

**GEOPOLITICS OF WORLD FOOD RESOURCES:  
A PRODUCTION, CONSUMPTION,  
TRADE AND SYSTEMS PERSPECTIVE**

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### CERTIFICATE

This is to certify that the dissertation entitled “ **GEOPOLITICS OF WORLD FOOD RESOURCES: A PRODUCTION, CONSUMPTION, TRADE, AND SYSTEMS PERSPECTIVE** ” submitted by **Mr. AVINASH CHAMPAWAT**, in partial fulfilment of the requirements for the award of the degree of Master of Philosophy of this university has not been previously submitted for any degree of this or any other university. This is his original work.

We recommend that this dissertation be placed before the examiners for evaluation.

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15.7.03

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*Any research would be utterly impossible without the help of documentation and availability of scholarly works. The JNU Library has been the mainstay of this dissertation. Other libraries have also been of immense help, especially the Central Reference Library of Delhi University.*

*I pay my regards to my Papa and Mama and love to Pincha for inspiring me during my work.*



15.7.2003

Avinash Champawat



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## **INTRODUCTION**

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Food is one of the basic needs to sustain life. But just this simple criteria does not make it a subject matter of Political Geography. For it to qualify as being an area of study we need to look at its spatio-political dimension. This makes food a subject matter of political geography also. Now in what way do we study food in our subject. Either to look at it from a resource perspective or to look at it from a production, consumption or trade perspective, or to look at the system that has evolved around food on the international scale. So there are multiple areas under which food can be studied.

Resources had been a subject matter of geography since long. Since political geography has evolved as an important branch of geography, - at times has even aspired to become independent due to its importance - resources have come to occupy an important place in it also. The reason being that resources are not equally distributed all over the world and there is also some conflict going on to control the available scarce resources. This element brings in political geography as we look at this aspect both spatially and politically. Non the first question that comes to mind is that, is food a resource, and if yes than how does it affect the relationship of States.

Since food is a resource, control over it has been an important aspect of International politics. It is not just control over it, but how to influence opinion of other States is also important. Food has been used as a tool of diplomacy, to extract benefits from developing and least developed countries, by the surplus developed countries. The example of the US is before everyone, who has used this as an important tool in international diplomacy, often falling to low levels<sup>AK</sup>

while dealing with many countries - the case of PL 480, which US used against many, including India.

Now, coming to the topic of this study. It is, 'Geopolitics of World Food Resources : A Production, Consumption and Trade Perspective'. The topic itself denotes the significance of political geography - rather than just geography or politics - in the topic. How does food become an area of geopolitical interest. Since the producing countries are not necessarily the consuming countries, so trade in food is a natural element of international commerce. The study begins with treating food as an important resource. It does not just stick to what is food, what are its types, from where it comes and how it is important for human survival, but it is all about it being used as a weapon by some countries against others and to safeguard its own interests. The geographical element in the study is about dealing with food as a resource as well as the spatial element of its production and consumption and the consequent trade and commerce patterns. The political element is the establishment of the 'Global Food System'.

Agriculture is considered to be the foundation of food, it becomes equally important and necessary to take into consideration and analyze the current trends and the outlook for agriculture. Will agriculture continue to be important in International arena especially regarding trade. It is presumed that the demand for agricultural products will continue to grow more slowly. The other likely scenario being that agricultural trade deficits might worsen for developing countries. This might lead to the persistence of food insecurity, not just caused by production shortfall but shortfall in accessibility also, which is a result of poverty. The prospects for food and nutrition are also not bright. There has been significant improvement in nutrition but hundreds still remain undernourished. Populations and incomes will continue to grow which would result in the improvement of average nutrition, but undernourishment will fall only slowly due to increasing population.

Regarding the food scenario, it is very important to deal with the crop production. Among crops cereals play the most important role of providing the basic diet to humanity. But the increase in cereal demand is slowing down due to changing pattern of diets, but developing countries will become more dependent on imports and this demand would be filled in by the exporters, thereby bringing in some element of politics in it.

Land and water, being the basic constituents that make any type of agriculture feasible, so sufficient attention is paid to them. Is there enough potential cropland for future needs or is land becoming scarce? Is there enough irrigable land for future needs and is there enough water? These questions are essential as land and water sustain agriculture and if they are in ample quantity and good condition and of course, in abundant supply, then they do help in augmenting agricultural production and thereby increasing the availability of food. Besides land and water, livestock and fisheries are also important food resources. The later two also form an element of the world food supply and are very important from the nutritional point of view. They are an important source of animal protein and fats in the case of livestock. So their availability and consumption is also an element of the study of the world food resources.

