system is in use in Egypt and Kenya. The inventory of natural resources and the monitoring over time of weather changes make it possible to ascertain the impact of human activity. This is one of the objectives pursued by the network of observatories in Tunisia.



# Retaining water is a key concern...

## Crop-based irrigation systems



J. Hartley, FAO

The agricultural sector uses nearly 70% of the world's drinking water resources. Over 30% of agricultural products are grown on irrigated land, which accounts for 16% of all farmland. The need to conserve water resources depends on irrigation systems that properly distribute water and water pipes with tight joints. An appropriate drainage system avoids the harmful accumulation of salts on the surface and in the upper layer of soil, which deplete and spoil crops. Some Caribbean farmers dig drainage ditches around crops, thus enabling them to control and recover runoff. Water from rivers, lakes and wells in arid zones often contains high levels of minerals and salts which are hard to remove from the soil.

In Bangladesh, Pucca irrigation channels are a simple, economical irrigation system built with bricks to irrigate rice paddies. Stabilized dirt bricks have been developed in Guinea to obtain a sustainable water supply system. Various gravity-feed canal systems are used, in particular in Benin, to channel runoff into reservoirs and thus avoid downward leaching

of the fertile layer of soil. Localized irrigation, such as drip irrigation, often requires more expensive equipment. This system makes it possible to optimize water use while minimizing loss through evaporation. Several farmers in countries such as Algeria, Lebanon, Tunisia and South Africa are using drip irrigation in fruit production.

One surface irrigation method is the berm and furrow method, in which the water circulates horizontally in furrows, thus reducing losses in the vertical profile of the soil. The repeated passage of water in the furrows creates a thin impermeable layer that stabilizes the berm. This practice makes it possible to effectively control weeds. It also allows for multi-crop production such, for example, as the growing of sugar cane in the furrows and wheat on the berms found in Pakistan.

## Retain and collect water

Concern has been expressed in some regions of Pakistan that water tables need to be replenished, because of overexploitation from agricultural practices. The construction of retention ponds is making it possible to regenerate aquifers. Simpler structures are being used locally, especially hillside water storage facilities to retain and channel runoff. A number of farmers, including South African fruit growers, make use of ponds and simple earth dams to collect and conserve water.

# Integrated Pest Management (IPM)

Integrated pest management seeks to reduce pesticide use to what is strictly necessary. Crops are regularly inspected and sprayed, using only the products designed for a specific parasite. The use of phytosanitary products must take into account balance in the agro-ecosystem. Appropriate crop rotation, the destruction of plant residues harbouring parasite eggs in the following season, the use of pest-resistant varieties, and the interaction between natural enemies are examples of biological means of controlling the propagation of pests and weeds. In this way, the use of pesticides and herbicides is only necessary during a

clearly determined period. According to FAO, the success of integrated pest management depends, first and foremost, on farmers' willingness to adopt this method.

This approach reduces the use of chemical products and marks the first step toward sustainable resource management. For example, some South African fruit growers rely on the disruption of butterfly breeding to curtail the propagation of caterpillars. They also rely on biological control to curb devastation caused by red spiders. These methods reduce the required number of sprayings of fruit trees.

## From conventional tillage to zero-tillage

In the 1960s, conventional tillage was associated with growing soil fertility; however, in the long term, this practice depletes the soil. Since the process exposes surface organic matter, nutrients in the soil are deteriorated through oxidatization. To prevent the deterioration of soil structure and fertility, other methods were introduced, such as conservation tillage and zero-tillage. The latter technique was developed in Brazil in the 1970s to halt erosion. Zero-tillage is now practiced on nearly 5 million hectares of land.

While the transition to zero-tillage engenders high initial costs associated with the requirement of specialized seeding equipment, it reduces work time and long-term production costs. The propagation of weeds is the main concern, although it can be controlled by mulching and appropriate crop rotation.

Conservation tillage is a form of limited tillage that does not disturb the decomposition of organic matter by micro-organisms. In Mauritania, farmers engage in shallow manual cultivation in order to ensure superficial tillage. Algerian farmers use toothed tools and some farmers in Benin use light hoes.

### **Zero-tillage**

*A thin layer of humus forms on soil that has not been tilled for several years through the biological breakdown of organic matter. This fertile layer nourishes and protects the soil against erosion and regulates its moisture content. Untilled soil can more efficiently retain carbon, thus contributing to the reduction of atmospheric carbon dioxide emissions.*

# Good Practices

## Farmers' Experiences

The analysis, based on 40 contributions from 26 countries, 19 of them in the priority solidarity zone (ZSP), does not allow us to draw final conclusions. Instead it presents certain farmers' perceptions of desertification and seeks to inform readers about the strategies adopted. The findings must be interpreted in regards to the respondents' characteristics.

The factors that contribute to the intensification of desertification are numerous and varied, which makes it difficult to compile the responses. The experiences and strategies gathered have been classified according to the predominant level of aridity in each country, since certain generalizations can be established by zone, especially in respect of soil, plants and water resources. In arid and semi-arid conditions, for

example, low rainfall reduces the growth rate of plants, and organic matter is produced slowly, which makes the soil less fertile and more sensitive to weather constitutions and inappropriate practices.

Arid land is defined as land on which the evaporation rate exceeds precipitation.

The table below indicates the breakdown of countries by climatic zone and level of soil deterioration as established by the United Nations Environment Program (UNEP). The characterization adopted is that applicable to the largest area in the territory. Some countries such as Mauritania and Egypt have similar aridity conditions although soil deterioration differs, which clearly points to the effect of human factors in the struggle to combat desertification.

While the countries classified in the dry sub-humid zone are more numerous, they account for 46% of the contributions received, which means that the distribution of experiences is balanced.

**Table 1:** Level of soil deterioration in the 26 participating countries, by aridity zone

<b>Arid and semi-arid</b>	<b>Level of deterioration</b>	<b>Dry sub-humid</b>	<b>Level of deterioration</b>
South Africa	<i>Very high</i>	Bangladesh	<i>Average</i>
Algeria	<i>High</i>	Benin	<i>Average</i>
Burkina Faso	<i>Very high</i>	Cambodia	<i>Very high</i>
Egypt	<i>High/average</i>	Cameroon	<i>High/average</i>
Lebanon	<i>High</i>	Caribbean	<i>High</i>
Mali	<i>Very high</i>	Comoros	<i>High</i>
Mauritania	<i>Very high</i>	Ivory Coast	<i>Average</i>
Pakistan	<i>High/average</i>	Guinea	<i>Average</i>
Senegal	<i>Very high</i>	Haiti	<i>High</i>
		Kenya	<i>High</i>
		Madagascar	<i>Very high</i>
		Nicaragua	<i>High</i>
		Philippines	<i>Average</i>
		Rwanda	<i>High</i>
		Sri Lanka	<i>Very high</i>
		Tunisia	<i>High</i>
		Turkey	<i>Very high</i>

The table shows that even in countries such as Haiti, Sri Lanka and Madagascar included in the dry sub-humid zone, severe soil deterioration is widespread.

Plant cover, which stands at only 2% in Haiti, and the availability and accessibility of water are key factors in assessing the level of soil deterioration.

## Respondents' profiles

### Who are the respondents?

Most of the experiences noted are those of farmers who perform certain administrative tasks within professional farmers' organizations. It should be noted that one-quarter of the surveys are from the scientific sector and that roughly 40% of the contributions received described experiences at the national level.

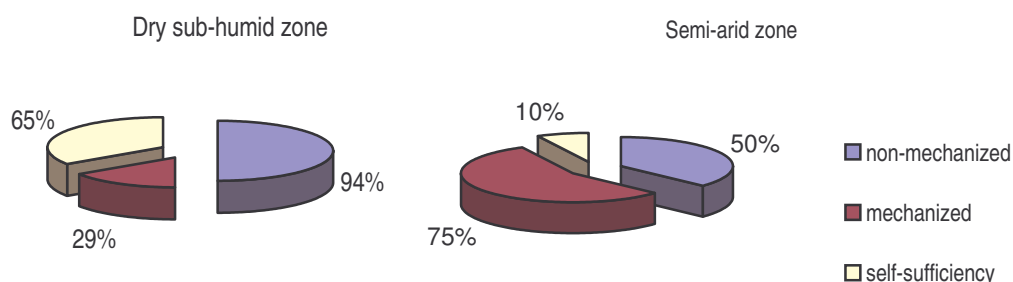
### What do they grow?

The farmers surveyed produce, first and foremost, for the market gardening sector, followed by the cereal grain sector and cattle farming.

### What means do they use?

Water supply methods vary depending on climatic conditions and production sector. In dry sub-humid zones, most farmers rely mainly on rain. Some 65% of farmers in arid and semi-arid zones rely on irrigation systems such as drip irrigation, mainly to irrigate fruit trees, especially in South Africa and Algeria.

### Breakdown of the percentage of farmers according to equipment level and production objectives, by aridity zone



Equipment level varies according to production objectives. Some farms still rely on manual labour and animal draught power, mainly in countries in the dry sub-humid zone where production is geared primarily to self-sufficiency. The charts above clearly indicate that farmers make much greater use of mechanized equipment in countries in the semi-arid zone, where most agricultural production is marketed.

### Are there any National Action Programs to Combat Desertification (NAP)?

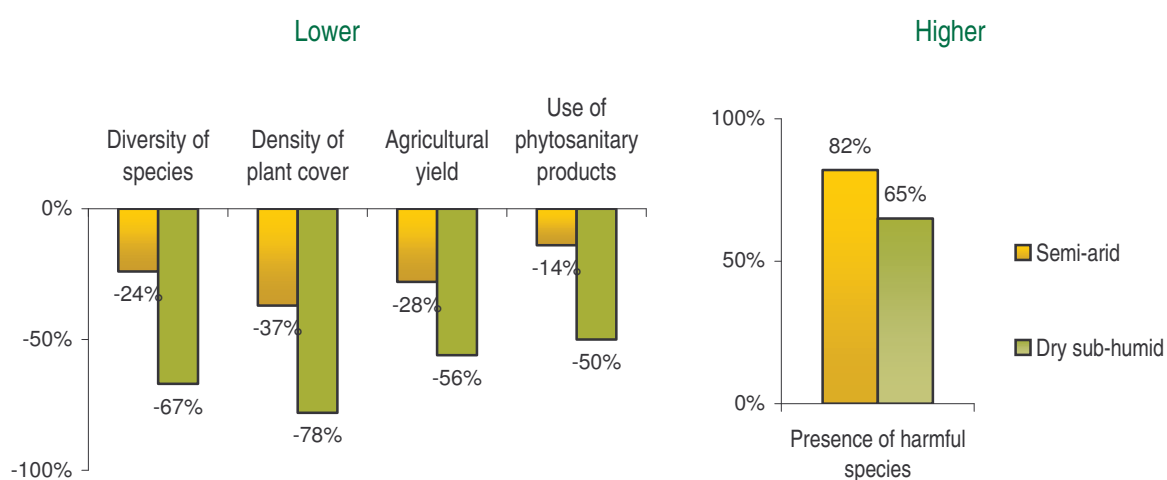
Over half of the farmers responded to the question on a National Action Plan to Combat Desertification (NAP) and 90% of respondents confirmed that they resort to a national plan to protect natural resources. However, this does not mean that there is a specific program to combat desertification. In Algeria, for example, the national reforestation plan and the national agricultural development plan are deemed to be effective means of combating desertification. In countries that do not have a national plan, the appropriate authorities, such as the department of agriculture in Bangladesh, adopt emergency measures to limit the effects of desertification. Other countries, such as Benin, rely on the initiatives of a network of environmental protection programs and agencies.

