

ISSUES PAPER:

THE MULTIFUNCTIONAL CHARACTER

OF AGRICULTURE AND LAND

Paper prepared for FAO/Netherlands *Conference on “The Multifunctional Character of Agriculture and Land”*, Maastricht, Netherlands, September 12-17, 1999.

Executive Summary

At the dawn of the 21st Century, dramatic developments are continuing to transform global agriculture and rural economies. Continued growth in the world population, demands to feed and improve the quality of life of that population, the reach of human influence to the remotest corners of the Earth, direct manipulation of nature at the genetic level, increasing globalisation of the world economy, and the immediacy and profound impact of communication and information technologies are among the most striking examples.

Throughout the 1970s and 1980s, international interest focused on developments in agriculture that could directly address growing concerns about future food security, productivity and sustainability. Thinking crystallised in the 1990s as an approach that became known as “Sustainable Agriculture and Rural Development (SARD).” The SARD approach aims to foster sustainable development (in the agricultural, fisheries and forestry sectors) that “conserves land, water, plant and animal genetic resources, is environmentally non-degrading, technically appropriate, economically viable and socially acceptable.”

More recently, a new analytical approach and interpretative framework built on an understanding of the Multifunctional Character of Agriculture and Land (MFCAL) has emerged which helps to capture the complexity and continuing importance of the new agricultural patterns and land-use systems that have emerged throughout the world and assess their relationships with other sectors of the economy and society. The concept of MFCAL has evolved from and builds upon SARD. It encompasses the entire range of environmental, economic and social functions associated with agriculture and related land-use. Analysis of the multifunctional character of agriculture contributes to understanding the potential linkages, synergies and trade-offs necessary to achieve sustainability in agriculture and rural development. The MFCAL approach provides a policy-oriented analytical framework for the achievement of SARD goals.

THE MULTIPLE FUNCTIONS OF AGRICULTURE AND LAND

The first and foremost role of agriculture remains the production of food and other primary goods and contributing to food security. Attaining food security is a complex task which requires an enabling environment and policies that ensure social, cultural, political and economic stability and equity. Combining the economic, social, and environmental functions of agriculture can help to achieve these goals. Agricultural activity and related land use also result in a wide range of non-food goods and services, shape the environment, affect social and cultural systems and contribute to economic growth.

Agriculture and related land use have several major functions:

The Environmental Function. Agriculture and related land use can have beneficial or harmful effects on the environment. The MFCAL approach can help to identify opportunities to optimise the linkages between agriculture and the biological and physical properties of the natural environment. It is relevant to a number of critical global environmental problems including biodiversity, climate change, desertification, water quality and availability, and pollution.

The Economic Function. Agriculture remains a principal force in sustaining the operation and growth of the whole economy, even in highly industrialised countries. Valuation of the various economic functions requires assessment of short, medium and long-term benefits. Important determinants of the economic function include the complexity and maturity of market development and the level of institutional development.

The Social Function. The maintenance and dynamism of rural communities is basic to sustaining agro-ecology and improving the quality of life (and assuring the very survival) of rural residents, particularly of the young. On another level, the capitalisation of local knowledge and the forging of relationships between local and external sources of expertise, information and advice are fundamental to the future of existing rural communities. Social viability includes maintenance of the cultural heritage. Societies still identify intensely with their historical origins in agrarian communities and rural lifestyles.

The three functions are clearly inter-related. Their relative importance depends on strategic choices at the local and national levels. The multiple functions may be relevant at many scales, from local, through national and regional, to global. Different functions and their implications may operate over different time horizons – indeed some innovations and transformations may have short-term disadvantages, such as lower productivity, before leading to longer-term, overall economic and environmental benefits. At a further level of complexity, multiple functions may generate various impacts that vary in time and space. Informed decision-making requires a transparent assessment of the advantages of possible synergies as well as trade-offs between options for agriculture and land.

For example, in an industrialised country with established industries, increasing emphasis on the service economy and a small rural population, a local agricultural system can still have multiple functions. In a mountainous region, seasonal crops continue to have economic value for food and fodder, while animal husbandry can furnish a variety of goods. The landscape has value as a place of leisure and recreation for visitors from near and far. The watershed has an environmental function to maintain water quality and quantity, and prevent downstream erosion. Forested areas provide gathered products, timber and benefits to the air and soil. Finally, the continuing vitality of the overall rural economy preserves the common cultural heritage and guarantees the availability of labour for managing natural resources. Choices about land use and employment generation involve striking a balance between short and longer-term economic benefits, and considerations of scale in land use - changes at the top of a watershed can affect activities and resources far downstream.

In a developing country, agriculture may remain central to the economy as a source of goods for national consumption and processing, and for trade, as raw materials and finished goods. The employment of much of the population is tied mainly to these activities, but also extends to management of local resources that affect the environment. The economic function also extends to the longer-term care and sustainable use of natural resources, and increasingly to other activities such as cottage industries and tourism. Decisions on investment in new forms of land use involve striking a balance between short and long-term costs and benefits (for example, immediate revenue for export crops as compared to loss of natural habitats and their capacities), and considerations of the social implications of some developments (for example, the conversion of smallholder fields to large-scale plantation, mechanised or irrigated agriculture).

A CONCEPTUAL FRAMEWORK

Although agriculture and related land use have long been recognised as inherently multifunctional, the paper proposes a new, coherent framework for the comparative assessment and valuation of the multiple functions in order to achieve sustainability in agriculture and rural development. The framework charts relationships between the market, institutional, and geographic and resource-based aspects of multifunctional agriculture. Dimensions of space, scale and time can be incorporated. Regions with different characteristics can be located within this framework, to assist in the development of optimal policies which take local circumstances and preferences into account. A general relationship is postulated between the development of institutional capacity and the potential contribution of multifunctional agriculture and land use to sustainable development.

Use of the conceptual framework in the light of case studies allows three conclusions to be drawn for further empirical confirmation:

- in environmental terms, the multifunctional character of agriculture and land is used to a lesser degree when natural resources are more abundant and the cultivated ecosystems are resilient; multiple functions are relied upon to a greater degree when the environment has limited potential;
- in economic terms, the multifunctional character is used more when structures associated with the market economy are present and work satisfactorily, which entails sound functioning in parallel of public institutions and mechanisms for decision-making;
- in social terms, the multifunctional character can be optimised when information flow between stakeholders at all levels is direct and transparent.

THE WAY FORWARD

Our understanding of the factors crucial to achieving greater sustainability in agriculture has increased through building on the potential scope of multiple functions in rural areas. This requires the involvement of all stakeholders and effective mechanisms to co-ordinate action and make decisions, collaborating with other actors at the local level and from civil society. Residents of rural communities, in particular farmers, continue to play a central role as stewards of agricultural land and the environment. An appreciation of their vital contribution has progressively permeated government

and private agencies in urbanised, industrialised and developing countries. However, ultimate responsibility for ensuring the viability of agricultural systems and the environment remains in the public arena, and there must be mechanisms for addressing competing interests, immediate needs and conditions for long-term sustainability that take proper account of the general goals of equity and poverty reduction.

Possible domains of action include:

- More *public and private sector research* would help to develop more productive, environmentally friendly and equitable agriculture allowing for more sustainable management of natural resources (water, soils, biodiversity). Organisations with appropriate technical and scientific expertise can assist governments and stakeholders with the tools needed to optimise the potential of the multiple functions of agriculture and land.
- *Public policies* at national levels can channel revenues towards food security and production in countries where agriculture is the main sector, help to match labour supply coming from agriculture with the urban capacity for labour, and progressively decentralise responsibility for management and planning as local institutions become stronger.
- *Market forces* can be an incentive for sound resource management and best use of the diverse functions of agriculture, given the absence of market imbalances, conditions of fairness and equity, freedom of association and action, and transparency in transactions.

Processes at the National and International Levels

The ability to distinguish the functions of agriculture in precise contexts offers insights into possible directions for future policy and activities. Contribution to the overall objective of sustainable development encompasses improving food security and strengthening the synergies between the environmental, economic and social functions of agriculture and related land use. National priorities and processes for establishing these priorities will vary, and choices between options will depend on public decision-making processes. National bodies for governance and management will continue to shoulder the primary responsibility for arriving at and executing such decisions.

Regional and international bodies will play an increasing role in formulating joint policies that focus on comparative advantages for trade and development, with explicit social goals affecting equity and gender issues and access to resources. Perhaps the greatest challenge to the development of sustainable agriculture and related land use is to reconcile the primary objective of achieving food security with environmental objectives. Both have an inherently international character. The Commission on Sustainable Development (CSD) process offers a common venue to recognise the enduring and irreplaceable role of agriculture for the future, building on possible synergies between the environment and different sectors of economy and society.

However, this may not be sufficient. There is a need to collaborate on ways forward that combine global mechanisms and institutions that are responsible for all dimensions of land use. The relevant

mechanisms and institutions also encompass macro-economy, public policy and overall planning. Initiatives must also be developed in the context of the many relevant Conventions regulating international concerns about the environment, commerce and society.

Particular areas of continuing concern for the future include:

- influencing public awareness in societies that are still dependent on, but no longer have roots or practical experience in the countryside;
- developing better understanding of the dramatic transformations in human relations to agriculture and the environment;
- achieving greater social equity and increasing opportunities for rural societies.

Distinguishing the environmental, economic and social functions of agriculture and land already add significantly to appreciation of changes in the traditional role of agriculture. Further progress towards sustainability will require closer collaboration between institutions responsible for agriculture and land use, the economy, public policy and overall planning. As a neutral platform for international debate, FAO will continue to dedicate its efforts to issues critical to the future of food and agriculture.

