

By the year 2025, 83 per cent of the expected global population of 8.5 billion will be living in developing countries. Yet the capacity of available resources and technologies to satisfy the demands of this growing population for food and other agricultural commodities remains uncertain. Agriculture has to meet this challenge, mainly by increasing production on land already in use and by avoiding further encroachment on land that is only marginally suitable for cultivation.

Major adjustments are needed in agricultural, environmental and macroeconomic policy, at both national and international levels, in developed as well as developing countries, to create the conditions for sustainable agriculture and rural development (SARD). The major objective of SARD is to increase food production in a sustainable way and enhance food security. This will involve education initiatives, utilization of economic incentives and the development of appropriate and new technologies, thus ensuring stable supplies of nutritionally adequate food, access to those supplies by vulnerable groups, and production for markets; employment and income generation to alleviate poverty; and natural resource management and environmental protection.

The priority must be on maintaining and improving the capacity of the higher potential agricultural lands to support an expanding population. However, conserving and rehabilitating the natural resources

on lower potential lands in order to maintain sustainable man/land ratios is also necessary. The main tools of SARD are policy and agrarian reform, participation, income diversification, land conservation and improved management of inputs. The success of SARD will depend largely on the support and participation of rural people, national Governments, the private sector and international cooperation, including technical and scientific cooperation.

A Agricultural policy review, planning and integrated programmes in the light of the multifunctional aspect of agriculture, particularly with regard to food security and sustainable development

Basis for action There is a need to integrate sustainable development considerations with agricultural policy analysis and planning in all countries, particularly in developing countries. Recommendations should contribute directly to development of realistic and operational medium- to long-term plans and programmes, and thus to concrete actions. Support to and monitoring of implementation should follow.

The absence of a coherent national policy framework for sustainable agriculture and rural development (SARD) is widespread and is not limited to the developing countries. In particular the economies in transition from planned to market-oriented systems

need such a framework to incorporate environmental considerations into economic activities, including agriculture. All countries need to assess comprehensively the impacts of such policies on food and agriculture sector performance, food security, rural welfare and international trading relations as a means for identifying appropriate offsetting measures. The major thrust of food security in this case is to bring about a significant increase in agricultural production in a sustainable way and to achieve a substantial improvement in people's entitlement to adequate food and culturally appropriate food supplies.

Sound policy decisions pertaining to international trade and capital flows also necessitate action to overcome: (a) a lack of awareness of the environmental costs incurred by sectoral and macroeconomic policies and hence their threat to sustainability; (b) insufficient skills and experience in incorporating issues of sustainability into policies and programmes; and (c) inadequacy of tools of analysis and monitoring.¹

Objectives

- a By 1995, to review and, where appropriate, establish a programme to integrate environmental and sustainable development with policy analysis for the food and agriculture sector and relevant macroeconomic policy analysis, formulation and implementation;
- b To maintain and develop, as appropriate, operational multisectoral plans, programmes and policy measures, including programmes and measures to enhance sustainable food production and food security within the framework of sustainable development, not later than 1998;
- c To maintain and enhance the ability of developing countries, particularly the least developed ones, to themselves manage policy, programming and planning activities, not later than 2005.

Management-related activities Governments at the appropriate level, with the support of the relevant international and regional organizations, should:

- a Carry out national policy reviews related to food security, including adequate levels and stability of food supply and access to food by all households;
- b Review national and regional agricultural policy in relation, *inter alia*, to foreign trade, price policy, exchange rate policies, agricultural subsidies and taxes, as well as organization for regional economic integration;
- c Implement policies to influence land tenure and property rights positively with due recognition of the minimum size of land-holding required to maintain production and check further fragmentation;
- d Consider demographic trends and population movements and identify critical areas for agricultural production;
- e Formulate, introduce and monitor policies, laws and regulations and incentives leading to sustainable agricultural and rural development and improved food security and to the development and transfer of appropriate farm technologies, including, where appropriate, low-input sustainable agricultural (LISA) systems;
- f Support national and regional early warning systems through food-security assistance schemes that monitor food supply and demand and factors affecting household access to food;
- g Review policies with respect to improving harvesting, storage, processing, distribution and marketing of products at the local, national and regional levels;
- h Formulate and implement integrated agricultural projects that include other natural resource activities, such as management of rangelands, forests, and wildlife, as appropriate;
- i Promote social and economic research and policies

that encourage sustainable agriculture development, particularly in fragile ecosystems and densely populated areas;

j Identify storage and distribution problems affecting food availability; support research, where necessary, to overcome these problems and cooperate with producers and distributors to implement improved practices and systems.