# Agro-environmental conditions and strategies

## The biotope is declining

A majority of respondents claim that most biotope components have deteriorated over the past five years. Over half of the farmers have noted deterioration in plant cover and a striking increase in harmful species (see charts). The deterioration of plant cover stems from deforestation and overgrazing. The growing sedentation of herds has led to soil compaction and the destruction of plants through repeated trampling.

### Percentage of farmers who have observed changes, by aridity zone



## Strategies

Over half of the farmers resort to agroforestry and participate in reforestation campaigns. In some instances, treated wastewater is used to irrigate reforestation zones, as is the case in Egypt. Significant loss of plant cover caused by bush fires in dry sub-humid

regions has prompted extensive awareness campaigns. The selection of fully adapted varieties is another way of restoring the biotope, a method practiced by nearly 50% of farmers (see Table 2).

**Table 2:** Percentage of farmers who rely on certain strategies, by aridity zone

	Semi-arid	Dry sub-humid
Agroforestry	44	76
Reforestation	61	88
Fight against bush fires	44	76

Rural populations in certain countries, e.g. Guinea, Rwanda, Kenya, Madagascar, Cameroon and Mali, use wood and charcoal as the main source of energy and this use is often the cause of deforestation and bush fires. In order to remedy the situation, awareness and popularization campaigns are being organized. The use of high-efficiency hearths in Bangladesh and Benin and gas-oil stoves in the Comoros are being encouraged in order to save firewood. Mention should also be made of pilot projects in Egypt to harness solar energy.

Recourse to local species that both protect the soil and generate income from their sale is

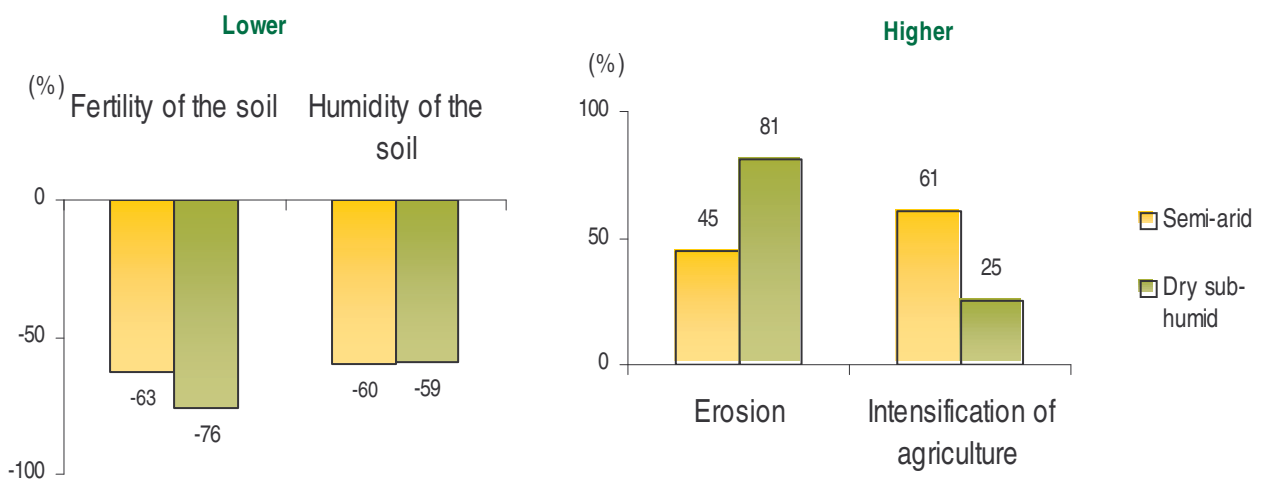
widespread in Tunisia and Algeria. In order to regenerate the biotope, the planting of forage shrubs is being promoted in the Comoros and the planting of pearl millet in Haiti. Moreover, the introduction of high-yield seeds adapted to soil conditions and climate is arousing the interest of rice farmers in Sri Lanka and Bangladesh. Scientific research is being conducted in Egypt on drought- and salinity-resistant varieties.

The majority of farmers engage in integrated pest management, especially in the Philippines, Ivory Coast and Sri Lanka, where khomba leaves and seeds are used as a natural pest repellent.

## Soil erosion is increasing

Nearly 70% of farmers are concerned about declining soil fertility and water retention (see charts) and half of them are confronted with the silting of sand and high constant rates of soil salinization. Overgrazing, the over-exploitation of land and tillage are regarded as inappropriate practices that promote soil deterioration and desertification. The intensification of agriculture is especially apparent in semi-arid regions. The decline in soil quality observed in several instances has led to an appreciable increase in erosion. Soil salinity, a source of concern for a majority of farmers, is one consequence of the inappropriate management of irrigation systems.

### Changes in soil-related factors, by aridity zone



## Strategies

The most popular soil-conservation measures used by farmers is summer fallow, compost, farming along contour lines, and terraces. Intercropping is widespread in dry sub-humid zones. To curtail erosion, the planting of inert barriers and windbreaks is one of the most widespread methods. They are regarded as a preventive measure against the gradual drying of the land. In Senegal, for example, anti-salt dams and anti-erosion stone walls are used to remedy the main soil problems (see Table3).

**Table 3:** Percentage of farmers who apply soil-conservation measures, by aridity zone

	Semi-arid	Dry sub-humid
Soil covering	41	69
Composting	59	88
Planting of trees and windbreaks	65	88

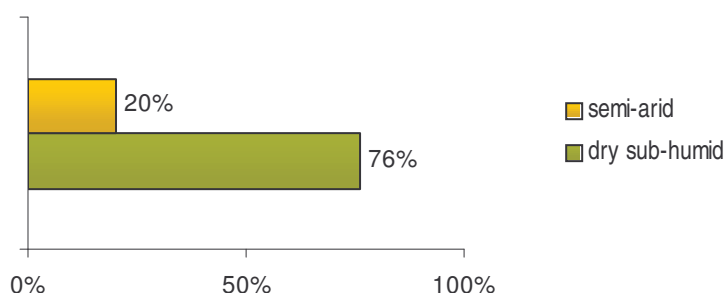
The most widespread techniques are composting, the planting of trees to act as a natural barrier to erosion, and plant cover such as legumes. In some regions of Burkina Faso and Mali, stone walls surround fields to limit erosion caused by runoff. Composting pits, called “zaïs,” are also built. The conventional zaïs system consists in square holes roughly 25 cm wide and 15 cm deep dug during the dry season, which are then filled with agricultural residues and manure. The composting pits stimulate termites, which dig tunnels that allow water to better penetrate the soil during the rainy season. In addition to enriching the soil, the zaïs, like stone walls, help to curtail runoff

## Runoff is worsening

No improvement in soil water retention has been observed that confirms the foregoing findings, nor has the quality of water improved significantly. Most farmers, especially in arid countries such as Egypt, Mauritania and Algeria, note a high level of salinity.

The chart below reveals the extent of runoff noted by farmers in the dry sub-humid zone. Runoff carries away the thin layer of soil that is rich in nutrients and is the main cause of water erosion. These findings agree with observations on erosion (see “Soil erosion is increasing”).

**Percentage of farmers who have observed increased runoff, by aridity zone**



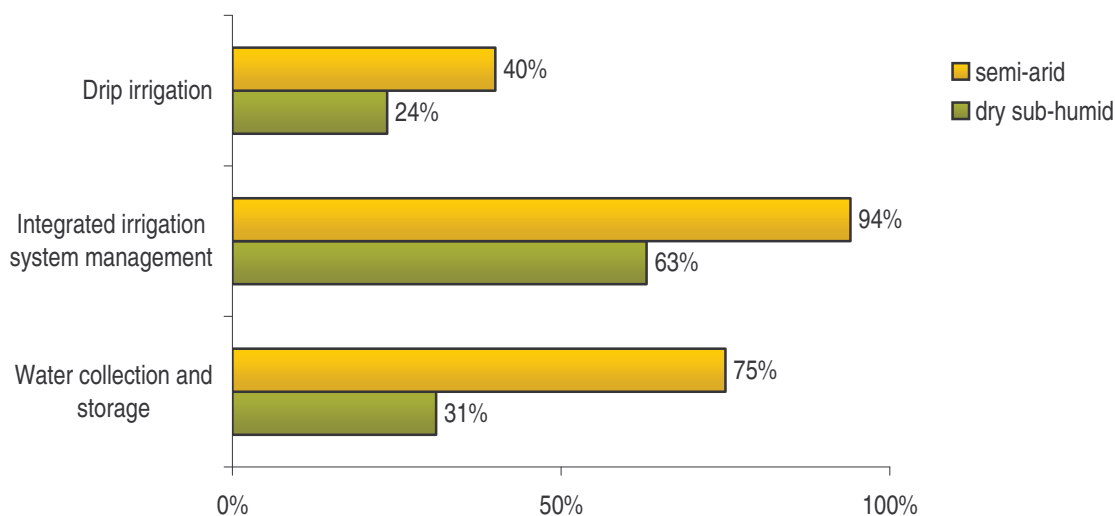


## Strategies

The planting of trees, hillside water storage, the construction of ponds and dams and appropriate irrigation management are the most widely adopted strategies to control water supplies. More than half of farmers rely on collective water management, in conjunction with which advisory organizations and groups comprising farmers and other water users are set up. This participatory management is found, in particular, in Pakistan, Turkey, the Caribbean and Madagascar. More specialized management committees are established, such as those that oversee ponds in Cameroon. They also encourage the adoption of timetable slots to limit watering periods and thus optimize water use.

This is true, in particular, in South Africa and Haiti. Rational water resource management relies in Algeria and Lebanon on water-saving technologies such as drip irrigation, the use of watertight piping systems, and the establishment of hillside water storage, e.g. ponds, djoubs and tanks. The chart below shows the importance attached to water-conservation methods in countries in semi-arid zones. Localized drip irrigation is still in the experimental stage in Sri Lanka and Pakistan. The high initial investment required by drip irrigation is an obstacle to its spreading.

Percentage of farmers who rely on specific strategies, by aridity zone



Water resource management techniques are widely practised by fruit growers, e.g. apples, pears, citrus fruits, and so on. Mention should also be made of localized irrigation that is

sometimes computer aided a technique that relies on electron probes and stress meters to determine the moisture content of the soil and water needs.

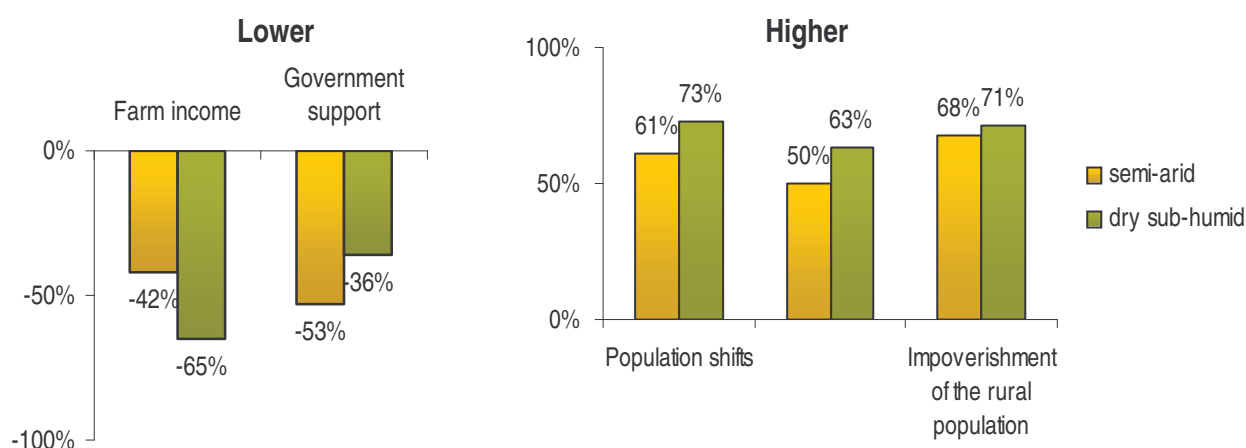
# Social and economic impact

## Trends

Most farmers have noted a renewed shift of rural populations to the cities and an upsurge in rural poverty. Nearly 50% of the respondents conclude that farm incomes have fallen and support from public services has declined, as the chart below indicates. Many farmers mention a lack of training, especially in Madagascar and Burkina Faso.