Contents

Executive Summary	iii
Acknowledgements	ix
Chapter 1 INTRODUCTION	1
Chapter 2 THE MFCAL CONCEPT	5
2.1 The Multifunctional Character of Agriculture and Land	5
2.2 Key Functions of Agriculture	9
2.2.1 Food Security	10
2.2.2 The Environmental Function	12
2.2.3 The Economic Function	15
2.2.4 The Social Function	15
Chapter 3 ILLUSTRATIVE EVIDENCE	19
3.1 MFCAL Parameters	20
3.1.1 Space and Scale	20
3.1.2 Time and Sequence	21
3.1.3 Multiple Impacts	22
3.1.4 Trade-Offs	22
3.1.5 Cross-Functional Benefits	23
3.1.6 Enabling Factors	23
Chapter 4 A CONCEPTUAL FRAMEWORK	24
4.1 The Conceptual Framework: A Way of Looking at Trends in Agriculture and Land	25
4.1.1 Regions with low natural resources potential and low institutional development	26
4.1.2 Regions with high natural resources potential and low institutional development	26
4.1.3 Regions with low natural resources potential and high institutional development	27
4.1.4 Regions with high natural resources potential and high institutional development	27
4.2 Trends in Market Development, Trade and Multiple Functions	28
4.2.1 Regions with weak markets, with low or high utilisation of multiple functions	28

4.2.2 Regions with well-defined markets and low utilisation of multiple functions	28
4.2.3 Regions with well-defined markets, with growing public and private demand for the multiple functions of agriculture and land	29
4.3 Policy Implications of the Conceptual Framework	30
Chapter 5	31
THE WAY FORWARD	
5.1 The National Process	34
5.2 The International Process	35
Figure 1	37
REFERENCES	39

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Chapter 1

Introduction

The relationships between human society and the land have been progressively transformed as a result of dramatic changes in the course of the 20th Century, particularly by increasing industrialisation, the mechanisation of agriculture, immediacy in global trade and communication, rapid increases in population size and densities, and the expanding use of biotechnologies. National, regional and international perspectives on agriculture must examine these and other factors in order to provide the best possible basis for allocating resources, establishing rules, formulating policy and making decisions. The emerging awareness that agriculture contributes in many varied forms to societal goals leads to a need for better understanding of the “multiple functions of agriculture.” Other economic activities have strong relationships to land use, but agriculture also has unique social and environmental dimensions.

The first and foremost function of agriculture remains to provide food security, defined by FAO as “the access for all people at all times to enough food for an active, healthy life.” The 1996 World Food Summit emphasised access to sufficient and adequate food as a universal human right. Clearly permanent availability, reliability of supply, relative autonomy, and population access and equity are all critical issues.

In addition to producing food, agriculture also produces a wide range of non-food goods and services, shapes the environment, affects social and cultural systems and contributes to economic growth. All these functions of agriculture can contribute to the achievement of sustainable development.

But agriculture also presents major challenges to sustainable development, among which the most important are:

- pollution, contributions to the greenhouse effect, depletion of water sources, erosion and degradation of soils and reduced biodiversity;
- damage to ecologically fragile areas, and in some cases destruction of entire ecosystems, as a result of more intensive and extensive agriculture driven by economic development and demographic growth, resulting in increasing food requirements;
- pressures on fragile or precarious rural livelihoods, with people unable to live off their land, migrating to other regions at the risk of increasing competition for land, increasing pressure on natural resources, and land tenure conflicts, contributing in turn to problems of urbanisation as well as to social and military conflict.

FAO and other institutions focused attention in the 1970s and 1980s on emerging developments in agriculture that could address concerns about future food security, productivity and sustainability. Thinking was crystallised as an approach to “Sustainable Agriculture and Rural Development (SARD),” with the principal characteristics being that “such sustainable development (in the agricultural, fisheries and forestry sectors) conserves land, water, plant and animal genetic resources, is environmentally non-degrading, technically appropriate, economically viable and socially acceptable.” Significant accomplishments have included support to improvements in farm-level

information, technology and organization as well as a better understanding of the linkages between rural areas and external institutional and commercial forces.

Evolving from SARD, the concept of the Multifunctional Character of Agriculture and Land (MFCAL) is defined as the entire range of associated environmental, economic and social functions of agriculture. The concept encompasses all the multiple goods and services generated by agriculture and related land-use. Analysis of the multifunctional character contributes to understanding the combination of potential synergies and trade-offs necessary to achieve sustainability in agriculture and rural development.

The concept of multiple functions captures the complexity, scope and significance of this wide range of inter-relationships and interactions between the agricultural sector (assumed to include forestry and fish farming) and the environmental, economic and social domains, helping to describe and understand the multiple and often combined functions of agriculture. A multifunctional analysis can furnish a description of current conditions and sufficient information to determine the likely impacts of specific actions. The approach can thus inform discussion on critical issues such as trade, food security, biodiversity and rural employment and help to identify potential synergies and trade-offs and formulate better policies to achieve the ultimate goal of sustainability in agriculture within the related resource base.

This paper covers MFCAL concepts, issues and policies. Along with the accompanying Taking Stock Paper and six Background Papers, the paper constitutes the principal input to the FAO/Netherlands Conference on the Multifunctional Character of Agriculture and Land at Maastricht in the Netherlands from 12-17 September 1999. The Conference is expected to contribute to the Eighth Session of the United Nations Commission on Sustainable Development (CSD-8), which will take place in April, 2000, by assessing progress in terms of success stories, contributing factors, best practices and lessons learned, and determine how best to continue progress towards implementing Agenda 21 globally in the next century.

The overall objective of the Conference is to identify the new practices and the necessary enabling environments that will lead to increased agricultural sustainability. Its particular emphasis is on raising international, national and local awareness of the range, diversity and positive potential of the multiple contributions that agriculture and related land use can make to improving both food security and sustainability in the broad sense.

The principal tasks of the Conference are to:

- review progress, in the context of agriculture and related land use, towards the principles contained in the Rio Declaration on Environment and Development and Agenda 21: Programme of Action for Sustainable Development;
- identify the main issues to be addressed, taking into consideration the continually evolving nature of agriculture and related land use.

The context for the Conference and this series of input papers is set out in the boxes below.

BOX 1: RIO DECLARATION ON ENVIRONMENT AND DEVELOPMENT**Principle 3**

The right to development must be fulfilled so as to equitably meet developmental and environmental needs of present and future generations.

Principle 4

In order to achieve sustainable development, environmental protection shall constitute an integral part of the development process and cannot be considered in isolation from it."

Principle 5

All States and all people shall cooperate in the essential task of eradicating poverty as an indispensable requirement for sustainable development, in order to decrease the disparities in standards of living and better meet the needs of the majority of the people of the world.

Principle 8

To achieve sustainable development and a higher quality of life for all people, States should reduce and eliminate unsustainable patterns of production and consumption and promote appropriate demographic policies.

BOX 2: THE ROME DECLARATION ON WORLD FOOD SECURITY

"Convinced that the multifaceted character of food security necessitates concerted national action, and effective international efforts to supplement and reinforce national action, we make the following commitments :

- we will ensure that an enabling political, social, and economic environment designed to create the best conditions for the eradication of poverty and for durable peace, based on full and equal participation of women and men, which is most conducive to achieving sustainable food security for all ;
- we will implement policies aimed at eradicating poverty and inequality and improving physical and economic access by all, at all times, to sufficient, nutritionally adequate and safe food and its effective utilization ;
- we will pursue participatory and sustainable food, agriculture, fisheries, forestry and rural development policies and practices in high and low potential areas, which are essential to adequate and reliable food supplies at the household, national, regional and global levels, and combat pests, drought and desertification, considering the multifunctional character of agriculture ;
- we will strive to ensure that food, agricultural trade and overall trade policies are conducive to fostering food security for all through a fair and market-oriented world trade system ;
- we will endeavour to prevent and be prepared for natural disasters and man-made emergencies and to meet transitory and emergency food requirements in ways that encourage recovery, rehabilitation, development and a capacity to satisfy future needs ;
- we will promote optimal allocation and use of public and private investments to foster human resources, sustainable food, agriculture, fisheries and forestry systems, and rural development, in high and low potential areas ;
- we will implement, monitor, and follow-up this Plan of Action at all levels in co-operation with the international community.

We pledge our actions and support to implement the World Food Summit Plan of Action."

The next chapter of this paper describes the MFCAL concept and its origins and sets out the main relationships and interactions between agriculture and related land use and the environmental, economic, social and cultural domains, both in terms of benefits and challenges. Chapter 3 discusses

the findings of the series of case studies presented in the Taking Stock Paper and uses these to illustrate particular features of the concept of the multifunctional character of agriculture. This is followed by a chapter describing a conceptual framework which charts the complex sets of relationships and interactions in terms of geographical dimensions, such as the locations of agricultural potential and resilience, and institutional dimensions, such as the levels of development of markets, institutions and public capacity. The final chapter looks at possible ways forward, in terms of the actions, collaboration and partnerships needed to realise the potential contribution of MFCAL and other relevant concepts to the achievement of sustainability.

Together, the Issues and the Taking Stock Papers provide a broad, integrated and thematically coherent examination of MFCAL issues for the benefit of policy-makers, technicians, practitioners and other interested parties. The analysis seeks to inform and guide but not prescribe national and international policies and actions.

References appear as footnotes, and are listed at the end of the paper.

Chapter 2

The MFCAL Concept

2.1 THE MULTIFUNCTIONAL CHARACTER OF AGRICULTURE AND LAND

Previous approaches to agriculture and related land-use issues have developed sophisticated tools that help to understand the complexity and diversity of rural areas. Since the Den Bosch Conference in 1991 and the Rio Summit in 1992, proponents of “Sustainable Agriculture and Rural Development” (SARD) have developed a comprehensive view of topics including rural extension and research, science and technology, infrastructure, human capital and sustainable livelihoods. SARD encompasses a wide range of economic, socio-cultural and environmental questions related to agriculture.

The concept of multiple functions builds on these previous approaches by:

- widening focus to include services from the agricultural sector to society as a whole;
- providing a framework for comparative appreciation of trade-offs and synergies between the different functions of agriculture and related land use;
- examining the dynamic relationships between rural and urban areas at different scales;
- incorporating the global range of conditions, from predominantly rural societies with emphasis on primary production for food or other goods, to highly industrialised nations with a small rural population and limited importance attributed to primary production in the national economy.

Thus the concept facilitates understanding of the complex interactions between agriculture and related land use, the multiple goods and services (food and non-food) produced by agriculture, the contribution that these goods and services make to the achievement of wider societal goals, and, in turn, the impacts on agriculture of the environmental, economic and social domains, including demography and the increasing globalisation of markets and trade.