Financing and cost evaluation \$3 billion, including about \$450 million from the international community on grant or concessional terms.

B Ensuring people's participation and promoting human resource development for sustainable agriculture

Basis for action This component bridges policy and integrated resource management. The greater the degree of community control over the resources on which it relies, the greater will be the incentive for economic and human resources development. At the same time, policy instruments to reconcile long-run and short-run requirements must be set by national Governments. The approaches focus on fostering self-reliance and cooperation, providing information and supporting user-based organizations. Emphasis should be on management practices, building agreements for changes in resource utilization, the rights and duties associated with use of land, water and forests, the functioning of markets, prices, and the access to information, capital and inputs. This would require training and capacity-building to assume greater responsibilities in sustainable development efforts.²

Objectives

- a To promote greater public awareness of the role of people's participation and people's organizations, especially women's groups, youth, indigenous people and people under occupation, local communities and small farmers, in sustainable agriculture and rural development;
- b To ensure equitable access of rural people, particularly women, small farmers, landless and indigenous people and people under occupation, to land, water and forest resources and to technologies, financing, marketing, processing and distribution;
- c To strengthen and develop the management and the internal capacities of rural people's organizations and extension services and to decentralize decision-making to the lowest community level.

Management-related activities Governments at the appropriate level, with the support of the relevant international and regional organizations, should:

- a Develop and improve integrated agricultural extension services and facilities and rural organizations and undertake natural resource management and food security activities, taking into account the different needs of subsistence agriculture as well as market-oriented crops;
- b Review and refocus existing measures to achieve wider access to land, water and forest resources and ensure equal rights of women and other disadvantaged groups, with particular emphasis on rural populations, indigenous people, people under occupation and local communities;
- c Assign clear titles, rights and responsibilities for land and for individuals or communities to encourage investment in land resources;
- d Develop guidelines for decentralization policies for rural development through reorganization and strengthening of rural institutions;
- e Develop policies in extension, training, pricing, input distribution, credit and taxation to ensure necessary incentives and equitable access by

the poor to production-support services;

f Provide support services and training, recognizing the variation in agricultural circumstances and practices by location; the optimal use of on-farm inputs and the minimal use of external inputs; optimal use of local natural resources and management of renewable energy sources; and the establishment of networks that deal with the exchange of information on alternative forms of agriculture.

Financing and cost evaluation \$4.4 billion, including about \$650 million from the international community on grant or concessional terms.

C Improving farm production and farming systems through diversification of farm and non-farm employment and infrastructure development

Basis for action Agriculture needs to be intensified to meet future demands for commodities and to avoid further expansion onto marginal lands and encroachment on fragile ecosystems. Increased use of external inputs and development of specialized production and farming systems tend to increase vulnerability to environmental stresses and market fluctuations. There is, therefore, a need to intensify agriculture by diversifying the production systems for maximum efficiency in the utilization of local resources, while minimizing environmental and economic risks. Where intensification of farming systems is not possible, other on-farm and off-farm employment opportunities should be identified and developed, such as cottage industries, wildlife utilization, aquaculture and fisheries, non-farm activities, such as light village-based manufacturing, farm commodity processing, agribusiness, recreation and tourism, etc.