Basic infrastructure is missing and its absence is impeding rural development. Markets are distant, credit is hard to obtain and prices for farm products remain low. Kenya, Madagascar, Pakistan and South Africa have expressed concern over the lack of infrastructure and storage space for agricultural products. This situation is a serious drawback for fruit and vegetable producers.

Percentage of farmers who have noted socio-economic changes, by aridity zone



## Measures Adopted

From the standpoint of the bodies and organizations involved in the agricultural sector, the State is, by and large, responsible for implementing programs and projects aimed at preserving natural resources. Over half of the respondents have confirmed the leading role that governments play in agriculture. For example, the Algerian government provides direct support in investments and products. In Sri Lanka, the government is facilitating the transfer of modern agricultural technologies. Awareness and extension programs, including training on available credit, are also being implemented. NGOs are working in rural areas, for example, through reforestation campaigns and by carrying out socio-economic development projects, as is the case in Lebanon.

The progress that has been achieved is encouraging farmers and rural populations to

participate actively in the elaboration of projects. Some 80% of the surveys confirm the leading role attributed to farmers when rural natural resource management projects are implemented. Representatives of the public sector also play a prominent role. Some 30% of the farmers surveyed say that NGOs are playing an active role. Various initiatives have been undertaken, such as exchanges between farmers, especially in Haiti and Kenya, field schools in Ivory Coast and the Philippines, and training programs in Bangladesh and Pakistan.

To ensure rural development and combat soil deterioration, some farmers have mobilized and organized themselves. Local networks and committees have been set up in Ivory Coast and Madagascar, where a number of farmers' organizations and village committees have been established in recent years, in particular to fight bush fires.

# Outlook

## *Summary of the Study*

The question of sustainable agriculture is of paramount concern to farmers, since they directly sustain the positive or negative consequences of the practices employed. The enhancement of living conditions in rural communities, e.g. infrastructure, income-generating activities, schools, and so on, and natural resource conservation are inextricably linked since rural poverty encourages communities to engage in the intensive, unsustainable use of land, forests and water. To combat desertification, the farmers surveyed have revealed existing interaction between the agro-environmental and socio-economic sectors. They are advocating the

adoption of integrated strategies to combat desertification, i.e. strategies that encompass and rely on all available means to ensure a comprehensive approach. This comprehensive approach seeks long-term results in order to satisfy the needs of current and future generations.

Farming techniques such as composting, mulching and the collection of rainwater are useful, but these methods, alone, cannot ensure sustainable development in rural communities. It is necessary to encourage the involvement of the communities concerned in the struggle to combat desertification. This is a key factor for success.

The farmers surveyed have pinpointed a number of causes and consequences of desertification and the deterioration of natural resources. These factors are of an agricultural, environmental and socio-economic nature.

### **Agro-environmental issues**

- Deforestation, whether to increase the amount of farmland or provide firewood and building timber, is an important factor in exacerbating desertification.
- Aside from pests and the vagaries of weather, the availability and quality of water are of concern to many farmers. To control the level of salinity is a serious challenge. The establishment of management committees offers a solution to ensuring the integrated management of irrigation systems.
- Recourse to local, drought-resistant plant varieties is an effective means of combating desertification and food insecurity.

### **Socio-economic issues**

- Pressure exerted by human beings and animals on the ecosystem, which has very often already deteriorated through drought, is leading to the gradual destruction of plant cover, thus increasing wind and water erosion and the shifting of sand dunes.
- The success of rural development and sustainable agriculture programs depends, by and large, on the determination displayed by farmers and political bodies. For this reason, many farmers maintain that extensive awareness and popularization campaigns must be conducted among rural populations and be extended to all farmers in order to introduce good production practices.

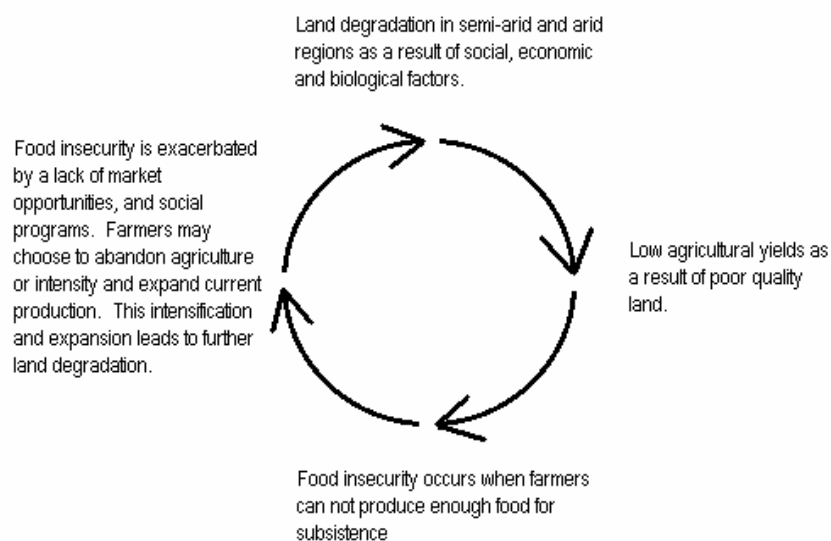
**To combat desertification and reduce rural poverty, sustainable management practices in respect of natural resources must be economically viable, ecologically sustainable and socially acceptable.**

## Food Security

For many farmers surveyed, sustainable agriculture is an essential approach to ensuring food security and maintaining an economic livelihood associated with the land. The factors that farmers have identified as the causes of desertification have been agricultural, environmental and socio-economic in nature. A holistic approach that encompasses all available means and responds to all causes and factors, be it environmental, economic or social, is necessary in the struggle to combat desertification.

In reality, the underlying issue in the desertification problem is food security. For many farmers, land is the only means of obtaining adequate subsistence. Without access to arable land, rural communities become extremely impoverished, as they are unable to produce sustainable amounts of food for survival. Low farm incomes, as a result of poor agricultural land, intensify the unsustainable use of land, forests and water. A vicious cycle is created when farmers try to develop marginal land or intensify the use of current land in production, thus contributing to further environmental degradation. In addition, the lack of public services available in rural communities contributes to an exodus of the rural population.

### Vicious Cycle of Land Degradation and Food insecurity



The solutions to desertification that have been identified in the survey range from simple local based technologies highly sophisticated techniques. Although these methods are creative and ingenious adaptations to agro-environmental factors, they are too reactionary in nature. The solutions are punctual responses to the symptoms of desertification rather than being global or preventative measures. A holistic approach that incorporates all the main actors of desertification, and considers both the biological and socio-economic realities is a more sustainable solution to combat desertification.

## A Holistic Approach

In a holistic approach, participatory development and socio-economic policy prescriptions are advocated in addition to the agricultural techniques described earlier. The use of participatory development in formulating strategies for combating desertification will help build the management and decision making capacity of local communities and strengthen rural institutions. In developing countries, the provision of financial services and the improvement of rural markets will address the economic causes of desertification, while the introduction of economic incentives and taxation mechanisms in developed countries can be used in a similar fashion.

### Participatory Development

Written within the UNCCD, the concept of participatory development is an underlying theme that is reflected in the proposed mechanisms for combating desertification. The convention advocates a “bottom up” approach in which local communities are consulted and encouraged to participate in the implementation of the convention. Action Programs developed at the local level and based on genuine participation evoke the feeling of shared ownership among stakeholders over planned initiatives and may be the key to the success of the programs.

Acknowledging the rights of local communities over the management of their natural resources ensures cooperation between community members and other stakeholders. When local communities feel removed from the process of management, the use of land and other natural resources can become highly inefficient. Participatory development recognizes the importance of the community in identifying and formulating solutions to land degradation problems. The close relationship that farmers, breeders, nomads and other local users have with the land can provide valuable insight and knowledge into the proper management of the resource.

### What needs to be addressed in a holistic approach?

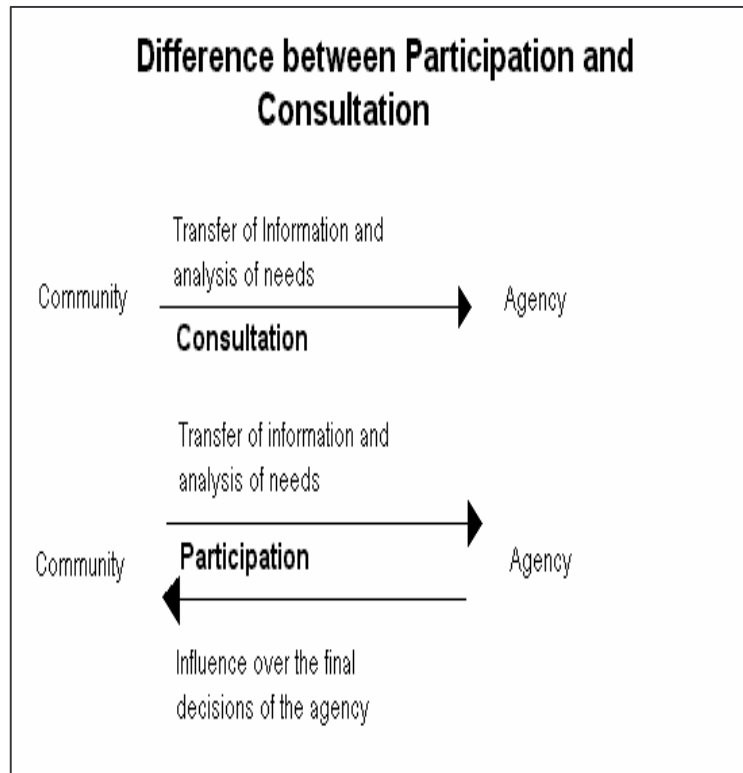
Some of the questions that need to be addressed in a holistic approach are:

- How to apply national action plans against desertification at the local level?
- How to include farmers in the development and implementation of desertification policies?
- How to increase the capacity of farmers to access services and implement the solutions to desertification?
- How to develop local knowledge and re-enforce farmers existing capacity?
- How to provide institutional support to farmers such as markets and financial services to treat some of the symptoms to desertification?

## What is Participation?

***Participation can be defined “as a range of processes through which local communities are involved and play a role in issues which affect them.”***

Participation is different from consultation, which is a process that implies a one-way flow of information between an agency such as a government institution and the community. Although consultations include participative activities such as the transfer and collection of information as well as the analysis of local needs, in reality, the local community has limited influence over the decisions of the agency. Participation involves the creation of partnerships between various stakeholders, and the interested parties involved in the fight against desertification include all levels of government, citizens' groups such as farmers' organizations and environmentalists, members of the scientific community and industrial and agricultural lobby groups.



***A Partnership is defined as an “on-going interaction where power is shared between the agency and the community” through collective decision-making and collective management projects.***

Partnerships must be forged between all levels of government, civil society and the scientific community. The role of the state is to create an enabling environment that allows these partnerships to foster and grow. By supporting legislation and macroeconomic policy frameworks that are conducive to drylands development, public infrastructure and technical assistance, the state can become an ally to the public in the struggle against desertification.



## What does Participation involve?

Participation needs to begin during the planning stages of a project, because community input is essential to identifying needs and setting goals and objectives. Once a program or project has been developed, community participation is needed to ensure that the program or project is implemented, monitored and evaluated. In order for participation to be successful, organization and cooperation must be present. Individuals who wish to engage in the participatory process have the right to access relevant information, to participate in actions and discussions, and to lodge concerns and appeals.