While the multifunctional character of agriculture is intrinsic, the agenda for food and agriculture has only recently started to focus on the policy challenges relating to reinforcing a range of functions.

- From the 1950s to the late 1970s, the primary focus in agricultural policy was increasing food supplies. There was an evolution in approaches starting with the Green Revolution but later broadening to farming systems approaches, participation, attention to gender, etc.
- During the early 1980s, the dimension of food security was added to the policy agenda, based on the recognition that access to food was as essential as food supply in achieving household

and national food security. It was also increasingly recognised that strong policy and institutional support systems were a necessary complement to technologies for agricultural development.

- In the late 1980s and early 1990s, increasing concern over the environment was accompanied by greater policy commitment to sustainable agriculture. Concern was first expressed in developed countries but was also embraced in lower income countries within the broader framework of sustainable agriculture and rural development.

After nearly a decade of focusing on a sustainable agriculture agenda, there has been some progress in translating sustainable agriculture concepts and priorities into practice. However, resource managers need appropriate incentives if greater use is to be made of sustainable practices. The incentive structures should offer farmers opportunities and interests which go well beyond agriculture and subsistence food production. Increasing understanding of the many opportunities and constraints affecting success in improving sustainability underlies the present concern with a broader policy agenda for food and agriculture.

A broadening of the policy agenda also arose from a reassessment, in many countries and regions, of the role of agriculture in economic development. In different contexts and for quite divergent reasons, there is increasing policy awareness of the continuing role of agriculture and land in development for low-income and high-income countries in all regions.

- In Africa, the contribution of agriculture to meeting food needs for contributing to economic development has been a major global concern for at least two decades. Agriculture continues to be an essential sector for development, even apart from food production. With few prospects for rapid industrialisation, most African countries will continue to rely on agriculture as an engine of development for the foreseeable future.
- In Asia, there were high expectations that agriculture would play a declining role in national development as countries rapidly industrialised. With the Asian economic crisis, many countries are reconsidering the role that agriculture can play in meeting domestic consumption requirements, providing agro-industrial inputs, and serving as a cushion for rural employment. Agriculture can play the role of an economic “buffer” in times of crisis for employment and food supply.
- In Latin America, critical issues are the vertical integration of agriculture and the shift in sectoral composition from primary production to agro-industries, for which Latin American countries have a long-term comparative advantage. At the same time, countries continue to have dual-sector agricultural economies with large pockets of resource-poor farmers and rural poor who need better and more secure land-based livelihoods.
- In Eastern and Central Europe, a dominant focus of agricultural policy during the past decade has been dealing with privatisation and preparations for entering the EU. At the same time, millions of small family farms are struggling to survive and sustainable agriculture practices remain to many a luxury.
- In Western Europe, North America, the Asian-Pacific Rim and highly industrialised countries elsewhere, relatively few people rely directly on agriculture or land resources. In these

countries, priority is given to a complex combination of functions, including food production, environmental, recreational and cultural.

Increasing regional differentiation in agriculture, and associated divergences in developmental goals and priorities, are yet other factors stimulating interest in the specification of multiple functions. An examination of the debates in various international forums demonstrate that values and goals for agriculture and land use are not the same across regions or even among countries within regions. This is most apparent in various negotiations relating to international trade.

The multiple functions of agriculture and land offer different specific benefits in different contexts and in different regions. The best combination of functions results in optimum management for economic, social and environmental purposes.

In regions with poor and low potential agriculture in the developing countries, where it is generally difficult to ensure the renewal of natural resources and the sustainability of agricultural ecosystems, but where subsistence agriculture is likely to remain a major activity, the advantages of a combination of options are:

- strengthening food security for local people through sustainable local production and a diversified rural economy;
- diversifying the means of subsistence for rural populations with different products and resources;
- contributing to the development of the local economy through greater flexibility and increased opportunity;
- improving natural resource renewal and limiting threats to the environment by maintaining natural capital for future use;
- easing social conflicts resulting from rivalry over sharing scarce resources;
- improving resilience of ecological and economic systems through use of different aspects of agriculture and land;
- contributing to poverty alleviation and providing a stronger local economy.

In regions of developing countries where the market economy now predominates, but where conditions are not favourable to agriculture and the natural environment is fragile, emphasis on multiple functions can play an important role by:

- stimulating production systems that best combine modern inputs with the possibilities offered by the capacities of the ecosystems;

- offering opportunities for producers to quickly exploit new types of markets;
- encouraging diversification of agriculture to boost income-generating opportunities offered by the new outlets;
- developing diversified agriculture within and near to urban zones to contribute to increased incomes.

In areas where intensive agriculture is practised, but which suffer from environmental problems, the impact of combining functions can result in:

- reducing significantly the pollution caused by agriculture and livestock;
- cutting production costs by more moderate use of chemical inputs that are more compatible with the ecological capacities of the ecosystems;
- diversifying production where there is over-specialisation and where specialisation creates risks of ecological and economic vulnerability;
- promoting the recycling of wastes as bioenergy and biochemical inputs.

In the “traditional” agricultural regions in developed countries, where production runs the risk of becoming increasingly less competitive, emphasis on multiple functions can result in:

- developing markets for tourism, with relevant incentives for the general population to preserve the landscape and rural ways of life and culture;
- sustaining the rural economy, notably through a range of local activities and jobs;
- managing certain natural resources to limit cumulative risks to the environment: maintenance of water quality, protection of wildlife and flora, and conservation of rangelands;
- diversifying agriculture and forestry towards energy crops and other forms of renewable energy production.

In regions on the agricultural frontier in forest zones or where the environment has a high production potential and where the market is rapidly taking root, use of the MFCAL concept can contribute to:

- reducing deforestation and its negative environmental consequences;
- improving the sustainable harvesting of forests and their products;
- benefiting from funding available for biodiversity management;
- creating more range and flexibility in agriculture by multiplying the means of local subsistence.

In each case, the value and importance of the various functions must be assessed before deciding the most relevant forms of action. The choice of measures is always subject to debate, between local communities, local and state government, technical agencies and external partners. Measures and action are then based on common agreement, joint evaluation of achievement, and periodic reassessment and re-negotiation.

BOX 3: VISIONS OF MFCAL**Britain**

In 1939 "there were almost half a million farms in Britain including part-time holdings. The majority were small, mixed units of less than 50 acres, with cattle, sheep, pigs and poultry as well as some arable crops. Before the age of state protection farmers needed to grow a range of products for financial security. If the price of any one product collapsed, there were others to buffer them against ruin. Economically this mixed-farm structure was extremely stable. It also happened to produce a vigorous and attractive countryside, rich in wildlife and largely free of pollution.

At the same time almost one million workers were employed wholly or partly on British farms. Thus almost 1.5 million families were able to make part or all of their living from the land, while delivering environmental benefits as a "free" extra. Never has the British countryside looked so good. Never has it supported a richer diversity of habitat and wild species..." (Harvey, 1997: 9)

Indonesia

Today, home kitchen gardens are particularly well developed on the island of Java in Indonesia, where they are called *pekarangan*...In one Javanese home garden fifty-six different species of useful plants were found, some used for food, others as condiments and spices, some for medicine and others as feed for the livestock ... Much is for household consumption, but some is bartered with neighbours and some is sold...So dense is the planting that to a casual observer the garden seems like a miniature forest...Closer analysis shows the high diversity in the home garden is matched by high levels of productivity, stability, sustainability and equitability...(Conway, 1997: 177)

Kenya

"The positive outcomes of an increasing rural population density included, in Machakos (with a population of 1.3 million), the stabilisation and reversal of land degradation, increasing investment in land-improvement, technological change, higher output per hectare and per person, agricultural and income diversification and diminished vulnerability to food crises..." (Mortimore, 1998: 196)

Japan

"Paddy fields have a structure to retain large quantities of water. Paddy fields contribute to lowering the risk of landslides and floods...Calculated from the water retention capacity, the water buffering function of paddy fields in Japan would be approximately 5 billion m³, which is more than eight times as large as the reservoir capacity of the largest dam in Japan...A study indicates that the monetary value of multifunctionality, such as land conservation by paddy fields in Japan, amounts to more than 4.6 trillion yen per year, which far exceeds the total output of rice production at approximately 3 trillion yen per year" (Government of Japan, 1999)

2.2 KEY FUNCTIONS OF AGRICULTURE

Agriculture is the activity that occupies the largest share of "humanised" land in all countries, and therefore plays a significant role in humanity's transformation of the environment. These transformations have moulded the landscape and natural systems of rural life over centuries. In most

countries, agriculture still represents the direct and indirect base for the economic livelihood of the largest share of the population. It is not surprising, therefore, that, in addition to food and fibre, agriculture contributes in many ways to the activities of societies. Agriculture furnishes goods and services that can be classified as distinct “functions.” Instead of simply distinguishing between food and non-food outputs, the MFCAL concept implies the joint and integrated production of a multiplicity of outputs, which may be significant both to society and to the environment.

The key functions to which agriculture contributes are as follows:

- **food security;**
- the **environmental**, including the enhancement of positive effects and mitigation of negative effects;
- the **economic**, including primary production (of food and other goods) and products and services related to farm/enterprise capacity, multiple activities with wider economic effects, and their direct and induced effects on economic systems;
- **social**, including the viability of rural communities and livelihoods, culture and cultural values.

The combined effects of the four functions contribute to achieving rural development.

2.2.1 Food Security

Food security exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life. (WFS Plan of Action). Food security is interrelated with a variety of factors, including sustainable management of natural resources (agriculture, fisheries, and forestry), increased production, policies at different levels, international trade, maintenance of biodiversity, protection of the environment, investment, peace and stability.

Political support for achieving food security is high as is shown by the fact that 112 Heads or Deputy Heads of State and Government, and over 70 high-level representatives from other countries adopted the Rome Declaration on World Food Security and World Food Summit Plan of Action in 1996.

Food security and the environment

In many parts of the world, unsustainable and otherwise inadequate policies and programmes, inappropriate technologies, insufficient rural infrastructures and institutions, as well as pests and diseases, lead to inefficiency and wastage of natural and human resources, inputs and products. The resource base for food, agriculture, fisheries and forestry is under stress and is threatened by problems such as desertification, deforestation, overfishing, overcapacity and discards in fisheries, losses of biodiversity, as well as inefficient use of water, climate change and depletion of the ozone layer. These negative effects on the environment threaten long-term food security.