Objectives

- a** To improve farm productivity in a sustainable manner, as well as to increase diversification, efficiency, food security and rural incomes, while ensuring that risks to the ecosystem are minimized;
- b** To enhance the self-reliance of farmers in developing and improving rural infrastructure, and to facilitate the transfer of environmentally sound technologies for integrated production and farming systems, including indigenous technologies and the sustainable use of biological and ecological processes, including agroforestry, sustainable wildlife conservation and management,

aquaculture, inland fisheries and animal husbandry;

c To create farm and non-farm employment opportunities, particularly among the poor and those living in marginal areas, taking into account the alternative livelihood proposal *inter alia* in dryland areas.

Management-related activities Governments at the appropriate level, with the support of the relevant international and regional organizations, should:

- a** Develop and disseminate to farming households integrated farm management technologies, such as crop rotation, organic manuring and other techniques involving reduced use of agricultural chemicals, multiple techniques for sources of nutrients and the efficient utilization of external inputs, while enhancing techniques for waste and by-product utilization and prevention of pre- and post-harvest losses, taking particular note of the role of women;
- b** Create non-farm employment opportunities through private small-scale agro-processing units, rural service centres and related infrastructural improvements;
- c** Promote and improve rural financial networks that utilize investment capital resources raised locally;
- d** Provide the essential rural infrastructure for access to agricultural inputs and services, as well as to national and local markets, and reduce food losses;
- e** Initiate and maintain farm surveys, on-farm testing of appropriate technologies and dialogue with rural communities to identify constraints and bottlenecks and find solutions;
- f** Analyse and identify possibilities for economic integration of agricultural and forestry activities, as well as water and fisheries, and to take effective measures to encourage forest management and growing of trees by farmers (farm forestry) as an option for resource development.

Financing and cost evaluation \$10 billion, including about \$1.5 billion from the international community on grant or concessional terms.

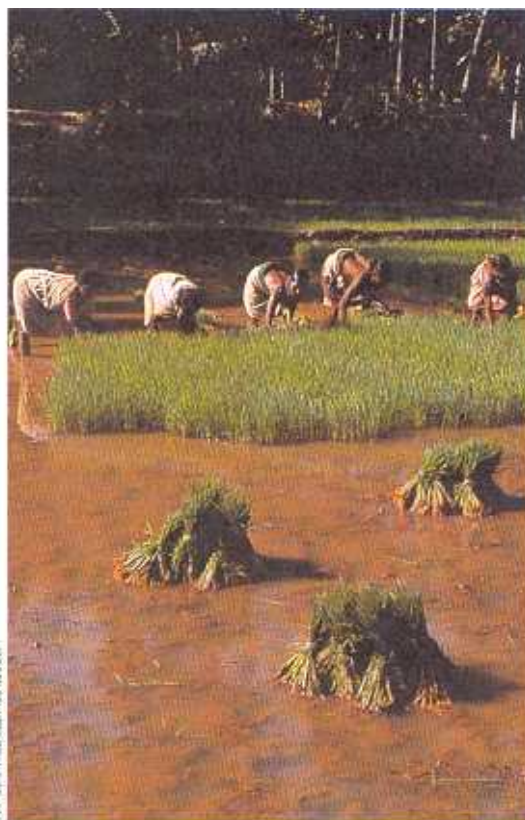
D Land-resource planning, information and education for agriculture

Basis for action Inappropriate and uncontrolled land uses are a major cause of degradation and depletion of land resources. Present land use often disregards the actual potentials, carrying capacities and limitations of

The sunflower fields in the Perigord region of Southern France reflect the growing demand in the western world for sunflower oil products.



Farmers harvest rice by hand in Karnataka, India. Agriculture needs to be intensified to meet future demands. Where intensification is not possible, other on-farm and off-farm employment opportunities should be identified.



land resources, as well as their diversity in space. It is estimated that the world's population, now at 5.4 billion, will be 6.25 billion by the turn of the century. The need to increase food production to meet the expanding needs of the population will put enormous pressure on all natural resources, including land.