A drawback of the participatory process is that it is time-consuming and labour intensive. In some cases, participation actually complicates the development process if community members cannot agree on a plan of action for the management of a disputed resource. The participatory process also suffers when the initial level of development in a community is low, and community members do not have the capacity to effectively participate.

To strengthen the participatory process, agricultural extension services or basic education services provided by the state or through NGO's can have a significant impact in building up the community's capacity for participatory planning. Although local decision-making procedures may have to be adapted and strengthened, the community will slowly acquire confidence in its ability to manage resources as they become more familiar with the participatory process.

### Farmers' Organizations

Based on farmers' experiences, the key factor to success in the struggle to combat desertification is collective action taken by rural communities. Collective action can take many forms, but the most effective form of cooperation is through the establishment of strong farmers' organizations. Through these organizations, farmers can lobby for more institutional support, become more actively involved in government policies, and conduct extensive popularization and awareness campaigns to disseminate good production practices. Farmers must be involved at all levels of the decision making process and be considered as equal partners, because their knowledge is important to designing policy frameworks for the fight against desertification. Farmers, more than anyone else, have a good knowledge of the natural environment, and can provide more appropriate technologies and solutions. It is important to note that the involvement of farmers in the design of policies does not exclude the State's role in safeguarding the environment and policy making.



## Socio-economic Prescriptions

Addressing the socio-economic causes of desertification can be done by providing the financial means for adopting techniques to ameliorate desertification, by improving and developing rural markets, or by applying economic policy prescriptions to encourage land users to change land use patterns or find alternative uses for the land. The provision of financial services in rural areas is essential to encouraging the adoption of new techniques that require a large initial

investment, however, the mobilization of financial resources can be extremely difficult without the proper infrastructure. In these cases, the state may be required to assist in the set up of financial institutions, as well as provide a mechanism to ensure that all rural members have the ability to access these financial services.



For communities with informal credit institutions, these rural financial services can be modernized or adapted to meet the needs of the community. Non-governmental organizations with technical expertise in financing may also assist in the management of credit services, and train rural communities to establish linkages with formal financial institutions, creditors and rural bankers. Collective action by farmers in forming cooperative societies can also provide greater access to funds as the risk of loan defaulting to financial institutions is lessened as the number of borrowers increases.

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A significant problem in rural communities is the lack of access to markets and market opportunities. Without an alternative livelihood strategy, farmers and breeders fall into a vicious cycle where degraded land continues to be used intensively as there are no other alternatives for earning income. By developing and improving rural markets and their linkages to larger markets, other income earning opportunities such as marketing and home industry may be created and made available to the rural population. Home industry may include the home processing of food products or the manufacturing of handicraft items.

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Economic policy prescriptions can be employed by some countries to encourage farmers to change land use patterns or find alternative uses for the land. The idea behind economic incentives and taxation policy is to correct market inefficiencies that allow grazing and farming to persist in an area where it is biologically unable to support the activity. By introducing a tax to account for the environmental cost of an activity such as farming or grazing, farmers are forced to include the value of land degradation in their decision making process for land use. Taxation and economic incentives should be used with caution as they may unnecessarily penalize some farmers while favoring others if they are used inappropriately.



TECHNICAL FACT SHEET  
**South Africa**

**Land Care  
Programme**

### **Agriculture and Grazing**

South Africa's terrestrial landscape is classified as semi-arid. The degradation, alternation, and transformation of terrestrial ecosystems in the country is a result of rapid population growth, urbanization, industrialization and agricultural intensification. Desertification and drought are real threats to food security, and two of the most significant land alternating processes in South Africa are agricultural production and livestock grazing. Approximately 86% of the land area is used for crop cultivation or for the grazing of livestock. In response to concerns about land degradation and water scarcity, the government of South Africa ratified the UNCCD in 1995 and has introduced the LandCare Initiative.

### **Crop Cultivation and Livestock Grazing**

Approximately 13% of land in South Africa has been transformed for crop cultivation, while 5% of land is degraded. Soil deterioration and the draining of water sources are two key concerns among South African farmers. The loss of nutrients stemming from soil deterioration reduces output and further encourages producers to use chemical inputs. It is necessary to treat depleted soil and pursue research in order to counteract erosion and the accumulation of silt in waterways. Each year, soil deterioration engenders heavy financial damage.

### **Overgrazing in the Paulshoek region and its impact on the biotope**

Intensive grazing occurs when the size of the herd largely exceeds pastureland's ability to regenerate. In the Paulshoek region, nearly twice the recommended number of goats is grazing on pastureland. Over the past 30 years, overgrazing has led to significant deterioration in plant cover. According to studies conducted by scientists at the National Botanical Institute, the impact of overgrazing on biodiversity primarily concerns the type of species rather than the total number inventoried.

Annual weeds and other inedible plants such as *Galiena Africana*, a toxic plant, have gradually invaded the pastureland. This change in the biotope has encouraged the proliferation of insects, scorpions, spiders and seedeaters such as scarab beetles. Moreover, the loss of bushes in the Paulshoek region has caused nocturnal as opposed to diurnal rodents to flourish and certain bird species have replaced those that relied on the bushes for nesting.

## National LandCare Programme

Implemented in 1998, the National LandCare Programme is a form of community based, government supported natural resource management. The concept of LandCare was developed in Australia and it involves the participation of grassroots community groups, native populations, landowners, and government institutions. The program's success is mainly dependent on the farming community, who is responsible for identifying, implementing, and monitoring the land base. LandCare in South Africa has been supported by the Poverty Relief Fund and AusAid, and its goal is to develop and implement integrated approaches to natural resource management which are efficient, sustainable, equitable and consistent with the principles of ecologically sustainable development.

LandCare is intended to ensure the sustainable management of agricultural resources in order to optimize production, food security, job creation and better living conditions. Landcare encourages farmers' initiatives and supports local economies through job creation. It has established partnerships between the public sector, communities and the private sector. There are several themes which fall within the National LandCare Programme: Watercare, Veldcare, Soilcare, and Juniorcare.

**WaterCare** - focuses on regions suffering from a lack of water that require proper irrigation systems.

**VeldCare** - encourages the adoption of appropriate grazing methods, and promotes preventive practices that reduce erosion and boost production.

**SoilCare** - encourages farmers to resort to innovative structures to combat soil erosion. The methods proposed under the program are designed to reduce soil acidity and slow the loss of organic matter. Through the program, conservation farming practices such as diversification, the integrated management of inputs and zero-tillage are applied.

**JuniorCare** - empowers previously disadvantaged youth by providing training in facilitation and leadership skills. This program includes the promotion of food security in the home and at school, awareness of sustainable agriculture, stimulating the formation of youth clubs, and small projects that aim to promote other components of LandCare.



## Progress of the Project

In South Africa, groups that are interested in implementing LandCare projects apply for funding through the Department of Agriculture, and successful proposals are in accordance with the objectives of national strategies such as the National Agricultural Policy, the Water and Forestry Management Strategy, Land Reform Programme, and National Environmental Strategy. Interested groups may be NGO's, Community Based Organizations, local governments, farmers groups, public agencies and private interest groups.

For the fiscal year of 2001-2002, an allocation of 25 million Rand was set aside for the implementation of Landcare projects, and under the WaterCare theme, 11 irrigation schemes were selected in four regions of the northern province of Limpopo. These projects involved the holistic and integrated rehabilitation and restructuring of the irrigation systems. Fourteen projects valued at approximately 4.6 million Rand were selected under the Veldcare project, and they benefited 545 communal farmers by clearing away alien invasive species and controlling bush encroachment. SoilCare projects in Eastern Cape and KwaZulu-Natal were valued at 7 million Rand and covered seven projects that were concerned with soil conservation and the rehabilitation of degraded areas. Finally, three JuniorCare projects with a value of 1 million Rand were also implemented.

*Contribution from farmers' members of Agri South Africa*



# AUSTRALIA

## Social Economic mechanisms to combating desertification

### Australia and Desertification

Australia's rangelands cover over 70% of the country's land surface. Characterized by low biological and vegetative carry capacities, the ecosystem is additionally put under stress by the grazing of domestic, native and feral animals. Fragile soil in Australia's arid and semi-arid lands is prone to soil erosion, compaction, infertility, surface sealing and poor water penetration. Variable climate characterized by erratic rainfall, extreme long dry periods and flooding deluges exacerbate soil degradation in the region.



As the most extensive form of land use, agriculture occupies 60% of the total land area in the country and is under pressure from either soil erosion, loss of natural vegetation cover, over-use of irrigation water, or the impacts of introduced invasive species. The largest user of agricultural land is the pastoral industry, which is composed of cattle grazing in the north and sheep grazing in the south. The profitability of the industry is declining as land degradation is affecting at least 44% of the land area and creating an estimated loss of \$200-300 million Australian dollars. Some of the causes of land degradation in the rangelands have been attributed to intensive over-grazing and inappropriate land management. Other industries that the rangelands support are mining and tourism.

The management of water resources is a crucial issue in Australia, as only 6% of the land is arable without irrigation. Problems with salt, sodicity, waterlogging and acidity affect large areas of the rangeland. Approximately 70% of water consumption in the country is used to support agriculture, and only 12% of annual rainfall runs off to collect in rivers.

## Australia and the UNCCD

In 2002, Australia ratified the UNCCD and officially joined in the struggle to combat desertification, even though Australian domestic legislation already exists for targeting land degradation. Australia's model of commitment for the convention is a community based government supported land management system called LandCare which has been adopted by countries such as South Africa (refer to South Africa Fact Sheet) and New Zealand.

Also included in Australia's model of commitment is an emphasis on research and development. Through organizations such as Land and Water Australia and the Commonwealth Scientific and Industrial Research Organization (CSIRO) and programs such as the National Rangelands Research and Development Program, a knowledge-based industry specializing in semi-arid and arid lands is being cultivated. The creation of computer models used for rangeland management, as well as the testing of economic theories and policy prescriptions for grazing are fostered under these initiatives.

## LandCare

Landcare is a community-based approach to managing and protecting natural resources, addressing environmental issues, and improving the sustainability of agricultural production systems. Originating in the community during the mid-1980's, the LandCare movement in Australia developed independently of government involvement. The Decade of LandCare, 1990-1999, witnessed rapid adoption of the LandCare concept by communities all over Australia.

Although the origins of LandCare are in the community, the Australian government provides financial support to local groups for capacity building and on-ground work. LandCare has enabled the government to channel investments into social and physical infrastructure, thus facilitating and fostering regional and rural development.

The concept and practice of Landcare is realized through the work of community members who take responsibility for sustainable resource management in their regions. By providing their time to identify, plan and implement management at the ground level, stakeholders become actively involved in resource decision-making. Approximately 40% of all Australian farmers are members of Landcare groups. There are over 4250 Landcare organizations in Australia.

The government's Landcare policy package includes:

- Financial assistance for Landcare groups
- Support for the Australian Landcare Council to provide an avenue for the community to influence natural resources policy at the national level
- Support for Landcare Australia Limited to raise corporate sponsorship for landcare activities and to raise awareness of landcare in the wider community
- Provision of a National Landcare facilitator to link the Landcare community with the Australian government
- Support for land and water resource development,
- Taxation measures to encourage landholders to adopt sustainable management



## Research and development

One way that the Australian Government promotes research and development is through statutory research and development corporations held under various government portfolios. Established under the Primary Industries and Energy Research and Development (PIERD) Act (1989), Land and Water Australia is an initiative of the Australian Government and it falls under the Commonwealth Agriculture, Fisheries, and Forestry portfolio. Another government initiative is the Commonwealth Scientific and Industrial Research Organization (CSIRO). This corporation is part of the Industry, Science and Resources portfolio of the government and it is operating under the provisions of the Science and Industry Research Act (1949).