Food security and economic and social development

The economic and social development of the rural sector is a key requisite for the achievement of food security for all. Poverty, hunger and malnutrition are some of the principal causes of accelerated migration from rural to urban areas in developing countries. Poverty eradication is essential to improve access to food. The vast majority of those who are undernourished either cannot produce or cannot afford to buy enough food. The rural areas in developing countries are generally poorly equipped in terms of technical and financial resources and educational infrastructure. In these areas, lack of income opportunities, failure to harvest crops, inadequate maintenance of production systems, inadequate distribution networks, limited access to public services and the poor quality of such services are all fundamental aspects that need to be considered with regard to rural food security.

Expanding production in low-income food-deficit countries (LIFDCs) is frequently one of the primary means to increase the availability of food and income for those living in poverty. This needs to be complemented by generation of employment and income which will raise effective demand in these areas, in turn stimulating production, economic diversification and rural development and thus long-term food security.

Food security and trade

Trade is a key element in achieving world food security. Trade generates effective utilisation of resources and stimulates economic growth which is critical to improving food security. Trade allows food consumption to exceed food production, helps to reduce production and consumption fluctuations and relieves part of the burden of stock-holding. It has a major bearing on access to food through its positive effect on economic growth, income and employment. Appropriate domestic economic and social policies will better ensure that all, including the poor, will benefit from economic growth. Appropriate trade policies complement such policies and help to attain the objectives of sustainable growth and food security for all.

Unless national governments and the international community address the multifaceted causes of food insecurity, the number of hungry and malnourished people in developing countries will remain very high and sustainable food security will not be achieved. The international community has a key role to play in supporting the adoption of appropriate national policies and, where necessary and appropriate, providing technical and financial assistance to assist developing countries and countries with economies in transition in fostering food security.

Food security and MFCAL

Clearly, attaining food security is a complex task which requires an enabling environment and policies that ensure peace, as well as social, political and economic stability and equity. The combination of economic functions (enabling conditions for credit, investment and trade) and social functions (attention to public services, human resources and equity) related to agriculture can help to achieve this goal. The concept of MFCAL may offer a useful perspective and tools to specify options for decision-makers to achieve food security.

2.2.2 The Environmental Function

As actor and guardian, humanity plays a dynamic role in the maintenance and viability of any ecosystem. The environment has a role vital to sustaining all life, as well as to satisfying most requirements for fundamental services such as recycling air and water, furnishing basic materials, energy and other resources, and in other areas such as recreation. All agricultural and land-use systems directly affect the components and operations of local ecologies. Nearly all ecosystems have thus progressively become managed systems, though the results vary widely.

Agriculture and related land use can have beneficial or harmful effects. Indeed, the impacts of agricultural systems have become intimately linked to the normal functioning of most ecosystems. Agriculture can influence the quantity and quality of the water supply for industrial and urban destinations, through maintenance of watersheds, infiltration and a regular level of fluctuation in the water table. It can help to control erosion, and thus heavy run-off with negative downstream effects. When this occurs, the economic impact is indirect and spread over time.

The direct environmental benefits of agriculture include: pollution abatement through management of soils and vegetation; increases in biomass and nutrient fixation with mixed cropping, land use and fertiliser application; and increasing ecosystem resilience with techniques that control erosion.

Agriculture can also have negative effects on ecosystems and on the renewal of natural resources. Examples include agricultural practices with excessive use of chemical inputs, irrigation and mechanised tillage. In most cases these systems are highly specialised, using production systems with multiple functions but significant disbenefits. The main negative effects are pollution, the loss of resilience and diversity of the cultivated ecosystems, and the non-renewal of soil structure, which makes the land much more vulnerable to external shocks and reduces its capacity to recover after a shock. This is the case, for example, during the dry season when the soil has lost water storage capacity or when heavy rainfall has had an erosive effect due to the loss of the structural stability of the topsoil.

Changes in the environment are of concern at many levels. The negotiation and implementation of international agreements has become a major mechanism for influencing practices in the use and management of the environment. The series of Conventions established since the Rio Summit, notably regarding biodiversity, climate change and desertification, have direct implications for agriculture. The Conventions establish both guidelines and objectives for conserving some key resources. Particular attention has been focused on the dangers of the reduction of biodiversity, which represents a definitive loss of genetic materials, and on the level of emissions which can contribute to global climate change.

The relevance of the MFCAL concept to enabling the agricultural sector to respond to the specific global problems of climate change, desertification, biodiversity, water quality and availability and pollution, encouraging beneficial impacts, limiting harmful impacts on the surrounding environment,

increasing reliance on renewable resources, and taking account of possible cumulative impacts, is illustrated in the box below.

For the whole of the environmental function, however, the MFCAL concept can guide the process of optimising linkages between agriculture and the biological and physical properties of the natural environment. The reinforcement of the capacities of local institutions to ensure the sustainable management of local resources is crucial. In order to stimulate investment and longer-term planning, farmers must be confident that they have adequate rights of ownership, managed access or other tenure arrangements. When rights of access to the resources are unclear, obsolete, or relegated by other forms of rights, or not honoured, the users are more likely to use resources for their own immediate interest. The resources may not be managed sustainably, not renewed and ultimately become depleted. This applies equally to forests, rangelands, water, fisheries and wildlife. Such conditions inevitably give rise to conflicts. Enduring resolution of conflicts requires a respect for the rules, whether these rules are set out in a new contract established among the users themselves, or in relation to the state and other actors. In all these cases, a system for monitoring and imposing penalties in the event of a breach of rules is necessary.

BOX 4: EXAMPLES OF THE RELEVANCE OF THE MFCAL CONCEPT TO SPECIFIC GLOBAL ENVIRONMENTAL PROBLEMS

Climate change

In terms of global warming over the next 20 years, emissions from agriculture are projected to represent about one-third of the total. Clearing of forest lands for agriculture and slash-and-burn agriculture are major contributors to carbon emissions. Agro-forestry and sustainable livelihoods based on forestry, including non-wood products, are excellent alternatives.

Agriculture can help to combat the greenhouse effect, primarily through a better management of nitrate fertiliser use and by substituting carbon through the use of biofuels. Significant reductions in burning and surface exposure through some forms of ploughing can cut CO₂ emissions. Also, more intensive use of organic matter can contribute to carbon sequestration in the soils, which is one of the natural functions of cultivated ecosystems.

This is where the multifunctional character of agriculture and a number of joint potential benefits can be directly exploited. Policies to stimulate new practices could combine producer training with the provision of financial incentives. The Kyoto and Buenos Aires negotiations on the Climate Convention are moving policies towards such measures. These include the "Clean Development Mechanism" and proposed mechanisms for an "emission rights" market. Whatever instruments are chosen, the availability of financing will make it possible to encourage the spread of carbon-fixing, substitution and reductions in emissions.

Desertification

Agriculture and forestry can contribute to limiting desertification (see the Background Paper 3: Drylands, FAO/Netherlands 1999c). Many techniques have already been tested and used, including managing watersheds using water storage techniques, anti-runoff techniques, planting trees and soil fixation species and water control earthworks. Implementation requires detailed technical co-ordination for consistent implementation and production of synergistic effects. In order to succeed, land and natural resource owners and users must agree on how the work is to be carried out, financed and scheduled. Local communities can benefit as a whole from these developments, but individuals and social groups can lose and gain to differing degrees.

Such measures presuppose significant institutional capacity for negotiation and mediation. Successful examples demonstrate that people often have a keen awareness of the problems involved and are ready to accept solutions demanding great effort, both in terms of physical investment and demonstrations of good will in negotiation and performance. Negotiations should cover all dimensions of proposed transformations, with responsibilities, tasks and beneficiaries defined in detail. Support – whether financial or material - has to be carefully targeted in order to encourage the investments needed.

Biodiversity

Agriculture has major impacts on biodiversity, on-farm and off-farm. On the other hand, biodiversity itself, including both domesticated and wild species, underpins agriculture, in several ways, and at several levels (see the Background Paper 1: Agricultural Biodiversity, FAO/Netherlands 1999a). Crop and livestock genetic resources provide the main productive elements of agriculture, and the genetic diversity within crops and livestock allows continued improvement and adaptation to changing needs through evolution and deliberate breeding. At another level, many components of biodiversity provide essential ecological services to agricultural production systems: soil organisms ensure nutrient cycling, and natural predators provide for pest control, for example. Diversity at the ecosystem or landscape level is also often important in providing for stability in production systems.

Different agricultural practices may impact on biological diversity positively or negatively. Integrated Pest Management, for example, may preserve natural predators. Conservation of soil organic matter may have synergistic effects by stabilising natural predator populations through supporting their alternative food sources. Use of traditional landraces may help to conserve genetic resources of global importance to farm crops. Changes in agricultural practices, and new technologies, may enhance or reduce agricultural biological diversity.

Water Quality and Availability

The increased demand for water for agriculture, industry and urban areas is heightening competition and potential conflict in many regions(see the Background Paper 6: Water, FAO/Netherlands 1999f). Agriculture can make a major contribution to water storage through conservation techniques on the land. Individual and local gains are linked to common social benefits. Maintaining forests can facilitate water infiltration in the public interest. Negotiations, contracts and incentives stimulate the interest of land users, who might otherwise prefer to clear the land and farm rather than maintain or replant the forest. There are also new techniques which can reconcile agricultural use of land with water infiltration, for example by using cover vegetation which reduces runoff, and combinations of hydropower, supply of drinking water and gravity irrigation.

At the national and regional levels, public water-basin management agencies can design and adopt the necessary incentive measures and instruments. Internationally, promoting joint improvements in the management of international waters is based on conventions and through financial mechanisms such as the Global Environment Facility.