Poverty and malnutrition are already endemic in many regions. The destruction and degradation of agricultural and environmental resources is a major issue. Techniques for increasing production and conserving soil and water resources are already available but are not widely or systematically applied. A systematic approach is needed for identifying land uses and production systems that are sustainable in each land and climate zone, including the economic, social and institutional mechanisms necessary for their implementation.³

Objectives

- a** To harmonize planning procedures, involve farmers in the planning process, collect land-resource data, design and establish databases, define land areas of similar capability, identify resource problems and values that need to be taken into account to establish mechanisms to encourage efficient and environmentally sound use of resources;
- b** To establish agricultural planning bodies at national and local levels to decide priorities, channel resources and implement programmes.

Management-related activities Governments at the appropriate level, with the support of the relevant international and regional organizations, should:

- a** Establish and strengthen agricultural land-use and land-resource planning, management, education and information at national and local levels;
- b** Initiate and maintain district and village agricultural land-resource planning, management and conservation groups to assist in problem identification, development of technical and management solutions, and project implementation.

Financing and cost evaluation \$1.7 billion, including about \$250 million from the international community on grant or concessional terms.

E Land conservation and rehabilitation

Basis for action Land degradation is the most important environmental problem affecting extensive areas of land in both developed and developing countries. The problem of soil erosion is particularly acute in developing countries, while problems of salinization, waterlogging, soil pollution and loss of soil fertility are increasing in all countries. Land degradation is serious because the productivity of huge areas of land is declining just when populations are increasing rapidly and the demand on the land is growing to produce more food, fibre and fuel. Efforts to control land degradation, particularly in developing countries, have had limited success to date. Well planned, long-term national and regional land conservation and rehabilitation programmes, with strong political support and adequate funding, are now needed. While land-use planning and land zoning, combined with better land management, should provide long-term solutions, it is urgent to arrest land degradation and launch conservation and rehabilitation programmes in the most critically affected and vulnerable areas.

Objectives

- a** By the year 2000, to review and initiate, as appropriate, national land-resource surveys, detailing the location, extent and severity of land degradation;
- b** To prepare and implement comprehensive policies and programmes leading to the reclamation of degraded lands and the conservation of areas at risk, as well as improve the general planning, management and utilization of land resources and preserve soil fertility for sustainable agricultural development.

Management-related activities Governments at the appropriate level, with the support of the relevant international and regional organizations, should:

- a** Develop and implement programmes to remove and resolve the physical, social and economic causes of land degradation, such as land tenure, appropriate trading systems and agricultural pricing structures, which lead to inappropriate land-use management;
- b** Provide incentives and, where appropriate and possible, resources for the participation of local communities in the planning, implementation and maintenance of their own conservation and reclamation programmes;
- c** Develop and implement programmes for the rehabilitation of land degraded by water-logging and salinity;
- d** Develop and implement programmes for the progressive use of non-cultivated land with agricultural potential in a sustainable way.

Financing and cost evaluation \$5 billion, including about \$800 million from the international community on grant or concessional terms.

F Water for sustainable food production and sustainable rural development

This programme area is included in chapter 18 programme area F.

G Conservation and sustainable utilization of plant genetic resources for food and sustainable agriculture

Basis for action Plant genetic resources for agriculture (PGRFA) are an essential resource to meet future needs for food. Threats to the security of these resources are growing, and efforts to conserve, develop and use genetic diversity are underfunded and understaffed. Many existing gene banks provide inadequate security and, in some instances, the loss of plant genetic diversity in gene banks is as great as it is in the field.

The primary objective is to safeguard the world's genetic resources while preserving them to use sustainably. This includes the development of measures to facilitate the conservation and use of plant genetic resources, networks of *in situ* conservation areas and use of tools such as *ex situ* collections and germ plasma banks. Special emphasis could be placed on the building of endogenous capacity for characterization, evaluation and utilization of PGRFA, particularly for the minor crops and other underutilized or non-utilized species of food and agriculture, including tree species for agro-forestry. Subsequent action could be aimed at consolidation and efficient management of networks of *in situ* conservation areas and use of tools such as *ex situ* collections and germ plasma banks.