Land and Water Australia has done extensive work on rangeland and water management. The National Rangeland Research and Development program is an attempt by the corporation to link research to regional and property planning so that decision making enhances long term sustainability. Researchers in this program are interested in assessing the economic and ecological impacts of different land uses, as well as the economic and ecological factors that influence the decision making process of each individual land user.

### Some examples of the research projects developed under this program are:

- The development of decision rules for different land classes to identify opportunities for sharing resources and management between sectors
- The examination of institutional structures at the regional level so that shared visions and priorities can be used to implement resource use and management change
- The building of capacity in the local region, and the building of institutional structures that will support local negotiation and decision making between different sectors

## Centre for Arid Zone Research

CSIRO's research and development on rangeland management is mainly done through the Centre for Arid Zone Research (CAZR). Established in the late 1940's, the CAZR's research in central Australia has been essential to understanding the functioning of arid landscapes, especially in relation to rainfall, fire and grazing. The goal of the CAZR is to apply this knowledge to developing new land management strategies and tools to help assist land managers. Some examples of the centre's past and present research projects are:

- **RANGEPACK (1987-1993)**– the development of computer-based decision support tools and training for strategic management decisions on pastoral properties. One computer program that emerged from the project was Herd-Econ, a module dealing with herd dynamics and property economics of a grazing enterprise. The program was used to compare alternative management decisions, to examine the effects of climate variability on decision-making, and to track the process of trading from one property state to another over time.



- **DroughtPlan (1994-1997)** – a participatory project aimed to identify and meet key self-reliance needs of the grazing industry in Australia. As a result of consultation with hundreds of producers, nine management packages were prepared in collaboration with industry, and these packages included the following: training courses, leaflets, case studies, spreadsheets and computer programs into integrated responses.
- **Land Use Change in Northern Australia (LUCNA) (1997-2000)** – an economic analysis of the grazing industry in Northern Australia. The project aimed to predict what combinations of changing productivity, prices, and policies would cause the pastoral industry to be infeasible. Producers were consulted across Northern Australia to gain knowledge on marketing strategies and approaches to stocking rate management. Factors like changes in pasture conditions, climate, rising carbon dioxide, domestic and export prices, and a variety of policy related costs were incorporated into simulations to predict the likely economic and environmental responses.
- **RISKHerd (1999-2001)** – a project that developed tools for assessing different tax instruments in the grazing industry.



In Australia, taxation policy instruments have been considered and a computer simulation called RISKHerd has been used to test the viability of such a policy. The RISKHerd project was implemented in September 1998 and it aims to evaluate the pastoral industry in Australia in terms of both income measures and measures relating to the sustainability of the natural resource base. Policy instruments being analyzed using the RISKHerd computer model include: Farm management deposits and other drought related instruments, tax averaging, accelerated depreciation provisions, and the implementation of a stock valuation system for taxation purposes.

*Contribution from farmers' members of National Farmers' Federation, Australia*



## **Appropriate technologies: drip irrigation, greenhouses and the foggara**

### **Review of national initiatives to prevent soil deterioration**

The strategy to combat desertification is part of a nationwide effort to counteract a massive rural exodus.

Immediately after gaining independence, Algeria launched the Programme de Défense et Restauration des Sols (DRS), a sweeping program to combat erosion, designed to:

- curb erosion in the mountainous zone;
- increase the incomes of waterside residents through the planting of arboricultural species.

In the 1970s, the green dam program sought to halt the advancement of deserts by establishing a forest belt along the edge of the steppe. The green dam was followed by efforts to stabilize dunes by means of walls (tabias) topped by dry windbreaks. Adapted tree species were planted at the foot of the tabias. In the 1980s, the Direction Générale des Forêts set up forest tree nurseries and farmers were encouraged to plant trees. During the 1990s, liberalization in the agriculture sector led to withdrawal by the State, a policy that did not foster the implementation of programs to combat desertification.

In the year 2000, the government elaborated a Plan National de Développement Agricole (PNDA) in collaboration with the Farmers' organisations from the Chambers of Agriculture. The plan, which focuses on the sustainable, integrated development of rural areas, involves both the government and farmer's organisations in the fight against rural poverty.

At present, implementation of agro-sylvo-pastoral programs is being considered. Local populations would be involved in the management of such programs. This is the only guarantee of their success.

### **The Plan National de Développement Agricole (PNDA)**

The plan encourages the application of concrete measures that foster the development of farming, such as the conservation and rational management of natural resources, especially water and soil, and the strengthening of food security. Among the incentive and support measures intended for farmers and designed to protect natural resources, mention should be made of:

- government participation in the re-conversion of irrigation systems and water management;
- the assumption by the government of responsibility for drainage operations and localized irrigation systems such as drip irrigation, with a view to saving and conserving water;

- the adaptation of soil management systems in arid and semi-arid regions;
- the development of crops adapted to natural zones and soils;
- the revitalization of rural arboriculture, viticulture, livestock production and other activities suited to arid conditions;
- the improvement of farmers' incomes to eliminate the risk of abandonment of the land by the upcoming generations, in the absence of a promising future.

Moreover, initiatives to combat desertification are supported by national reforestation and crop re-conversion programs.

## Appropriate technologies and crop choices

The introduction in northern Algeria of drip irrigation on industrial tomato farms raised average yields from 13 tons to 90 tons.

In 1990, there was little farming in southern Algeria, aside from dates, oases and palm groves. The introduction of greenhouse plasticulture has made it possible to grow vegetables in areas where farming had not, until then, been carried on. The introduction of potato growing has led to yields of 50 tons/hectare, since weather conditions allow crops to be planted year round.

## THE FOGGARA: community water management



Conventional farms in southern Algeria are irrigated by the foggara, a traditional method whose origins can be traced back 3000 or 4000 years, which relies on wells dug on a plateau overlooking the oasis. Underground galleries link the wells and water is drawn

by gravity to the gardens requiring irrigation.

Under a partnership agreement stipulating the distribution of the water drawn, each participant receives a share of the water in accordance with the investment made in the foggara's construction.

An "association-sharing" partnership exists in one region, a form of association between the owner of non-irrigated land and the owner of a water quota. In exchange for irrigation to develop the land, the landowner undertakes to transfer to his associate half of the land. According to custom, the "association-sharing" ends when the palm trees planted bear their first fruit, i.e. after seven years. At that time, the landowner assumes permanent possession of the water provided by his associate and, on half of his land, of a producing palm grove where before there was dry, bare land.

In these regions of southern Algeria, conventional farming is still carried on through this type of socio-economic and legal interdependence and the operators of the foggaras have set up associations.

*Contribution from the Chambre Nationale d'Agriculture d'Algérie (CNA)*



R. Faidutti, FAO

## TECHNICAL FACT SHEET **Côte d'Ivoire**

# Comprehensive strategy to combat desertification

## Farming in Côte d'Ivoire

Most farmland in Côte d'Ivoire has a mixed topography - plateaus and plains, mountainsides, benchlands, valleys - and a semi-arid or dry sub-humid climate. Flood, canal and sprinkler irrigation are, along with rainfall, the main sources of water for agricultural land. This environment supports fruit (pineapple, bananas and mangoes) and cereal (rice, corn and millet) crops and sheep, goat, poultry and hog raising, which

together account for the bulk of the country's agricultural income.

Sixty per cent of the overall population are farmers, with extensive grazing, manual tilling and animal and tractor-drawn ploughing the techniques primarily used.

## Forest degradation

Côte d'Ivoire has identified deforestation, caused by bush fires and nomadic farming, as a factor contributing to land degradation and aggravation of desertification processes.

The reduction of forest resources is due primarily to the low-level technology used by farmers. A number of inappropriate practices have led to more intensified farming. The shortening of the time that land is laid fallow, from 20 years in the

nineteen sixties (1960's) to five (5) years today, along with bush fires and the cultivation of burnt fields have greatly reduced forest resources. In the period 1965-1991, tree-felling only affected 250,000 hectares whereas reforestation affected only 5,000 hectares per year. The origin of massive deforestation lies in high population growth rates and the need for charcoal and wood for heating.

## Strategy for combating deforestation and desertification

### Pillars of ANADER intervention

The Government of Côte d'Ivoire created the country's National Rural Development Support Agency (known by its French acronym, ANADER, for Agence Nationale d'Appui au Développement Rural) primarily to provide solutions to desertification problems. ANADER has partnered with farmers to establish several programmes, most notably the Sustainable Soil Management (French acronym, GDS) and Integrated Pest Management (French acronym, GID) programmes, along with the use of biopesticides.

## 1. Sustainable Soil Management (GDS)

The activities conducted under the Sustainable Soil Management (GDS) programme include:

- Implementation of regional committees whose membership includes agricultural producers ANADER and forestry industry high level representatives.
- Setting up of live hedges and promotion of zero tilling
- development of agroforestry
- Use of leguminous shrubs and plant cover to regenerate soil fertility and reduce the duration of fallow periods.

## 2. Integrated Pest Management (IPM)

Integrated Pest Management (IPM), which favours the rational use of pesticides, focuses essentially on rice crops. In the 1996-1997 season, the programme:

- delivered IPM strategy and technical training to 3 national managers and 17 trainers
- reduced production costs and increased yields by 25 to 60%
- created 8 agricultural field schools
- offered IPM expertise to over 160 rice farmers

## 3. Use of biopesticides

This programme encourages the use of biopesticides, primarily neem, papaya and pimento leaves, to control marshland field devastation by predators. Other activities are also conducted, including:

- Promotion of the use of biopesticides for the phytosanitary treatment of marshland crops and cereal crop conservation
- experimental use of biopesticides to combat cacao-tree capsid
- exploration of a biological method for combating brown pod rot in cacao
- manufacture and use of cacao pod-based compost

Several specific projects were also implemented, in particular:

- 1- Struggle against deforestation (Water and Forestry Ministry)
- 2- Struggle against bush fires (Ministry of Agriculture)
- 3- Struggle against erosion (Ministry of Agriculture)
- 4- Protection of park and forest reserves (Ministry of Environmental Affairs)

Inasmuch as three ministries are involved in the struggle against desertification, the Government of Côte d'Ivoire has taken measures to ensure the co-ordination of all projects geared to 'combating desertification' by a single ministry to facilitate communication on the action taken. Specifically, to combat bush fires and desertification, the Government and farmers have implemented the following operational resources:

- Awareness campaigns have been intensified on the hazards of bush fires. Nonetheless, changing farmer mentality in this regard is a very slow and difficult process, for this is traditional practice in certain rural populations.
- The creation of local monitoring committees. To prevent bush fires, the teams involved watch to ensure that the people accessing forest lands are not carrying utensils that could be used to set a fire.

## Perspectives for effectively combating desertification

### The necessary solution: comprehensive strategy

The struggle against desertification has no chance of succeeding unless it forms a part of a broader social, economic, cultural and political development policy. An integrated approach aiming to solve the problems generated by poverty in the areas of food, housing, employment, income, health, education and demographic pressure will provide the means for suitably combating desertification.

### The proposed solution: development of a National Action Plan (NAP)

The advantage of the National Action Plan is that it rallies all the ministries and NGOs, as well as civil society and development partners, around the implementation of a consensus strategy for combating desertification. Such a strategy, moreover, taking account of the socioeconomic, political and ecological context, combines the following three aspects: human development, protection of the environment and use of science and technology.

The strategies implemented in Côte d'Ivoire to involve participants include integrating public and private bodies as well as local and Farmers' Organisations, NGOs, via dialogue with all parties, concerned, multi-party consultations, furtherance of partnering agreements and engagement of development partners.

The priority areas and financial contributions required are defined on that basis. In addition to the consultation processes, papers are drafted with descriptions of all the methods used to combat desertification.