One of the very important factors influencing food production is technology. It has played a great role in improving the food supply by increasing production. Its application is not just in agriculture - the reflection in the form of Green Revolution which changed the face of most of the developing countries - but also in other areas like livestock, fisheries etc. The issues and prospects of biotechnology have been dealt with along with future directions for research. There is a need also for making agriculture sustainable as this would ensure a steady supply and also preserve the scarce resources of land and water.

The production of food resources is only one side of the story, the other being is consumption. Consumption shows the demand side and also the accessibility. Demand in developing countries but due to poverty they are not able to access them whereas in developed countries that high demand is sustained by the availability of finance with them. Now how to measure food consumption as there ought to be some common criteria to make the data comparable. This has been taken care off. Industrialization has played an important role in the transformation of western diets and the changing diet pattern is evident the world over. Population growth has affected the availability of food, but overall nutritional levels are improving and the change from a starch rich diet to a protein and fat rich diet is evident the world over, though in developing and least developed countries the pace is very slow.

The differentials in production and consumption of food bring in the element of trade. The matter is not that simple as developed countries have yet not opened their markets fully but expect the developing countries to do so! This is the cause for the rising trade deficits in developing countries. The goals have been ambitious but the achievements have been modest for developing countries as tariffs in developed countries continue to curb trade, domestic support remains high in developed countries and export subsidies are also substantial. Globalization has made the poorer countries poorer. It has concentrated too much power in the hands of the multinationals. But the benefits of globalization ought not to be forgotten as it has provided a market for many of the agricultural produce of developing countries.

Food aid has been important in the international arena. But the approach has differed in different times. The dependence of some countries on others for such a basic need as food has made them very insecure in terms of food. HIV/AIDS is a crisis like no other as its impact on food security and nutrition is very deep not just at the household level or at the community level but also at the national level and there is an urgent action needed to tackle this situation.

This look - at the food resources is purely from a geographical perspective though some political aspect was also evident while discussing trade and globalization. It is not just the spatial aspect which is important for the study but also the political aspect. The political importance of the food resources is evident at the global level. The impasse in international economic relations is centered on agriculture because in the agro food sector there exists the largest gap between national regulation and transnational economic organization. This gap is the legacy of the post - World War II food scenario. This "global food system" is the rule-governed structure of production and consumption of food on a world scale. There were different issues and countries which influenced the global food system. The US remained at the centre just after the second World War. It influenced the policy of many countries especially of Europe during the 1940s and 1950s and of the Third World in the 1960s and 1970s. Since the Oil Crisis of 1973, new relations were carved out and New Agricultural Countries - Brazil, Argentina, Australia - came to play an important role in this food system. Even at the end of the surplus food system, the importance of food as an element of international relations remains.

The globalization of food has brought about an industrialization of agriculture. It has changed the elements of agriculture and has influenced all arenas of both production and consumption of food. Globalization of food has brought a change in labour relations both in the developed and developing countries. The major issue today is whether food is first or trade is first i.e. do countries have any right to look at their food security or just to fulfill the elements of trade they make themselves food insecure. What do we need, do we need private global regulation or do we need democratic public regulation, is an important issue to be addressed.

The topic of my study is very relevant today, seeing the importance of food as a basic need and the fact that agriculture has come to occupy a centre

stage in WTO negotiations among the developing and developed countries. AS the geopolitics of world food production and supply is very much relevant and critical hence it is decided to study this angle in detail.

### **STATEMENT OF THE PROBLEM**

The present study seeks to analyse and evaluate the geopolitics of food resources in the world from the perspective of its production, consumption and trade and look at the emergence of the global food system and its future prospect.

### **OBJECTIVES**

Keeping in mind the above statement, this study proceeds with the following objectives in view:

1. to define resources, in general and the food resources in particular and how can food be considered as a resource, and what are its different types and the different sources from which it is obtained;
2. to look into the geography of world food resources from the production, consumption and trade perspective.
  - (i) From the production point of view, to look at the outlook for agriculture, crop production, the environmental issues, the land and water resources, crop yields, livestock and fisheries. Within these to look at the role of technology and what could be the directions for research and what policies need to be evolved to move towards sustainable agriculture.
  - (ii) From the consumption point of view to measure food consumption, to look into the transformation of Western diets brought about by industrialization, to look into the geography of food consumption in the early 1960s and changes brought about during the 1960s to the 1990s, to look into the trends in the

Dietary energy supply and its growth in relation to population growth, to look into the distribution of food in the world and the changes in food composition.