Major gaps and weaknesses exist in the capacity of existing national and international mechanisms to assess, study, monitor and use plant genetic resources to increase food production. Existing institutional capacity, structures and programmes are generally inadequate and largely underfunded. There is genetic erosion of invaluable crop species. Existing diversity in crop species is not used to the extent possible for increased food production in a sustainable way.⁴

Objectives

- a To complete the first regeneration and safe duplication of existing *ex situ* collections on a world-wide basis as soon as possible;
- b To collect and study plants useful for increasing food production through joint activities, including training, within the framework of networks of collaborating institutions;
- c Not later than the year 2000, to adopt policies and strengthen or establish programmes for *in situ* on-farm and *ex situ* conservation and sustainable use of plant genetic resources for food and agriculture, integrated into strategies and programmes for sustainable agriculture;
- d To take appropriate measures for the fair and equitable sharing of benefits and results of research and development in plant breeding between the sources and users of plant genetic resources.

Management-related activities Governments at the appropriate level, with the support of the relevant international and regional organizations, should:

- a Develop and strengthen institutional capacity, structures and programmes for conservation and use of PGRFA;
- b Strengthen and establish research in the public domain on PGRFA evaluation and utilization, with the objectives of sustainable agriculture and rural development in view;
- c Develop multiplication/propagation, exchange and dissemination facilities for PGRFAs (seeds and planting materials), particularly in developing countries and monitor, control and evaluate plant introductions;
- d Prepare plans or programmes of priority action on conservation and sustainable use of PGRFA, based, as appropriate, on country studies on PGRFA;
- e Promote crop diversification in agricultural systems where appropriate, including new plants with potential value as food crops;
- f Promote utilization as well as research on poorly known, but potentially useful, plants and crops, where appropriate;
- g Strengthen national capabilities for utilization of PGRFA, plant breeding and seed production capabilities, both by specialized institutions and farming communities.

Financing and cost evaluation \$600 million, including about \$300 million from the international community on grant or concessional terms.

H Conservation and sustainable utilization of animal genetic resources for sustainable agriculture

Basis for action The need for increased quantity and quality of animal products and for draught animals calls for conservation of the existing diversity of animal breeds to meet future requirements, including those for use in biotechnology. Some local animal breeds, in addition to their socio-cultural value, have unique attributes for adaptation, disease resistance and specific uses and should be preserved. These local breeds are threatened by extinction as a result of the introduction of exotic breeds and of changes in livestock production systems.

Objectives

- a To enumerate and describe all breeds of livestock used in animal agriculture in as broad a way as possible and begin a 10-year programme of action;
- b To establish and implement action programmes to identify breeds at risk, together with the nature of the risk and appropriate preservation measures;
- c To establish and implement development programmes for indigenous breeds in order to guarantee their survival, avoiding the risk of their being replaced by breed substitution or cross-breeding programmes.

Management-related activities Governments at the appropriate level, with the support of the relevant international and regional organizations, should:

- a Draw up breed preservation plans, for endangered populations, including semen/embryo collection and storage, farm-based conservation of indigenous stock or *in situ* preservation;
- b Plan and initiate breed development strategies;
- c Select indigenous populations on the basis of regional importance and genetic uniqueness, for a 10-year programme, followed by selection of an additional cohort of indigenous breeds for development.

Financing and cost evaluation \$200 million, including about \$100 million from the international community on grant or concessional terms.

Integrated pest management and control in agriculture

Basis for action World food demand projections indicate an increase of 50 per cent by the year 2000 which will more than double again by 2050. Conservative estimates put pre-harvest and post-harvest losses caused by pests between 25 and 50 per cent. Pests affecting animal health also cause heavy losses and in many areas prevent livestock development. Chemical control of agricultural pests has dominated the scene, but its overuse has adverse effects on farm budgets, human health and the environment, as well as on international trade. New pest problems continue to develop. Integrated pest management, which combines biological control, host plant resistance and appropriate farming practices and minimizes the use of pesticides, is the best option for the future, as it guarantees yields, reduces costs, is environmentally friendly and contributes to the sustainability of agriculture. Integrated pest management should go hand in hand with appropriate pesticide management to allow for pesticide regulation and control, including trade, and for the safe handling and disposal of pesticides, particularly those that are toxic and persistent.