### The challenges

Official ratification of the PAN is still outstanding in Côte d'Ivoire, where it is scheduled for November 2005. This is a minor obstacle given that the NAP has been included in the Poverty Reduction Strategy and the national development strategy, together with all the issues relating to the struggle against land degradation, desertification, deforestation, sustainable soil management, sustainable natural resource management and so on. Moreover, in this period of political instability, with most loans frozen, fund raising is proving to be a real challenge...

*Contribution from the Ivory Coast National Association of Rural Organizations (French acronym ANOPACI, for Association Nationale des Organisations Paysannes de la Côte d'Ivoire)*





## **The role of farm organizations in the development of rural populations and the management of fragile ecosystems**

### **The state of natural resources is linked to social structures**

Madagascar is an agricultural country, although the agriculture sector has developed little over the past decade. Farming in Madagascar continues to suffer from a lack of water, despite the availability of water resources, because of inadequate hydro-agricultural infrastructure, which, when it exists, is hard to manage at the community level. Farmers are still not using groundwater for irrigation purposes. Moreover, the lack of irrigation water is very often a source of social conflict.

### **Social factors responsible for soil deterioration**

In addition to successive natural disasters, limited access by farmers to resources such as land, water, technology, credit and markets has exacerbated rural poverty, which in turn has led to environmentally destructive practices. Several social factors have contributed to soil deterioration:

- failure by farmers to gain access to agricultural markets;
- the absence of markets, roads and other infrastructure needed to dispose of agricultural products;
- a 60% illiteracy rate in rural areas;
- a lack of communications infrastructure, for example to enable the Institutions Financières Mutualistes (IFM) to reach remote rural areas.

### **Assessment of rural development plans**

The representation of and participation by farmers in the Plan d'action pour le développement rural (PADR) is strikingly inadequate. Despite the establishment by the government of the Programme National de Vulgarisation Agricole (PNVA), the anticipated results have not been achieved because the strategy has not reached farmers and encouraged them to get involved in to the program.

In order to deal with the programs' failure, the government, in collaboration with the World Bank, has implemented a national rural development strategy, the Plan d'Action pour le Développement Rural (PADR), under which the government has made key participants of farm organizations, NGOs, the private sector and decentralized services, with a view to enhancing synergies.



## Accomplishments

Despite the development plans' limited accomplishments, some progress has been noted:

- farmers are more aware of environmental protection;
- appropriate agricultural innovations have been popularized, thus facilitating more intensive livestock and rice production and the development of a new technique for growing cassava;
- farmer organizations are being allowed to influence agricultural policy;
- organic farming has been introduced;
- mutual financial institutions and a decentralized financing system have been set up to enable farmers to access credit.

Organic farming is still in the nascent stage. It relies on the development of conventional techniques to protect plants and animals and innovations introduced by farmers.

## Farmers are getting organized to find solutions

Farmers started getting organized in the early 1990s through various farmers' organizations, which provide a means of reacting and influencing the country's agricultural policies. The organizations hope to involve Malgasy farmers in the development process, not only as beneficiaries but also, above all, as participants. Farmer organizations wish to raise awareness among farmers of the sustainable management of natural resources. They are also striving to facilitate access by farmers to technology, credit and markets.

Farmers' organizations recently assumed responsibility for fragile ecosystems and are collaborating with NGOs specializing in the environment. Collaboration projects are intended to raise awareness among rural populations and communities in order to:

- protect forests and combat bush fires;
- conserve soil;
- popularize new techniques such as zero-tillage, mulching and composting.

Through these projects, bush fires have been curtailed in recent years and the use of chemical fertilizer has been reduced on family farms.

## Awareness program to eliminate bush fires

The Vulgarisation des innovations agricoles pour une sécurité alimentaire durable (VIASAD) program seeks to promote two sustainable management strategies, i.e. composting and the zero-tillage-mulching system as a means of combating rural poverty. Moreover, recourse to mulching is due primarily to the widespread practice of setting bush fires. Awareness must be broadened among farmers to avoid possible controlled burning of mulch as a sign of rejection of the technology introduced.

Posters and pocket-sized manuals in Malgasy describing conservation techniques are the main education tools. Furthermore, the training of popularizers in rural areas and the organization of technical workshops are allowing for genuine community mobilization. These events have attracted over 200 participants who, in turn, are encouraging farmers in their communities to adopt the new techniques presented.

*Contributions from FIFATA, FEKRITAMA and the Coalition Paysanne de Madagascar (CPM), Madagascar.*



## **The struggle to combat poverty and desertification**

### **Profile of climatic zones**

Average precipitation has declined from north to south, from 1200 mm to less than 200 mm. There are four distinct climatic zones:

- South: the Sudanese-Guinean or sub-humid zone, covered with savannah woodland and forests (1200 mm);
- Centre: the Sudanese Zone is characterized by plant cover (600 mm to 1200 mm);
- North: the Sahelian Zone is covered by the interior Niger delta (220 mm to 600 mm);
- Far north: the Saharian zone accounts for 51% of the territory (less than 200 mm).

### **Factors in soil deterioration**

The rural population engages primarily in farming, livestock production, fishing and logging. The Malian economy depends to a large extent on the agro-pastoral sector, which employs nearly 70% of the labour force. Farming in Mali and in the other Sahelian countries is confronted with the

climate variations. Despite numerous efforts, the addition of unfavourable weather conditions such as recurring drought and growing pressure on the land has led to the widespread deterioration of natural resources throughout the country.

### **Measures to combat desertification**

The measures aimed at combating desertification and mitigating the effect of drought are two of the Malian government's priorities. To reduce poverty and combat hunger, initiatives have been undertaken to restore and enhance the management of farmland. Among other things, they focus on:

- the management of rainwater;
- the construction of anti-erosion structures;
- the development of marsh creeks, ponds and shallow water;
- the expansion of irrigated surfaces;
- crop diversification.

The organization and management in the villages of all projects are achieved in association with NGOs and village officials, with particular emphasis on the broader involvement of women in management.

The effects of the 1973 and 1983 droughts encouraged the Malian government to make water supply a priority. The water resource management policy was elaborated in collaboration with the public and development partners. The policy establishes measures pertaining to drinking water and irrigation water and seeks to achieve:

- food security;
- the enhancement of the environment and natural resource conservation.

## Results

To ensure the development of agricultural zones, in 1992 the government adopted the rural development master plan, which, has achieved the results indicated below, with the participation of farmers.

### Social factors:

- improvement in farmers' equipment level through the development of 30,000 hectares of irrigable land;
- establishment of professional farmers' organisations;
- establishment of networks to disseminate information, promote projects and elaborate policies;
- strengthening of the role of women in rural development following the identification of their needs, i.e. training, literacy and access to physical and financial resources.

### Water management:

The development of water resources enhancement has enjoyed spectacular success in recent years, which has contributed to a marked improvement in village and rural water-engineering projects. Attention should be focused on the:

- construction of numerous modern wells and boreholes equipped with manual pumps, some of which use solar energy;
- construction of more than 200 small dams;
- development of shallow water with the assistance of NGOs;
- establishment of numerous water points.

## Funding is a major constraint

Drought and desertification are major impediments to socio-economic development. However, one difficulty facing rural communities in ensuring their development and managing water resources is their inability to mobilize sufficient funding. Rural communities are thus unable to cover investment costs and the cost of operating and maintaining hydraulic infrastructure.

*Contribution from the Assemblée Permanente des Chambres d'Agriculture du Mali (APCAM), Mali.*



*Terrace cropping to curb erosion*

## **The Programa Campesino a Campesino (PCaC), A program to conserve soil and water**

### **Assessment of soil deterioration**

Over the past two decades, logging operations, the expansion of agricultural land and the indiscriminate use of chemical products such as pesticides, herbicides and fertilizers have seriously deteriorated and disturbed natural resources. Desertification has led primarily to significant soil erosion.

Tailor-made solutions for farmers in response to this situation, in 1987 the National Union of Farmers and Ranchers (UNAG) implemented the Programa Campesino a Campesino (PCaC), an innovative program that offers small farmers various sustainable, economically viable technologies. The practices proposed focus on local resources and conditions. In particular, the program seeks to:

- encourage active participation by rural communities and the transfer of know-how;
- propose simple, inexpensive, effective practices.

The techniques allow for the reuse of biological matter by limiting reliance on chemical inputs and other energy-intensive technologies.

This approach makes it possible to reduce long-term production costs, although the projects are initially labour intensive.

### **Soil conservation and water management**

In addition to carrying out small-scale pilot projects, the PCaC supports initiatives and projects aimed at:

- using mulch and inedible stems;
- introducing plant residues and using biological fertilizers;
- reforestation and planting hedges;
- encouraging alternative cattle feed (plants and shrubs from the region);
- selecting animal species and plant varieties fully adapted to local conditions;
- diversifying plant varieties and encouraging the use of legumes and cover crops.

## **Soil conservation:** Strategies to increase fertility and curb erosion

Recourse to mulching and the construction of dikes, hedges and barriers are among the methods used to conserve water, control erosion and increase organic matter and biodiversity in the soil.

The growing of cover crops such as legumes is also being encouraged. Drought-resistant legumes play a dual role: they enhance soil fertility and provide additional food for human beings and animals.

Thirteen varieties of legumes and cover crops are grown throughout the country to protect soil, conserve moisture and regenerate nutrients.

Moreover, the agro-forestry approach has aroused special interest among farmers. Over 300 of them have planted cacao trees, coffee trees and pepper plants around the Bosawas reserve. All of these simple practices are contributing to conserving natural resources and thus engendering increased production.



## **Water management:**

Here are two examples of simple techniques that rely on available materials to ensure efficient water management.

**Cisterns:** Cisterns are installed in dry areas in the country in order to collect rainwater running off the roofs of farmers' houses. Ponds are dug in the ground and channel the water to storage ponds. Water collects in the cisterns and when it reaches a certain level, it starts an appropriately adjusted pump. The pumped water can be drawn by gravity to different sites. It is reused for domestic purposes or to supply irrigation systems.

**A drip irrigation system** that uses bamboo, pails, cans and other recipients makes it possible to continuously water part of a field or a garden. The systems directly irrigate the base of the plants and thus give better results

## A successful experiment in the Masaya region

The PCaC was introduced at the Cooperativa Gaspar Garci Laviana five years ago. The following positive results have been achieved:



- crop rotation;
- plant residues are incorporated into the soil;
- natural barriers are used to combat erosion;
- reforestation and cover crops;
- spreading of manure;
- a 90% decrease in the use of chemical fertilizers;
- an increase in annual crops from 4 to 14;
- an increase in perennial and semi-perennial crops from 3 to 19.

In Masaya, 22 families are experimenting with the principle of the accelerated reproduction and multiplication of tubers such as cassava. This technique ensures the production within a short time of healthy, contamination-free plants. Given its potential, the technique has spread to other regions of the country.

## Beyond natural resources, rural communities participation

The PCaC has made it possible to raise awareness among small farmers of enhanced management of their natural resources. Farmers have become aware of their potential and their ability to manage sustainable projects. Moreover, under the impetus of the PCaC, a number of new organizations and programs have been established, which has strengthened the role of farmers in enhancing their living conditions.

*Contribution from the National Union of Farmers and Ranchers (UNAG), drawn from “Agricultura Duradera y Desarrollo Rural” by Jorge Iran Vásquez, Nicaragua*



**Prevention and monitoring program:  
the ecological observation network**



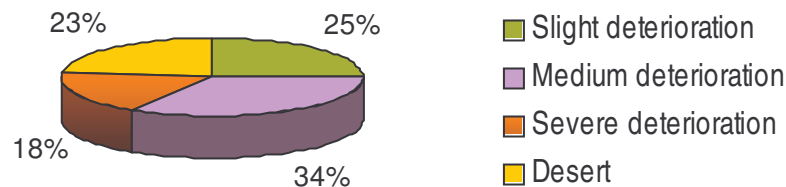
**Factors that contribute to ongoing soil deterioration**

Desertification is threatening over 75% of Tunisia’s territory. Farm and grazing land is subject to ongoing deterioration, stemming primarily from:

- water and wind erosion;
- land salinization;
- overgrazing of rangeland;
- over-exploitation of land and natural vegetation;
- constantly growing needs;
- individual initiatives that do not conform to the notions of conservation and the regeneration of biological potential.