Pollution

There are many solutions to reducing pollution including regulation, the "polluter-pays" principle, negotiations of contracts, and public incentives. Most countries are adopting and implementing environmental legislation laying down a framework to resolve conflicts. There are also many technical solutions available to agriculture. Changes can be made, for instance, in on-farm production techniques for Integrated Pest Management, the limitation of chemical fertiliser use and the use of crops and trees to recycle nutrients lost by leaching. Industrial innovations can also be useful, such as treatment of animal waste for transformation into energy and marketable fertilisers, multiple encapsulation of fertiliser in order to release nutrients only in limited quantities and under specific humidity and temperature conditions, and the production of less harmful chemicals.

2.2.3 The Economic Function

The main function of agriculture and forestry is the physical production of goods. These are primarily foodstuffs for human consumption or through trade (as commodities). Primary production also yields feed and fodder for animal consumption, raw materials destined for energy (for example for co-generation of heat and power using alcohol), biogas (see the Background Paper 2: Bioenergy, FAO/Netherlands 1999b), pharmaceuticals, and other products for clothing, habitat or other uses.

Agriculture remains a principal force in sustaining the operation and growth of the whole economy, even in highly industrialised societies with small farm populations. Investment or some new activity, linked for example to production diversification or to an increased level of activity, can generate economic effects both upstream and downstream of agriculture and related land use. On the demand side, agriculture requires inputs in the form of labour, various services and financial capital. As outputs, agriculture supplies products and services which are processed, transported, marketed and distributed. There are multiple linkages to other sectors. All these economic effects can be estimated using national accounting and economic calculations.

Assessment of the benefits and impacts of agriculture goes well beyond the primary production function. Valuation of various functions includes projections of potential short, mid and long-term benefits. The complexity and maturity of market development is fundamental to the economic function (see the Background Paper 4: Environment and Trade, FAO/Netherlands 1999d). The level of institutional development is crucial, as are the potentials of the sustainable natural resource base for goods and services.

2.2.4 The Social Function

The social functions of agriculture incorporate concerns important for all nations, from the most industrialised to the least developed. MFCAL recognises negative effects of prevailing agricultural practices once these are discovered and enables stakeholders to seek measures that not only counter or mitigate these, but also make use of possibilities for synergy. The immediate objectives are to increase the viability of rural areas and their communities and sustain the cultural values related to agriculture and land for both urban and rural societies. However, these objectives can be accomplished in several ways, and with different outcomes.

Rural areas are associated with notions of “culture,” “tradition,” and “identity.” These notions are perceived as a positive, indeed an essential, good. However, agrarian communities have undergone dramatic transformations. For example, labour migration to cities and linkages to these centres have major impacts on rural incomes and resources. In the most marginal agricultural zones, the resident populations have become dependent on a permanent exchange with and remittances from the exterior. Ties to urban and often international markets are consistent features of rural economies. The enduring and emerging dynamics between rural and urban areas can be taken into account in analyses based on the MFCAL concept.

The MFCAL concept has the advantage of not focusing strictly on production as the single, or even necessarily the most important, agricultural function for contemporary rural societies. The approach extends to a range of activities in relation to the land and the resource base, including caretaking of vital natural features, sustaining secondary and tertiary activities related to agriculture and land, maintenance of the historical and cultural heritage, recreation and returning retirement migration. The integrity of local and national cultures is often rooted in systems of belief and understanding that have gradually emerged in rural areas. Social viability thus does not depend on the “food function” alone.

The importance of the social function becomes evident when considering rural areas in the most industrial nations, which have only modest direct importance for employment and national revenues. However, the socio-cultural functions of agriculture and land apply equally to many mid-level income countries, as well as to other rural societies tied to urban areas or to other forms of activity for revenues. The social aspects of urbanisation and out-migration must also be considered, without a preconceived view of the relative merits or disadvantages of these processes.

Another entire range of issues is associated with questions regarding the general well-being of rural populations. Descriptions at multiple scales and levels can capture the considerable local variations in social conditions, as well as specifying vital linkages to sub-regional and other levels. In documenting experience, assessment can extend to the importance of questions related to gender, age, stratification, social categories, equity, differential access to resources and relative opportunity. The results of the analysis can be used to evaluate and influence the direction of future interventions regarding agriculture, taking into account the need to maintain the basic services and economic opportunities needed to keep rural areas attractive to community members. These include schools, dispensaries and other health services, security, communication, roads and transport.

The availability of information and education can also fall into the social function, though these issues cut across the spectrum of functions. Of particular importance is the valuation of local knowledge and the forging of relationships between local communities and external sources of expertise, information and advice. The effectiveness of policies on public information depends on the existence of an expression of the collective will of local people to ensure that their society can continue living in a sustainable manner. This will may be explicit if articulated by the local leadership or implicit when the growth and development of local activities create a favourable state of mind in the community.

Where agriculture has become highly specialised and makes highly intensive use of inputs produced by the chemical industry, landscapes have changed considerably and in some cases pollution has become widespread. People in certain societies, particularly when these are industrialised and with high incomes, have gradually developed a preference for forms of agriculture which at least partly preserve historic landscapes and reduce pollution. Demand is expressed in different ways: in political terms, by the emergence of “green” parties and platforms, nature conservation groups or associations, and in market terms by the emergence of a demand for agro-related tourism and high quality products. These products convey a positive – indeed often romanticised – view of rural landscapes and cultures. Such demand can be manifested both in a private and in a public form. There is an increasingly clear demand for “traditional” and artisanal, farmed products. In order to meet demand, quality must be certified through controlled denomination of origin, compliance with technical specifications, and

effective quality control. In order to obtain these products, consumers are willing to pay a higher price than that of an equivalent standard product. Producers must follow stricter regulations for some products (for example, in the care and feeding of animals).

But the demand for landscape and rural culture conservation cannot always be fully expressed by the demand for the produce of the land. There is also a demand which has all the features of a public demand: amenities to which everyone has access (non-exclusion). This is the case with rural landscapes. Some of these amenities can be expressed in the form of a demand for tourism and leisure (hotels, restaurants, museum visits, entertainment). Maintenance of demand requires preservation of the visual aspects of the original landscape (earthworks or pre-existing infrastructure, hedges, trees and forest groves, use of local materials for construction and techniques, etc.). Even intensely transformed landscapes with high population pressures, such as coastal and other waterfront areas, are increasingly under modification to recapture their original character.

Finally, multiple stakeholders – at different levels and scales – are the key to the future of agriculture and land. Stakeholder preferences and actions regarding goods and services are expressed directly through markets, and indirectly through public institutions (local, state or other mediators). They are central to issues of effective leadership, decision-making and empowerment at the local level, and at sub-regional and national levels. At the local level, the stakeholders are the farmers and other groups directly engaged in production, as well as groups in management and landholding. Those active in non-agricultural rural services such as banking and administration are also involved.

Chapter 3

Illustrative Evidence

The accompanying Taking Stock Paper presents a series of case studies that illustrate the contribution that the identification and analysis of multiple functions can make towards solving a range of social, economic and environmental problems related to land use, food security, trade, rural development, tourism and other industries (linked to agriculture). They show that there are a number of inherent advantages of the multiple functions of agriculture:

- diversified land-use systems are less risky than specialised systems and therefore of particular relevance to small farmers;
- diversified systems are intrinsically more sustainable than (highly) specialised systems;
- diversified systems tend to make more efficient use of natural resources – especially where these are heterogeneous – than specialised systems.

The main contributions of the multifunctional character of agriculture and land come about mainly through enhancing the effective operation of markets, enhancing the operation of public institutions and catalysing the emergence of new techniques and technologies.

Enhancing market mechanisms can strengthen the impact of MFCAL, for example:

- by establishing greenhouse gas emission rights markets to which all producers could have access, and promoting carbon fixation and substitution;
- by developing mechanisms for public tender to licence contracts for natural environment maintenance, biodiversity management, water management, ecological infrastructure maintenance, desertification reduction and mineral accounting;
- by developing ecological tourism markets, with the corresponding amenities provided by landscape and biodiversity maintenance;
- by increasing production in isolated, land-locked rural areas through greater integration into regional and international food markets, as these areas reach greater maturity in terms of economic competitiveness and a certain level of food security.

Improvements in institutional arrangements can include:

- encouraging local agreements between users for the management of renewable natural resources, in order to control erosion and land degradation, and best practice for use of water, rangelands, forests and wildlife;
- encouraging local agreements in order to guarantee community economic functions: integrated control, storage of foodstocks in the event of food shortages, promoting quality control and labelling;
- promoting efficient local public authorities with decentralised powers to create infrastructures that can cater for the preferences of local people relating to rural roads, communications and other services.

The emergence of innovative techniques and technologies can be facilitated by:

- diversifying agricultural production and the means of subsistence in regions with weak agricultural potential, by building on local knowledge, techniques and materials (such as improved strains of local crop varieties) and formalising localised rights and responsibilities;
- accelerating the diffusion of “evergreen” techniques for sustainable agriculture and land management, by rationalising commercial input use and intensively exploiting the renewal capacity of the ecosystems (see the Background Paper 5: Research and Technology, FAO/Netherlands 1999e).

The individual case studies can also be used to illustrate particular parameters, features and advantages of the MFCAL concept.

3.1 MFCAL PARAMETERS

3.1.1 Space and Scale

MFCAL involves complex combinations of spatial relations at different scales. Analysis is relevant at the local or micro levels, but also at regional, international and global scales. For example, innovation in availability and use of water resources is critical to agriculture at the local level, but the appropriate scale for determining the best management of an often limited resource is generally at the regional level.

Multiple functions may be relevant beyond the specific geographical scale of a given example. For example, they can relate to local issues (individual, household and extended family use of fields) or non-local issues (national and regional dimensions of export, trade and marketing networks). Some

processes, such as the transfer of research information, are not determined spatially, but appropriate geographical distributions and impacts can be identified in order to improve delivery and relevance.

Dependency on scale means that changes at one level (say national policy) may have a direct impact at a very different scale (such as the household or the individual smallholder), and vice versa. Similarly, the multifunctional character may vary through space: similar processes may yield diverse outcomes in different places. Production and marketing of just one species can have a very different impact on local biodiversity in different places, depending on the relations of the species to others in the ecosystem, its importance for the physical characteristics of the terrain (for example, of a climax tree species), etc. A single process may even have a range of impacts at different scales and geographical levels. For example, forestry plantations can simultaneously make a positive contribution to global carbon sequestration and substitution, to reducing erosion in a given watershed and to firewood production for domestic and market use. Location-specific, nostalgic, or even seemingly backward agricultural practices and land patterns can generate substantial regional income from the tourist industry. An example of a negative impact is the use of excessive upstream fertiliser which reduces downstream water quality and contributes to the eutrophication of reservoirs and estuaries.