Objectives

- a Not later than the year 2000, to improve and implement plant protection and animal health services, including mechanisms to control the distribution and use of pesticides, and to implement the International Code of Conduct on the Distribution and Use of Pesticides;

Agriculture has to meet the challenge of feeding a projected population of 8.5 billion by the year 2025 through increased production on existing agricultural land and by avoiding further encroachment on non-agricultural land, which is often not suitable for cultivation.



d To improve and implement programmes to put integrated pest-management practices within the reach of farmers through farmer networks, extension services and research institutions;

e Not later than the year 1998, to establish operational and interactive networks among farmers, researchers and extension services to promote and develop integrated pest management.

Management-related activities Governments at the appropriate level, with the support of the relevant international and regional organizations, should:

- a** Review and reform national policies and the mechanisms that would ensure the safe and appropriate use of pesticides – for example, pesticide pricing, pest control brigades, price-structure of inputs and outputs and integrated pest-management policies and action plans;
- b** Develop and adopt efficient management systems to control and monitor the incidence of pests and disease in agriculture and the distribution and use of pesticides at the country level;
- c** Encourage research and development into pesticides that are target-specific and readily degrade into harmless constituent parts after use;
- d** Ensure that pesticide labels provide farmers with understandable information about safe handling, application and disposal.

Financing and cost evaluation \$1.9 billion, including about \$285 million from the international community on grant or concessional terms.

J Sustainable plant nutrition to increase food production

Basis for action Plant nutrient depletion is a serious problem resulting in loss of soil fertility, particularly in developing countries. To maintain soil productivity, the FAO sustainable plant nutrition programmes could be helpful. In sub-Saharan Africa, nutrient output from all sources currently exceeds inputs by a factor of three or four, the net loss being estimated at some 10 million metric tons per year. As a result, more marginal lands and fragile natural ecosystems are put under agricultural use, thus creating further land degradation and other environmental problems. The integrated plant nutrition approach aims at ensuring a sustainable

supply of plant nutrients to increase future yields without harming the environment and soil productivity.

In many developing countries, population growth rates exceed 3 per cent a year, and national agricultural production has fallen behind food demand. In these countries the goal should be to increase agricultural production by at least 4 per cent a year, without destroying the soil fertility. This will require increasing agricultural production in high-potential areas through efficiency in the use of inputs. Trained labour, energy supply, adapted tools and technologies, plant nutrients and soil enrichment will all be essential.

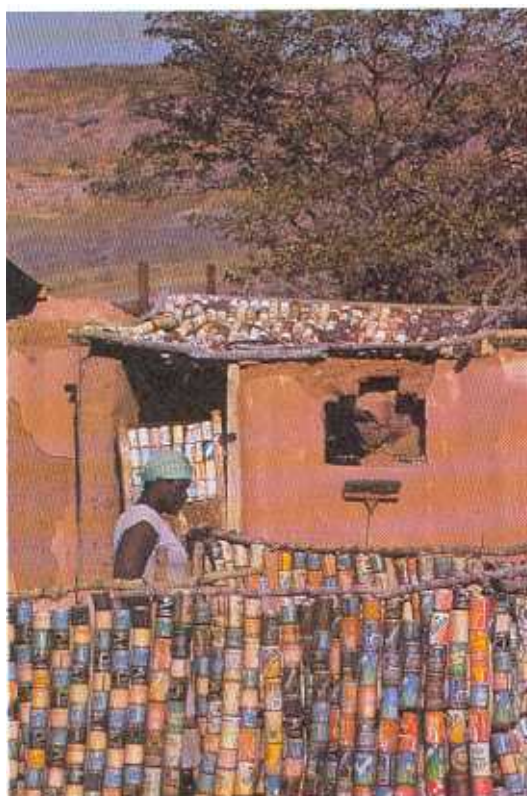
Objectives

- a** Not later than the year 2000, to develop and maintain in all countries the integrated plant nutrition approach, and to optimize availability of fertilizer and other plant nutrient sources;
- b** Not later than the year 2000, to establish and maintain institutional and human infrastructure to enhance effective decision-making on soil productivity;
- c** To develop and make available national and international know-how to farmers, extension agents, planners and policy makers on environmentally sound new and existing technologies and soil-fertility management strategies for application in promoting sustainable agriculture.