**Degree of severity of desertification**

The chart below indicates the degree of desertification in Tunisia:



**Promotion of a multisectoral strategy to combat desertification**

An array of sectoral strategies and projects intended to protect natural resources are aimed at combating desertification, including:

- the strategy to mobilize water resources;
- the strategy to conserve water and soil;
- the forestry-pasture strategy;
- the integrated agricultural development project;
- the integrated rural development project;
- support projects, i.e. research and ecosystem observation programs.



Efforts in recent years have focused, by and large, on streamlined water use. The national water resource mobilization strategy covers:

- the construction of dams and hillside lakes;
- equipping all of the country's irrigable land with water-saving devices;
- grants to farmers who opt for such equipment;
- recourse to high-yield crops;
- the popularization of research findings among farmers in order to reduce wasted water;
- a project to desalinate brackish water;
- a study of the possibility of using treated agricultural wastewater.

Efforts to increase the amount of irrigated land have offset the detrimental effects of drought in order to boost yields and achieve production stability. To round out these projects aimed at revitalizing the agriculture sector, programs designed to enhance the living standard of rural populations, such as the integrated rural development program, are proposing to rural communities the installation of:

- basic infrastructure, i.e. a road network, dispensaries and schools;
- basic conveniences such as running water and electricity; and
- the establishment of additional sources of income for needy households.

### **A specific program:**

#### **The National Action Program to Combat Desertification (NAP)**

The National Action Program to Combat Desertification (NAP) was elaborated in 1998 by the Ministère de l'Environnement et de l'Aménagement du Territoire (MEAT). NAP encourages the application of measures at all levels. This integrated, participatory approach

centres on partnership and cooperation between the populations concerned, institutions, farm groups and NGOs. The National Action Program seeks to streamline the management of natural resources and is pursuing, for example, projects to reduce soil salinity and combat the silting of sand.

### **Prevention and monitoring program: the ecological observation network**

In addition to developing ongoing strategies and projects, the National Action Program also combines preventive strategies and the monitoring of desertification. A system has been introduced to monitor and evaluate national policies in order to ensure the sustainable management of natural resources. In particular, a project designed to establish indicators of the seriousness of desertification was launched in the year 2000. Among other things, this project determines the extent of land affected in the country's four natural regions. Furthermore, the establishment of an ecological observation network has made it possible to pinpoint desertification indicators. Here are some of the projects monitored by observatories in the network:

- the use of remote sensing combined with on-site observation makes it possible to provide a physical and satellite-based database;
- ecological and socio-economic observation over two years has made it possible to map out land use and to conduct scientific analyses;
- Several research institutes and centres are managing short-, medium- and long-term ecological and socio-economic follow-up.

*Contribution from the Union Tunisienne d'Agriculture et des Pêches (UTAP), Tunisia*



## **Fight against Desertification and poverty:**

### **Participation of farmers in desertification project**

#### **Desertification and poverty**

They constitute the second largest forest reserve after the Amazon. Formerly these provinces in Cameroon were characterised by tropical forests with abundant vegetation. Around two decades ago, the forest started declining. In the forest in the central area (Obala, Mbam) there is a clear advance in the savannah, certainly due to climatic change and demographic pressures. In particular, the whole of the Mbam area has been invaded by savannah. The soil has become infertile for some speculations notably non wood forest products (NWFP) and wood forest products. The climate has become very hot in this part of the country. It is therefore noticeable that between two localities that are close together there is a great difference in the relief (variation in the flora).

To a great extent, the economy of Cameroon relies on the rural sector as much in terms of its contribution to economic growth as in terms of potential for reducing poverty. According to the United Nations Food and Agriculture Organisation (FAO), in 1980 of the 46.5 million hectares of land in the Cameroon, approximately 21.6 million hectares were forest but by 1995 the area was no more than 19.6 million hectares (Global Forest Watch, 2000). Between 1980 and 2002, the population of Cameroon went from 8.6 million to approximately 16 million, with a consequent increase in pressure on land and forest resources. However, the second survey conducted among

households in 2001 (ECAM II) shows that more than 6 million individuals are living below the poverty threshold, the total of 40.2% made up of 17.9% in urban areas and 52.1% in rural areas.

Forests in the central, south and eastern provinces of Cameroon make up part of the Congo basin.

One of the consequences on a social level is the new upsurge of certain diseases such as malaria, which is again rife. From an economic point of view, there is little choice in terms of speculation, the principal cash crop being cocoa. We can thus observe a rapid expansion of the savannah as we move towards the south of Cameroon.

They constitute the second largest forest reserve after the Amazon. Formerly these provinces in Cameroon were characterised by tropical forests with abundant vegetation. Around two decades ago, the forest started declining. In the forest in the central area (Obala, Mbam) there is a clear advance in the savannah, certainly due to climatic change and demographic pressures. In particular, the whole of the Mbam area has been invaded by savannah. The soil has become infertile for some speculations notably non wood forest products (NWFP) and wood forest products. The climate has become very hot in this part of the country. It is therefore noticeable that between two localities that are close together there is a great difference in the relief (variation in the flora).

#### **The obstacles to and challenges of fighting desertification**

- The interests of population survival take precedence over the preservation of the forest
- A lack of harmonisation in interventions
- Farmers with very inadequate means
- The various initiatives lack mechanisms for the participation of the local people and their appropriation of projects.

# Strategies in the fight against desertification

## 1- Involving the participants

- Awareness raising / sensitisation / modelling seminars for local populations
- Seminars to provide information on the connection between desertification and climate change
- Seminars to provide information and training for farmer facilitators and communities on methods of fighting desertification
- Training of farmer leaders on project cycle management and leadership
- Putting in place mechanisms for drawing up and managing the activities by farmers' organisations at grass roots level

## 2- Organising and starting programmes and projects to fight desertification

- 1997-1999: Second phase of the Alternative to Slash and Burn Programme (ASB)
- 2000-2002: Programme entitled '*Local People, Devolution and Adaptive Collaborative Management Programme*', conducted by CIFOR in the Cameroon
- 2000-2003: Third phase of the Alternative to Slash and Burn Programme (ASB)
- 2003-2004: The SOS-FAIM Belgique Project: Setting up improved plant material production centres in farmer organisations belonging to FORCE
- 2000-2005: Sustainable Tree Crop Program – STCP, funded by USAID
  - Strengthening grass roots community organisations
  - Technology transfer
  - Markets and information systems
- June 2004 - February 2005: Capacity Building Programme (CBP) / SNV – (Netherlands Cooperation: Support for NWFP capacity building in the plant material production centres of the grass roots farmers' organisations (Ndo'o, Ndjansang and Cola) at Mfou  
Building capacity in farmers' organisations through:
  - Ndo'o, Ndjansang and Cola Domestication techniques
  - Commercialisation and marketing aspects for a better knowledge of these products' sale places and prices.

## 3- Organising a number of training workshops, in particular:

- Training for trainers in the management of the different modules in farming schools
- Training workshop on NWFP domestication techniques and fruit trees based on the farm school model. They are key tools in the stable agricultural mix strategy. The endogenous resources formed provide knowledge and allow advances to be made permanent.
- Setting up vegetable material production centres as places where training can be applied and put into practice. In fact, cocoa plantations are ageing and a plant supply and good quality seed production system that would allow producers either to regenerate old plantations or to create new ones does not exist. Consequently, agricultural activities not only generate very little income but also seriously mortgage the future of the forest by extending the surface areas of food production agriculture in compensation.

## Results

<b>Successes</b>	<b>Setbacks</b>
<ul style="list-style-type: none"><li>▪ Setting up of 22 operational improved plant production centres in villages</li><li>▪ Setting up 25 farm schools that work not only to reduce the use of pesticides, but also to improve production. The 25 farm schools manage 625 other producers. Thus, a cocoa plantation previously producing 200kg of cocoa now produces 400kg, using less than half the chemical products previously used.</li></ul>	<ul style="list-style-type: none"><li>▪ Strategies for putting in place the cocoa and palm oil agri-forests, for the collection and domestication of NWFP (non wood forest products) that are isolated and compartmentalised, either from one another, from one farmers' organisation to another or sometimes from one locality to another and the conditions for synergies to be exploited do not always exist.</li><li>▪ For four years, with the exception of the actual exploitation of community forests, the performances of farmers' organisations and rural population remain out of step with the local and national environmental stakes and their potential to contribute to fighting rural poverty and the sustainable management of forests.</li><li>▪ Limits can be seen in the autonomy of operation of farm schools in terms of operating equipment and the beneficiary population taking responsibility for facilitators.</li></ul>

## Short and long term impacts

- 625 farmers trained in farm schools with an increasing demand because of the increase in production recorded during the most recent cocoa harvest.
- Cocoa production has doubled.
- The existence of a potential of more than 10,000 plants for the creation and increase in density of farms.
- Existence of a quantitative and qualitative production potential for improved plant material (22 production centres), a factor that encourages the reconstruction of ecosystems.
- At least 20 departments (administrative units) affected by issues relating to fighting desertification.

## Lessons to be learnt

- Programmes to fight desertification are only effective when they affect the vital interests of the local population and when these populations are involved in implementing them as well as in the strategy definition and evaluation phases.
- When being implemented, the most effective strategy consists of transferring technology to the beneficiaries, so that there is close technical assistance.
- Harmonise interventions on the ground.
- Put the appropriate resources into realising the aforementioned programmes.

## The challenges for the future

- Projects to fight desertification must carry local populations along with them.
- The projects should be part of an integrated programme / approach, the results of which should be spread over the medium and long term.
- In terms of methodology, the approach should be participative and integrate indigenous knowledge.

*Contribution from the Confédération des Organisations Rurales pour le Cameroun Économique (FORCE)*

# Ghana

## The Agro-forestry Reforestation Project of the Ghana Rural Reconstruction Movement (GhRRM)

### Introduction

Sixty-five percent of the population in Ghana is involved in agriculture, making the sector economically important. Agriculture in Ghana relies primarily on cultivation of fruits, vegetables, grains and nuts. The cultivated area has a topography of coasts, mountains and foot hills, with a semi-arid and dry-sub humid climate. Water supply to agricultural lands is achieved through rain-fed systems, drip irrigation, ditches and waterways.

In the past five years, farmers in Ghana have noticed lower soil fertility and moisture, higher soil erosion rates, salinity and greater use of chemical inputs. There has been an increase in demobilization of the rural population and migration during dry periods as a result of desertification. Social tensions for the repartition of fertile lands due to this delocalisation have increased and dependence on external aid to compensate for damages caused by desertification has also risen over this period.

Farmers have identified certain factors that lead to the degradation, desertification and aggravation of drought effects on lands. These include continuous and uncontrolled deforestation, especially due to logging, annual bush fires and impoverishment of soil fertility and soils becoming arenarous (sand winning). Climate and precipitation patterns, diseases and pests aggravate the situation by making cultivation difficult.

### Strategies for Combating Desertification

In Ghana, a National Desertification Committee has been established that plans and implements the National Actors Programme on Desertification. Participants involved in project development include farmers, public and private sector representatives, representatives from international cooperatives and scientists. This ensures diverse representation and considers the full scope and implication of the projects developed.