The approach thus incorporates geographical distribution, relationships and scale. Complex patterns and interactions are evaluated at the local, sub-regional, national, regional and international scales. The approach can capitalise on work with techniques such as agro-ecological zoning, biodiversity inventories, and mapping of land tenure, access and use systems.

3.1.2 Time and Sequence

MFCAL also has a temporal dimension. Basic notions of change and continuity depend on assessing transition and transformation over time, in sequence and as cycles. There is thus a need to examine and specify the time horizons for different functions and their implications. Evaluation of economic benefit from goods and services should clearly incorporate short, mid and long-term considerations. However, one function can cover different spans of time. For example, agro-forestry has impacts and benefits that vary in time according to its functions for controlling erosion, facilitating infiltration of rainwater and thus replenishing the water table, furnishing fodder to domestic and wild animals, and fixing nitrogen in the soil. In another example, some forms of institutionalised national or regional change (such as the development of new varieties through crop research) will occur at a much slower rate than experimentation and adoption of new techniques and technologies at the farm level (for instance different seed varieties, cropping strategies and land use).

There can also be another important time dimension. Some processes have distinct stages that imply a specific sequence or cycle over a defined period. Repetitive cycles can still incorporate aspects of cumulative change, whether ecological or social. Transitions and transformation may yield very different short and long-term impacts (as an example, short-term investment costs in small-scale land management techniques can lead to significant long-term income and environmental benefits). The aim remains to optimise both short and long-term benefits and establish precedents for sustainable development.

3.1.3 Multiple Impacts

Multiple functions may generate multiple impacts. These may vary in time and space and can be strongly influenced by a variety of (often local) case-specific factors and conditions. The factors that influence the precise outcomes also vary.

The challenge is to isolate, identify and explain those factors that enable (or disable) given processes and outcomes. Factors that contribute to similar processes in different places (or times) may include indigenous knowledge systems, access to alternative technologies, the availability of efficient markets for inputs and outputs, and efficient and effective local institutions. Any descriptive approach should therefore seek to record the range of factors, constraints and incentives that contribute either negatively or positively to given processes and outcomes.

3.1.4 Trade-Offs

Variations of both functions and impacts involves gains and losses – more significantly, gainers and losers. Informed decision-making and negotiation requires a transparent assessment of trade-offs. Understanding and dealing with these is difficult because they may involve stakeholders with different power and resource control. Failure to resolve stakeholder conflicts at various levels and develop consensus on strategies and priorities is mainly due to the lack of methods for assessing and quantifying trade-offs, but also to lack of institutions and mechanisms for agreeing priorities and building consensus.

There is a need to assist the process of making judgements of relative value. It may be necessary in some cases to recognise that certain projected impacts are more important than others. These considerations affect all levels. Both household heads and policy makers can face similar dilemmas regarding the differing priorities regarding, for example, food security, social welfare, the environment and the sustainability of production. The results are often decisions about the merits of particular trade-offs.

Trade-offs may possess distinct temporal and spatial dimensions. For policy dialogue and debate, potentially relevant scales for assessment and intervention include:

- local, community or district;
- farming system or watershed;
- sub-national or agro-ecological zone;
- national;
- trans-boundary.

Specific practices may have different impacts across geographical areas. Increased food production in a watershed, for example, may lead to reduced water quality downstream.

Specific land-use practices may also have different short and long-term impacts. In order to maintain precious organic materials or minerals in soils, the rate of increase in food production may have to be less in the short term in order to be higher in the long term.

Trade-offs clearly have a combination of social and ecological impacts, and appreciation of likely outcomes can be quantitative or qualitative. Establishing the criteria for precise measurement raises difficult questions. Despite the availability of concepts such as contingent valuation, replacement cost estimation and surrogate market values, the difficulties of assigning value to environmental resources and other forms of national capital are widely recognised. The challenge is to fix clear criteria and methods for estimating the relative value of different trade-offs into the identification, analysis and evaluation of the multiple functions of agriculture and land. Nevertheless, the economic importance of trade-offs is generally becoming better understood and appreciated as part of the decision-making process.

3.1.5 Cross-Functional Benefits

One way of incorporating trade-off considerations is to focus on benefits that embrace multiple (positive) impacts. This approach may still raise questions relating to the different value or weighting of these benefits and the more complicated trade-off calculations that may arise from cross-functional scenarios. Benefits are also typically inter-related and co-dependent. Indeed, these touch on some of the founding canons of environmentally sustainable development (such as hypotheses about the possibility of integrating short and long-term benefits, and of marrying economic and environmental imperatives) which seek to correct what has been portrayed as the systematic bias towards the excessive use of environmental resources.

3.1.6 Enabling Factors

Agriculture and land-use are strongly influenced by a range of specific factors, conditions and incentives. These factors determine the impact and contribution of different land-use patterns. Enabling factors include local knowledge, the availability of technology, the efficiency of markets and the effectiveness of institutions.

Social structure and institutions are at the heart of the multifunctional character. Most change is manifested through the reorganisation of collective behaviour, whether at the scale of a domestic or kin group or the nation state. Mechanisms for managing collaboration, co-operation and conflict affect the impact of challenges and innovation in agriculture and land, and create structural differences in opportunity with direct impact on equity and sustainability. Desired transformations in society certainly concern systems of rural production and conservation of resources, but also concern the transfer, presentation and application of knowledge.

The level and scope of different actors and institutions, public and private, profit and non-profit, are important. Organisations range from community-based associations to international business or agencies. Bodies on which collective action can be based include associations mobilised by common interest and on the basis of family, residential and professional provenance. The importance of institutions is well illustrated in the range of examples in the cases studies.

Chapter 4

A Conceptual Framework

Application of the concept of MFCAL depends on geography and the prevailing institutional conditions. A specific feature of institutional development is the level of complexity and maturity of the market economy. The level of market maturity is related to overall economic development, the level of urbanisation and socio-cultural characteristics. The framework outlined below charts the relationships between market development, geography, the resource base, and the institutional dimensions of agriculture and related land use. For example, the multifunctional character is expressed in widely differing ways on the agricultural frontiers of the Amazon, in the “Green Revolution” rural areas of India, in the arid landscapes of West Africa and in the alpine meadows of Switzerland. Consideration of specific characteristics, and of the relationships between the evolution of the market and priorities relating to needs and goals in different societies, lead to an assessment of unique national or regional conditions in order to achieve sustainability in agriculture and rural development.

4.1 THE CONCEPTUAL FRAMEWORK: A WAY OF LOOKING AT TRENDS IN AGRICULTURE AND LAND

The framework must bring out the major differences in the way in which each society uses the multifunctional character of agriculture and land. First, there is the capacity of cultivated ecosystems and rural systems (rural economy and societies) to encompass a large number of functions. The multifunctional character is considered in relation to the productive potential of natural resources (the “natural capital”) in the area under consideration. The degree of resilience or fragility is examined in relation to the systems of use and management of these natural resources.

The organizational and institutional capacities to manage ecosystems and resources in each society (the “social capital”) is also fundamental, as is a degree of long-term social stability. Manifestation of strengths and weaknesses in natural or social capital can result in the degradation of ecology and fragmentation of society, or conversely to improvement and sustainability.

The challenges differ within and between countries and regions, and policies will correspond to perceptions and opportunities in part in relation to patterns of international trade.

Figure 1 presents the conceptual framework with principal agro-ecologic types and specific, illustrative examples drawn from several regions. The vertical axis depicts natural capital, from low to high potential in natural resources. The horizontal axis indicates social capital, from low to high institutional development. Each axis includes a cluster of factors. For natural capital, the factors cited are relative availability and endowment in resources, and system resilience. For social capital, factors

include the strength of the market and the mechanisms and bodies for public decision-making at local and national levels. The degree of centralisation is also relevant.

The framework is designed to illustrate combinations of factors and trends in ecology and society. Given these factors, the figure plots some regional examples on a continuum in order to compare the combination of factors that influence the multiple functions of agriculture and land. Specifying the combinations opens the door to planning various options, with projected synergies and trade-offs under specified conditions. Building the capacity of institutions in order to manage viable levels of goods and services and still maintain environmental sustainability is a central challenge in all societies. Simplifying greatly, “capacity” represents the level of efficiency and organisation of the institutional framework for the market and public decision-making. A general relationship is postulated between the development of institutional capacity and the potential contribution that the multiple functions of agriculture and land use can make to sustainable development.

4.1.1 Regions with low natural resources potential and low institutional development

In biophysical terms, these are generally arid, mountainous or other regions in which production potential is limited. These areas are often far removed from markets because of physical distance and limited infrastructure. Transport and information problems reduce producer familiarity with the state of the market, raise trade costs and often give buyers of agricultural products a local monopoly to the disadvantage of producers. The market is therefore very imperfect in institutional terms. The local institutions for managing common goods or the public interest can be inappropriate for dealing with the situation. Decline in incomes, deterioration in the overall economic fabric and seasonal migration of the men often cause these institutions to become dormant. In some cases, constraints are compounded by land tenure laws bestowing exclusive rights on the State to manage resources throughout the national territory, thus depriving local communities of this role. These regions are therefore often in an ecological, economic and social crisis.

In some cases, development projects with external support have managed to recreate a positive dynamic for agricultural production, economic growth and institutional development by systematically exploiting the multifunctional capacities of agriculture. The relative isolation and general poverty of the people stimulates the use of some multifunctional forms of land use as one of the bases for triggering a process of local rural development and economic accumulation. But the slow pace of capital accumulation makes the mobilisation of external resources necessary. Strengthening the institutional basis will be necessary in order to achieve sustainability and rural development.