Management-related activities Governments at the appropriate level, with the support of the relevant international and regional organizations, should:

- a** Formulate and apply strategies that will enhance soil fertility maintenance to meet sustainable agricultural production and adjust the relevant agricultural policy instruments accordingly;
- b** Integrate organic and inorganic sources of plant nutrients in a system to sustain soil fertility and determine mineral fertilizer needs;
- c** Determine plant nutrient requirements and supply strategies and optimize the use of both organic and inorganic sources, as appropriate, to increase farming efficiency and production;
- d** Develop and encourage processes for the recycling of organic and inorganic waste into the soil structure, without harming the environment, plant growth and human health.

Imaginative recycling of soft drink cans used to make goat-pens in Damaraland, Namibia. Right: Villagers in Tahoua, West Africa get their first glimpse of a more distant world. The television is run by a battery which is powered by solar panels.



Financing and cost evaluation \$3.2 billion, including about \$475 million from the international community on grant or concessional terms.

K Rural energy transition to enhance productivity

Basis for action Energy supplies in many countries are not commensurate with their development needs and are highly priced and unstable. In rural areas of the developing countries, the chief sources of energy are fuelwood, crop residues and manure, together with animal and human energy. More intensive energy inputs are required for increased productivity of human labour and for income-generation. To this end, rural energy policies and technologies should promote a mix of cost-effective fossil and renewable energy sources that is itself sustainable and ensures sustainable agricultural development. Rural areas provide energy supplies in the form of wood. The full potential of agriculture and agroforestry, as well as common property resources, as sources of renewable energy, is far from being realized. The attainment of sustainable rural development is intimately linked with energy demand and supply patterns.⁵

Objectives

- a Not later than the year 2000, to initiate and encourage a process of environmentally sound energy transition in rural communities, from unsustainable energy sources, to structured and diversified energy sources by making available alternative new and renewable sources of energy;
- b To increase the energy inputs available for rural household and agro-industrial needs through planning and appropriate technology transfer and development;
- c To implement self-reliant rural programmes favouring sustainable development of renewable energy sources and improved energy efficiency.

Management-related activities Governments at the appropriate level, with the support of the relevant international and regional organizations, should:

- a Promote pilot plans and projects consisting of electrical, mechanical and thermal power (gasifiers, biomass, solar driers, wind-pumps and combustion systems) that are appropriate and likely to be adequately maintained;



- b Initiate and promote rural energy programmes supported by technical training, banking and related infrastructure;
- c Intensify research and the development, diversification and conservation of energy, taking into account the need for efficient use and environmentally sound technology.

Financing and cost evaluation \$1.8 billion per year, including about \$265 million from the international community on grant or concessional terms.

L Evaluation of the effects of ultraviolet radiation on plants and animals caused by the depletion of the stratospheric ozone layer

Basis for action The increase of ultraviolet radiation as a consequence of the depletion of the stratospheric ozone layer is a phenomenon that has been recorded in different regions of the world, particularly in the southern hemisphere. Consequently, it is important to evaluate its effects on plant and animal life, as well as on sustainable agricultural development.

Objective The objective of this programme area is to undertake research to determine the effects of increased ultraviolet radiation resulting from stratospheric ozone layer depletion on the Earth's surface, and on plant and animal life in affected regions, as well as its impact on agriculture, and to develop, as appropriate, strategies aimed at mitigating its adverse effects.

Management-related activities In affected regions, Governments at the appropriate level, with the support of the relevant international and regional organizations, should take the necessary measures, through institutional cooperation, to facilitate the implementation of research and evaluation regarding the effects of enhanced ultraviolet radiation on plant and animal life, as well as on agricultural activities, and consider taking appropriate remedial measures.

- 1 See chapter 3.
- 2 See chapter 8 and chapter 37.
- 3 See chapter 10.
- 4 See chapter 15.
- 5 See chapter 9.