There are three conservation techniques currently in use to ensure sustainable soil and water management and help prevent desertification:

- a) Agro-Forestry/ Reforestation
- b) Campaign Against Bush Fires
- c) Senetary Farming

### Main Problems Encountered

The project area had experienced land degradation due to deforestation (logging and lumbering), cutting trees for fuel (firewood and charcoal), and farming activities (especially shifting cultivation and annual bush burning and bush fires). This has resulted in the following environmental degradation:

- a) loss of vegetation cover
- b) increased soil erosion especially on waterlogged lands

- c) soil compaction, low infiltration rate and high water runoff
- d) loss of biodiversity (both flora and fauna)
- e) loss of soil fertility and consequent loss of crop yield
- f) drying of water bodies

Social impacts were manifested as poor income rates and lowered living standards.

The major challenge was that even though community members understood that continuous land degradation lead to dire consequences, they did not have access to technologies, technical know-how and resources that would enable them overcome the problem.

## Strategies to Overcome Desertification

The Ghana Rural Reconstruction Movement (GhRRM) is an NGO based in the Eastern Region and is involved in rural development with emphasis on agricultural and environmental issues. It uses the participatory approach to develop and promote appropriate farming systems based on indigenous knowledge of the people, and relies on joint efforts between NGOs, CBOs, farmers' associations and community members. Outlined below are strategies that have been used by GhRRM to overcome the problems associated with desertification:

- community mobilization, raising awareness of and education with respect to the problem
- participatory (GhRRM / Communities /Other Stakeholders) solution identification
- Joint planning and execution of activities
- Joint identification and mobilization of resources
- Training of community members (farmers, farmer groups, the youth, students etc.) and provision of appropriate technologies (agro-forestry, reforestation, composting and recycling organic matter etc.)
- Training some farmers as extensionists (farmer – to – farmer extension)
- Creation and training for anti-bush fire groups
- Introduction of fuel-efficient stoves
- Strengthening and enforcing the local anti-bush fire and other laws

## Results

- Increased availability of farm trees for firewood and charcoal, reducing the pressure on the little natural vegetation that is left
- Reduction in soil erosion, especially on waterlogged lands
- Reduction in annual bush burning and bush fires
- Adoption of composting and recycling organic matter by some farmers, especially for vegetable production

Farmers understand the importance of the project, however often complain that some of the technologies are too labor-intensive and time consuming. Involving communities and other stakeholders in carrying out the projects has given farmers ownership over the projects and has increased their initiative for adopting and implementing sustainable farming practices that contribute to combating desertification.

*Contribution from the Ghana Rural Reconstruction Movement (GhRRM)*



## Senegal

# Struggle against desertification: Need to raise funds for local community

### Introduction

The Rural Network for the Protection of the Environment was created in 1998 by 24 associations located in the regions of Diourbel, Fatick and Thies. It aims to defend the interests of its members in environmental issues, encourage the exchange of information and experience on the struggle against the destruction of nature and combine members' efforts to combat desertification.

### Socio-economic and ecological context in Senegal

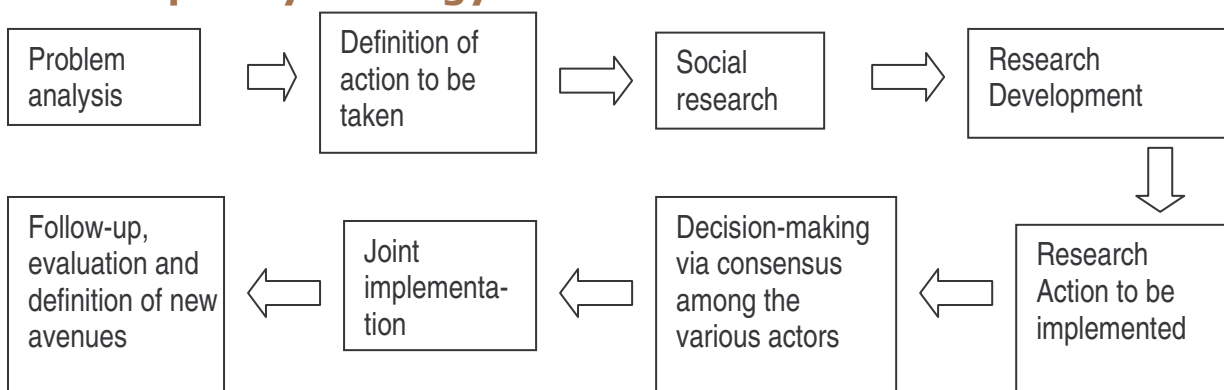
Farming in Senegal faces a number of constraints: chronic drought, impoverished soil, over-exploitation of natural resources and demographic pressure. In addition, the locust invasion in the summer of 2004 and again in March 2005 has worsened farmers' plight. The programme to combat desertification for non-governmental actors has not yet received the funding expected.

### Obstacles and challenges

The largest obstacle continues to be the lack of funding. In Senegal, the means and the partners willing to invest in the two-year programme must be found to be able to undertake the action envisaged. Such actions include, specifically:

- Dissemination of the Land Act
- Organization of concerted action among rural players: farmers, livestock raisers, local officials, workers and others
- Dispute prevention and settlement
- Reduction of charcoal consumption
- Research on medicinal plants
- Research and compilation of information on the environment
- Lobby against the most polluting industries and activities
- Enhancement of local actor capacity in the rational management of natural resources (women's role ...)
- Dissemination of the results obtained on certain species

### Participatory strategy to combat desertification





## **Desertification-combating project methodology**

Participatory implementation of the projects sponsored by the Rural Network for the Protection of the Environment entails meetings, field visits, research and documentation, communication and sharing information and experience to better identify the concerns of all involved parties. The stages followed by the network to prepare and ensure the success of its projects are set out below:

- Ensure conformity with legislation governing environmental protection as well as with governmental programmes and plans
- Capacity building by capitalising on experience
- Assessment of the results obtained (research)
- Providing support for relevant local initiatives
- Follow-up and evaluation of projects and programmes implemented

## **Actors involved**

Numerous actors have been involved in partnering to combat desertification. Such partnerships include both formal bodies and associations (members of network associations, governing bodies of local communities covered by the network, network development partners), as well as individuals (network resource people, rural producers, urban populations).

## **Results**

Protection of the country's flora has been more effective since the implementation of concerted action, which has been conducted through an exchange of experience, strengthening the capacities of the actors involved. Nonetheless, implementation of the second programme has been compromised by the lack of financial resources. This has caused dissipation of results and network cohesion. The organization is facing difficulties for lack of funding.

## **Positive aspects**

- environmental degradation-related problems shared in the area;
- information on a few shared experiences;
- awareness that action must be taken jointly and in a co-ordinated manner;
- existence of a partner willing to partially finance the first two-year programme

## **Long- and short-term impact**

Two types of impact may be identified: those that improve the environment and those that help disseminate knowledge and build capacities of the community. Kadd and young growth protection, the emergence of village forests, the increasing awareness and use of compost fertilization methods and soil enrichment are among the factors contributing to environmental improvement. Community capacities are strengthened thanks to measures and efforts undertaken jointly and the exchange of technical knowledge and experience; community members have acquired relevant information.

## **The lessons learnt**

Desertification is a plague for Senegalese farmers. Funds are needed to halt desertification, a fact that provides support for the utility of a concerted struggle. Such an approach entails the compilation of useful information to formulate a specific plan based on precise knowledge of the endogenous and exogenous causes of the phenomenon, to guide the most effective actions to combat it. There is no denying that the struggle will be long and arduous, given today's demographic pressures and over-exploitation of natural resources; desertification should prompt governmental support for sustainable local initiatives.

*Contribution from the Rural Network for the Protection of the Environment (Réseau Paysan pour la Protection de l'Environnement - R.P.E.)*

**Uganda****Capacity building to  
combat Desertification:****The role of Area Cooperative Enterprises (ACE)**

Eighty-five percent Uganda's population is involved in agriculture, primarily on coastal and plateau regions, under what is loosely described as a dry-subhumid climate. Fruits & vegetables (mangoes, oranges, apples, passion fruits, etc.), grains (maize, sorghum, sekedo, millet, selenut, rice, etc.) and grasses (sesbania, caliandra, rye grass, elephant grass) are rain-fed by an average annual rainfall of 1150 mm and make up primary harvests.

In the past, Uganda has been marked by political turmoil, lack of political will and absence of legal policy frameworks. Land tenure systems have been unfavourable resulting in high land pressure from inappropriate farming practices, deforestation and bush burning, aggravating desertification.

There has been a lack of action and implementation of the policy frameworks that have been developed (the Plan for Modernization of Agriculture; the National Forestry Authority and the National Environment Management Authority), and a land bill for land use rights, ownership and management has been written, but not yet passed.

**Strategies for combating desertification**

The Uganda Cooperative Alliance Limited was formed in 1961 as the apex body of the Ugandan Co-operative Movement. UCA is a service provider, capacity builder, and a catalyst for bringing about change; with time UCA hopes that the co-operatives will be able to carry on activities autonomously. UCA implements strategies to involve participants in the combat against desertification and therefore works closely with farmer cooperatives, organisations affiliated to Uganda National Farmers' Federation (a parish farmers' association), CBOs, NGOs and scientists and builds partnerships with local government field staff at the sub-county level.

To combat desertification, UCA has been involved in a capacity building process, under which it :

- Builds partnerships
- Mobilizes farming communities through village development committees for sensitization of the effects of land degradation and bush burning on desertification.
- Forms action plans and projects at the village level through a participatory dialogue with all stakeholders
- Introduces agroforestry technologies and practices in relation to farming practices

To strengthen individual farmer groups, they are united into a larger economic units known as Area Cooperative Enterprises (ACEs). Approximately 3 to 10 farmer groups make up an ACE, and can represent over 1000 farmers. ACE leadership and members identify and select enterprises for project implementation following which the ACE leadership assists members in sourcing for advisory service and facilitate retrieval of market information, collected from various sources. They provide training and education for members in soil management, use of organic materials, conservation and deforestation, simple irrigation technology, and they aid in establishing tree nursery beds.

Some of the technical farming methods encouraged by UCA and ACEs are:

- Land management techniques (erosion control through soil & water management/ conservation)
- Use of improved fallows
- Use of cover crops
- Use of pest and drought resistant crops to minimize persistent pesticides that degrade the land

## Results

### Successes

- Biodiversity addressed through planting a variety of trees
- Changed attitudes on deforestation, overgrazing and bush burning
- Increased knowledge, skills and awareness on topical environmental issues like organic farming
- Soil erosion reduced by 50% in fragile ecosystems through soil conservation techniques
- Increased adoption of water harvesting technologies
- Use of integrated pest management systems
- Adoption of agroforestry practices

### Failures and Difficulties

- Land tenure systems are a prohibiting factor in adoption of some technologies
- Lack of action and implementation of policy and legal frameworks
- Established policy and legal frameworks are not sufficient
- Increased awareness and sensitization
- Lack of funds to facilitate adequate training/seminars
- Rigid socio-economic/cultural inclinations in some regions
- Political tensions in some areas (war ravaged areas are inaccessible)
- Unpredictable weather patterns
- Lack of proper preparation strategy to address national disasters

### Factors enabling the project

- Support from development partners
- Political support
- Participatory approaches embracing people's livelihoods
- Supportive communities ready to take up new ideas.

### Short and long term effects

- Increased biomass
- Reduced soil erosion
- Availability of wood fuel
- Soil fertility improvement
- Improved biodiversity

## Looking Ahead

In order to achieve these, UCA has also identified a number of partnership possibilities for the future

- SACCOs, i.e. savings credit cooperatives mobilized with other UCA implemented projects.
- Swedish Cooperative Centre and/or Canadian Cooperative Association as partner organisations in development assistance to various districts in Uganda.
- NAADs (National Agricultural Advisory Services)

Based upon UCA past and current successes and failures, they have identified future challenges upon which to target their efforts:

- Identify partnerships willing to commit to joint action to combat desertification
- Integrate national action planning into national and budget planning process
- Facilitate genuine involvement of civil society
- Bring about concerted action to speed up the process.