4.1.2 Regions with high natural resources potential and low institutional development

These regions are typically on the pioneering frontier in tropical ecosystems, or in areas plagued by persistent conflicts and civil disorders, or in countries in steep decline due to weaknesses in national institutions. In many cases these regions have been resettled without sound planning to protect the sustainability of the resource base. In areas without effective markets, small-scale producers generally clear new lands for settlement and cultivation only using their own labour. Being far from markets, they produce a wide variety of different products for household consumption, beginning with staple

agricultural foodstuffs. Land-use strategy consists of multiplying means of subsistence and resources, and spreading risks. Agriculture therefore tends to be diversified and to exploit the multiple resources available in the environment.

Under these conditions, the natural functions that can renew soil fertility and regenerate resources may be inadequate. Some economic development is nevertheless perceptible, coming from the development of relations between agriculture and other sectors in new settlements. The multifunctional character in these cases is therefore not in terms of land suitability, but rather manifested in the capacity of pioneering agriculture to generate growth in the local economy.

4.1.3 Regions with low natural resources potential and high institutional development

In general, these regions were settled long ago and now have high population densities and have had high levels of institutional development. Examples include the Sahel and Savanna regions of West Africa, Northeast Brazil, some regions of Madagascar and the plateaux of the Andes. Prolonged settlement has enabled the societies to progressively develop production techniques to resolve the problems raised by the severe limitations and constraints of their environment. High population density has also encouraged the emergence of a local and subregional market economy, particularly on the outskirts of the towns.

The environmental constraints are such that the agricultural systems constantly run the risk of becoming unsustainable. Small land-holdings, fragmentation of tenure and intensive land use can lead to nutrient depletion and soil erosion. The high cost of restoring degraded lands can result in small farmers leaving the land. Ecological and economic constraints, however, can also compel farmers to exploit the multifunctional character of agriculture and land by diversifying production, maintaining ecological sustainability through appropriate techniques, seeking new market opportunities, and multiplying small-scale service activities in relation to agriculture. The rural economy can then become progressively connected to external markets.

4.1.4 Regions with high natural resources potential and high institutional development

These regions are in a favourable situation because of their natural endowments, market infrastructures and ability to implement effective public policies. This is the case for some zones with established plantation agriculture (such as Côte d'Ivoire), with mechanised agriculture in the industrial countries, or in the "Green Revolution" areas. As indicated earlier, these areas have tended historically to neglect the possibilities of using the ecological functions of the environment for production purposes. The sound operation of the market with State protection and incentives for agriculture at initial stages have made good performance possible.

4.2 TRENDS IN MARKET DEVELOPMENT, TRADE AND MULTIPLE FUNCTIONS

Trends in the development and maturity of the market in relation to MFCAL are a specific feature of institutional development. The evolution of the market is not uni-linear, absolute or final. For example, market efficiency can decline or return to a restrictive policy climate with heavy regulation and emphasis on a specific objective for agricultural areas, such as self-sufficiency. Regarding the evolution of demand and opportunities for optimising the multiple functions available, stakeholders can manifest their preferences in many cases, whether in highly industrialised or predominantly rural conditions.

The number of non-food multiple functions of agriculture may initially decline with the emergence of the market economy, integration in global trade, production specialisation and intensification of production based on chemical inputs and mechanisation. The relative importance of other functions then tends to increase again when the environmental and other dimensions of agriculture are emphasised in order to reduce the negative impacts and in response to new demands for social and other services. The evolution of the multifunctional character can thus be represented as a U-shaped curve over time. The change can be viewed as relating to economic development (and opportunity), better understanding of long-term trade-offs (initially often concerning the environment) and intrinsic transformations in industrial societies (such as moving towards service industries and recovery and use of by-products).

4.2.1 Regions with weak markets, with low or high utilisation of multiple functions

Regions with weak or embryonic markets usually have diversified production in order to meet all short-term human needs. Agricultural output is therefore in response to a variety of different production objectives, such as food for human consumption, animal feed, medicinal plants and construction materials. The diversity of products and activity stimulate local specialisation and trade. Moreover, resource renewal will rely on the natural functions and fertility of the ecosystems. Many of these resources – soils, forests, grazing lands, irrigation water, wildlife - are shared in common. Community members have access, but must respect rules governing techniques for use and management in order to guarantee sustainable production. Equity of access is also a fundamental common concern, and positive effects are ensured by social norms. Links to regional or global trade networks are limited, mainly to high value or essential goods.

4.2.2 Regions with well-defined markets and low utilisation of multiple functions

Regions which have benefited from a sound market economy in a context of continued growth, as well as benefiting from new agricultural techniques that have made high yields possible, develop rapidly. This is the case in the most highly industrialised countries since World War II, and in the countries or regions that have gone through the “Green Revolution.” In both cases the market was set up government authorities or agricultural organisations. Co-operatives organised supply, and public agencies and co-operatives handled marketing. There were guarantees provided for price stability, public credit, and public extension activities. Under these circumstances, production rapidly

specialised in response to national food needs and according to demand (for example, rice and wheat in India, and cereals in Europe). In some cases, specialisation was oriented to guarantee exports to meet a large demand (for cotton in West Africa, or hybrid maize in Zimbabwe). Market development, specialisation and reliance on chemical inputs were a great success in terms of yields, production and incomes. The multifunctional advantages intrinsic to “traditional” agrarian systems seemed to have become anachronistic. The market and new techniques appeared to be able to guarantee people's livelihoods and access to food.

However, perceptions and situations are now changing. Negative external effects have appeared in the environment and the market has become less dynamic as production progressively corresponds to current demand. Prices fluctuate directly in relation to changes in supply and demand, as subsidies fall and deregulation continues. This is leading producers to seek ways to reduce their costs and diversify production in order to cope with greater market risks. The idea of using ecological and biological practices as a partial replacement for methods using chemical inputs alone is gaining acceptance.

In some regions, agriculture is in transition from heavily administered to free market mechanisms. The market alone will not motivate producers to make better use of the potentials for multiple functions. In the developing countries, and particularly those undergoing rapid demographic growth, food security is a top priority and far from guaranteed. There can also be fundamental sub-regional differences in priorities and policies within one country, given differences in factors including resources, degrees of industrialisation and urbanisation, the quality of infrastructure, and institutional capacities. Nevertheless, policies in these countries will probably maintain some level of government intervention in order to guarantee producers a favourable economic environment so that they do not interrupt the pace of efforts to increase production and reinforce food security.

4.2.3 Regions with well-defined markets, with growing public and private demand for the multiple functions of agriculture and land

The general public in these regions is becoming increasingly vocal about the desirability of making agriculture less environmentally damaging and emphasising the development of a new range of services. These services include improved quality of health and nutrition (through tracking of products and assessment of risks), better water quality, the conservation of biological diversity (in particular, the protection of endangered species), conservation of forests and landscapes, preservation of the special qualities and visual features of unique agricultural and rural areas, and support to maintain the vitality of rural culture and ways of life.

The demand may be private or public. When private, as when individuals expect higher quality in agricultural products, the market is the best way to meet demand. But when demand is public, intervention by government or other public authorities should be envisaged in the most appropriate ways. Growing public awareness of opportunities and alternatives remains embryonic in even the most information-rich and highest average-income countries. However, emerging consensus on new priorities within each society and the accompanying changes in opinion can establish a mandate for making choices between potential scenarios for agriculture and land.

4.3 POLICY IMPLICATIONS OF THE CONCEPTUAL FRAMEWORK

The degree of natural resources potential and the level of institutional development encompass the diversity encountered in different situations. This relatively rapid overview allows three conclusions to be drawn for empirical confirmation:

- in environmental terms, the multifunctional character of agriculture and land is used to a lesser degree when natural resources are more abundant and the cultivated ecosystems are resilient; on the other hand, multiple functions are relied upon to a greater degree when the environment has limited potential;
- in economic terms, the multifunctional character is used more when structures associated with the market economy are present and work satisfactorily, which entails sound functioning in parallel of public institutions and mechanisms for decision-making;
- in social terms, the multifunctional character can be optimised when information flow between stakeholders at all levels is direct and transparent.

The choice of policies that best reflect the relative importance of multiple functions in agriculture and land must therefore take account both of the fragility or resilience of the biophysical conditions of each situation, and of the level of development of the market economy and public institutions.

The conceptual framework can contribute to analysing and identifying options for future action. There remains considerable variation between opportunities and likely directions of policy for individual nations. Contemporary processes of liberalisation and market development are creating differences between countries regarding the principal goals assigned to agriculture. In the industrialised countries there is a demand for a more multifunctional agriculture, particularly with effective ecological functions. In developing countries the debate on multiple functions relates above all to the desire to conserve a high level of local food security and a reasonable distribution of income and resources.

CHAPTER 5

The Way Forward

The evidence and arguments in this and the accompanying papers demonstrate the value of the multi-functional perspective. In relation to the SARD approach, the MFCAL concept adds to our understanding of the factors crucial to achieving greater sustainability in agriculture. Appreciation of the inter-relations between and impacts of different functions builds on our understanding of the complexity and scope of agricultural and land-use systems and helps to identify potential synergies and trade-offs. The conceptual framework proposed incorporates the dimensions of space, scale and time, different geographical conditions and levels of institutional development, as well as trends in market development.

The taking stock process on achievements since adoption of the Den Bosch Declaration and Agenda 21 indicated that there are six key requirements for progress:

1. active participation and leadership by rural communities is fundamental to success in sustainability for agriculture and rural development;
2. the progressive emergence of local and national institutions that mobilise farmers' associations, community groups, NGOs, the private sector and government agencies are a promising means of collectively addressing concerns about agriculture and land use;
3. an enabling national policy environment is necessary, though making policy effective and operational remains a major challenge under diverse social and economic contexts;
4. efficient, transparent flows of information between all levels, from the individual, rural land user to international bodies and institutions, is essential in order to promote participation and ownership in innovation;
5. the wide availability of the results of applied research on locally relevant, adaptable techniques for agriculture and natural resource use is vital for achieving sustainability in agriculture and land use;
6. changes in economic instruments, including rural credit and savings institutions, tools for valuation of the range of functions of agriculture, and longer term assessment of and perspectives on investment, are needed to develop better decision-making and management processes.

Given the above, the ability to distinguish the functions of agriculture in precise contexts offers insights into possible directions for future policy and activities. Contribution to the overall objective of sustainable development encompasses improving food security and strengthening the synergies between the environmental, economic and social functions of agriculture and related land use. National priorities, and processes for establishing these priorities will vary, and choices between options will depend on public decision-making processes. National bodies for governance and management will continue to shoulder the primary responsibility for arriving at and executing such decisions.

Residents of rural communities, in particular farmers, continue to play a central role as stewards of agricultural land and the environment. An appreciation of their vital contribution has progressively permeated government and private agencies in urbanised, industrialised and industrialising societies where decision-makers are increasingly divorced from direct experience with the land. There is growing recognition of the importance of decentralised governance, decision-making and empowerment. Building on the scope for multiple functions in rural areas may be a way of offering greater opportunity and confronting problems of equity – in relation to gender, age and social status, for example – and poverty. Choices between options would depend on an overall assessment of the likely consequences for the local environment and society. However, recognising the role of rural actors is neither a panacea for contemporary challenges to agriculture and land use, nor an alternative to the critical roles played by other actors.

The search for responses to these challenges is complex. Sustainability is contingent on local perceptions of livelihood security, strategies for risk minimisation and prudent assessment of available choices. There are high social and long-term economic costs of failing to confront some of the crucial problems facing rural areas, such as under-employment of youth and out-migration of young women and children to marginal, vulnerable service occupations. Perceptions of lack of security sometimes orient farmers towards unsustainable practices to maximise immediate benefit. Pursuit of short-term comparative advantages can also result in land-use choices in isolated or marginal areas that carry highly negative ecological and social costs (for example, some forms of intensive, irrigated cotton production, and production of narcotic crops).

Perhaps the greatest challenge to the development of sustainable agriculture and related land use is to reconcile the primary objective of achieving food security with the environmental objectives. Both have an inherently international character. Given annual fluctuations and comparative productive and distribution capacities, co-operation and collaboration between states and at local and sub-regional levels is needed to ensure food security. Many aspects of the environment are also supra-national, given the temporal and spatial scales associated with conservation of biological diversity, open bodies of water, watersheds and the atmosphere. Appreciation of the essential role of larger ecosystems – eco-regions - makes sustainability clearly a regional issue.

In the global arena, these issues are critical to international agreements. The social dimensions have been at the heart of the World Food Summit and a series of conferences regarding social development, population, women and poverty alleviation. The environmental dimensions of the MFCAL concept are highly relevant to the Convention on Biological Diversity, the Convention to Combat Desertification, the Convention on Climate Change and the Convention on Wetlands (RAMSAR). The evident relation of the concept to these conventions offers an opportunity to build common – or at least mutually informed and articulated – approaches. There is also an opening to build mechanisms for monitoring contemporary land resources and evaluating the effects of agriculture to optimise the use of national and international resources, and ensure global sustainability. The immediacy of contemporary international decision-making processes and their impacts further compounds the need to confront emerging issues rapidly and with flexibility.

This examination of the strategic, indeed essential, importance of the multiple functions of agriculture and related land-use brings us back to basic issues of governance and participation. Ultimate responsibility to ensure the viability of agricultural systems and the environment remain in the public arena, and there must be effective mechanisms to co-ordinate action and to make decisions, collaborating with other actors at the local level and from civil society. Clearly, precise roles will have to evolve and be subject to periodic negotiation, with intense consultation and collaboration between stakeholders and, most notably, members of rural communities. The evidence in the case studies, surveys and commissioned papers illustrates some alternatives for improving forms of local and national transformation in agriculture and land use. Public responsibility will also cover areas such as professional education and applied research.

Possible domains of actions include strategic and applied research, promotion of better policies, and the use of market forces :

- More *public and private sector research* could help to develop more productive, environmentally friendly and equitable agriculture allowing for more sustainable management of natural resources (water, soils, biodiversity). Organisations with appropriate technical and scientific expertise – such as FAO, the Consultative Group on International Agricultural Research (CGIAR) system, and many universities and applied research centres – can help to provide governments and stakeholders with the tools needed to optimise the potential of the multiple functions of agriculture and land. While biotechnology research is becoming increasingly privatised, natural resource management research will remain a public responsibility.
- *Public policies* at national levels can channel revenues towards food security and production in countries where agriculture is the main sector, help to match labour supply coming from agriculture with the urban capacity for labour, and progressively decentralise responsibility for management and planning as local institutions become stronger.
- *Market forces* can be an incentive for sound resource management and best use of the diverse functions of agriculture. But the market is beneficial only in the absence of market imbalances, and under conditions of fairness and equity, freedom of association and action, and transparency in transactions. In weak institutional economies with low productivity, liberalisation and access to international markets may have to be managed in order to facilitate the emergence of local economies, protect local production from overwhelming competition, and minimise negative environmental and social impacts.

Success will rely in part on improvements in understanding and knowledge of evolving transformations in agriculture and land. Progressive developments in the fields of biotechnology, “green” techniques and technology, energy sources and efficiency, field technologies (for example, to optimise water use), communication, and information processing and delivery are all likely to increase in importance.

Participation of the various stakeholders and principal actors would take place through mechanisms established for communication, negotiation, decision making, enforcement of decisions, and

adjudication in case of contested decisions or actions. In order to stimulate participation and innovation, this would involve:

- facilitating agreements between private parties for goods and services of a public nature;
- bringing users closer to public decision-making and public debate between diverging interests at the sub-regional and national levels;
- contractual financing to respond to public demand;
- information, training, participatory research.

5.1 THE NATIONAL PROCESS

Mobilising explicit, public commitment to fashioning the land for shared social and environmental goals for sustainability in the next century will be the first step. The subsequent steps for an assessment and decision-making process using the concept of MFCAL at the national level are set out in the box below.

BOX 5: MOVING TOWARDS SUSTAINABLE AGRICULTURE

Progress in optimising the multifunctional character of agriculture and land as a contribution to sustainability would require, in sequence:

- A process of studying and specifying the different functions, regarding localities, actors, scale and time. Some ecological functions, such as the renewal of forest or other vegetation and changes in physical features such as watersheds, will have a significantly time dimension. Examining the social function would include the effects of access to technology and information on the mobilisation of social groups in rural communities.
- Initiatives could capitalise on or address weaknesses identified as the six key requirements for progress during the stock-taking process (as described at the beginning of this chapter), following a process of determining objectives and priorities, in consultation with various stakeholders.
- Emphasis on particular functions, and the synergies between functions, would then lay the foundation for a range of scenarios. For example, soil regeneration could be one objective, with different methods and costs according to emphasis on particular functions. Organic farming methods could require longer-term investment than chemical inputs, with a need to consider the balance between a short-term decline in productivity and long-term benefits to the watershed.
- Negotiation between stakeholders should follow to determine preferences between scenarios. Clearly, the balance of interests and overall effect will constitute an important part of discussions, as will the distribution of responsibilities and tasks.
- Transparent mechanisms will be needed for final decision-making, including addressing competing interests, immediate needs and long term sustainability. Public authority will remain vested with the powers to make decisions for the general welfare, with an overall vision to encompass equitable impact and resource maintenance.
- Evaluation, and re-initiation of the cycle, will be necessary in order to improve tools and approaches, and adapt to novel circumstances.

The legitimacy of pursuing national values and objectives by taking full advantage of the MFCAL concept does not exempt the internalisation of any associated costs in national policies. However, benefits shared with the international community, as recognised by relevant international agreements, may constitute an exception under specific conditions.

5.2 THE INTERNATIONAL PROCESS

The sequential process at the national level suggested above may meet with converging acceptance and agreement at the international level. FAO, the CGIAR and other international agencies active in the agricultural arena should certainly prepare to help these national efforts to crystallise successfully. Heightened awareness of the trade-offs and synergies among functions may lead to proposals for novel initiatives, as well as new policies and priorities for the agricultural sector.

On the brink of the 21st Century, the challenges of global transformations and emerging trends in agriculture are immense. Pressures to feed humanity, competition for use of arable space, and the cumulative effects of further industrialisation and urbanisation will be basic components of debate and decision in every nation. Priorities for action will still be defined initially at the local, sub-regional and national levels. Nevertheless, regional and international bodies can play an increasing role in formulating joint policies that focus on comparative advantages for trade and development, with explicit social goals affecting equity, gender and access to resources. The commitments of the Rome Declaration consecrate the necessity of encompassing the breadth of these questions in order to achieve sustainability in all societies.

The concept of MFCAL can contribute to discussions at the Committee on Agriculture (COAG), the FAO Council and Conference, other food-related agencies, as well as to other mechanisms. The process of informing and motivating discussion has already started and can be continued at several of these forums. In addition, increasing precision in distinguishing the multiple functions and their inter-relations has implications well beyond the agricultural sector.

The Commission on Sustainable Development (CSD) is well placed to play a catalytic role on general issues of sustainability at the global level. The CSD process offers an opportunity to recognise the enduring and irreplaceable role of agriculture for the future, building on possible synergies between the environment and different sectors of economy and society. The participants and contributors to CSD – 8 should be able to consider the profile of the overall international community in order to move forward in addressing the most important issues relating to agriculture, including food security, rural poverty and access to resources.

However, this may not be sufficient. What else can pave the way to facing the agricultural challenges of the next century? The variety and importance of the environmental, economic and social functions of agriculture and land add significantly to the continuing importance of the provision of food and the other services directly related to agriculture. There is therefore a need to collaborate on ways forward that combine mechanisms and institutions that are already relevant to and responsible for all dimensions of land use, as well as for the macro-economy, public policy and overall planning.

Initiatives must also be developed in the context of the many relevant conventions and the existing platforms regulating international concerns about the environment, commerce and society.

The six key requirements for progress identified at the beginning of this chapter constitute a starting point for formulating a common international agenda for the future. Particular areas of persisting world-wide attention will include:

- influencing public awareness and education in a global society that is still dependent on, but no longer has roots or practical experience in, the countryside;
- developing better understanding, articulation of and influence on the dramatic transformations in human relations to agriculture and the environment;
- influencing the changing nature of the rural economy in order to achieve greater social equity and increasing opportunity.

As a neutral platform for international debates, FAO will continue to dedicate its efforts to issues critical to the future of food and agriculture.

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