(iii) From the trade point of view, to look into the effects of international trade and globalization on the economies of both developing and developed countries and to look at the benefits and disadvantages of globalization.

(iv) Within this spatial perspective of the food resources to look also at the aspect of food aid and the pathways to food security. Related to the aspect of food security is the spread of HIV/AIDS so to look at its impact on food security at the household, community and national level.

3. to look at the global food system and the evolving spatial pattern. Within it to look at the global food system, the globalization of food and the industrialization of agriculture, the power and politics in labour relations, the implications of this trade liberalization on food and to look at the evolving scenario.

## **SOURCES OF INFORMATION**

The source of information would be mostly secondary. The reason being that since the area of my study is at the global level it becomes difficult to generate data of a primary nature. So the source of information include books, articles, periodicals, publications of the United Nations like that from the F.A.O., publications of the World Banks like the World Development Report.

## **METHODOLOGY**

To a large extent the study was sought to be qualitative, comprising of the descriptive analysis of the data and the information obtained, however,

quantitative and cartographic techniques including the computer have been used.

The resource concept has been an analysis of the theoretical literature. But various quantitative techniques like square diagrams, triangular diagrams and other illustrations have been used.

While dealing with the geography of food resources, besides the analysis of relevant literature and data, ample illustrations have been provided by using quantitative and cartographic techniques. The quantitative techniques used include pie diagrams, bars, - multiple bars, horizontal bars, divided bars - graphs, square diagrams etc. and the cartographic techniques include the illustration of these data and diagrams on maps.

The chapter on the Global Food System is more or less a theoretical one and hence only qualitative. The analysis is not just descriptive but also explanatory.

## **CHAPTERISATION**

This study is divided into several broad sections for the ease of understanding, each being treated as a separate chapter. Hence the study is divided into five such chapters, each dealing with as follows:

**Chapter 1** is an introductory part of the study, providing a broad introduction of the topic, presenting the objectives of the study, the sources of information on which the study will be largely based, the methodology involved, schemes of chapterisation followed and a brief survey of few selected relevant literature;

**Chapter 2** deals mainly with the definitional and conceptual part of the study, defining resources and how can food be treated as a resource, what are the different types of food resources or the different sources from where they are derived;



**Chapter 3** provides an insight into the geography of world food resources, discussing the spatial variations in its production, which includes the long term perspectives of Agriculture, Food and Nutrition, Crop Production, Land Resources, other food resources and the Role of Technology.

**Chapter 4** provides an insight into the geography of world food resources discussing the consumption, security and trade perspectives.

**Chapter 5** looks at the global food system, its emergence and its end. Besides that it deals with the impacts on international economic relations, at the globalization of food and the resultant industrialization of agriculture, the power and politics in labour relations while working in the global food system, to look at the implications of liberalization on food and the likely scenario due to it.

Finally, **Chapter 6** tries to provide an overview of the entire study, trying to summarize it and conclude from the facts and findings of the study.

## **LITERATURE SURVEY**

The vastness of the topic has made me survey a large number of works; but there were only few which were fully useful. This makes the task of, review of literature more difficult. I would be surveying only the major works.

Since the work involved selected few things from a large literature, I have classified my literature under different heads so that each work has its significance in its right place. The study revolves around two major and one minor area of study. The major areas of study have been, “the geography of world food resources”; and the “global food system”. The minor one is the “Resource Concept”. The relevant literature can be surveyed under these heads. To start with the minor area first.

## **The Resource Concept**

Much has been said about resources, but as per the requirement of the study a basic introduction was enough. Roy (2001) provides a detailed analysis of the concept of resources. Though most of his work is based on the work of many economists, especially that of Zimmermann. Roy has concentrated on meaning, nature and significance of resources. While giving the various theories of resources like the functional, dynamic, etc. he also lays emphasis on the role of cultural factors i.e. humans and human society. But this work looks to be more descriptive rather than explanatory. He emphasizes more on classifications rather than explaining as to why it is such. Haggett's (1979) work is not on resources but has a chapter in his book on, 'resources and conservation'. He gives good insight in the concept of the stocks, resources and reserves. He classifies natural resources and harps more on the conservational aspect. It makes a good as illustrations are abounding. Clawson and Fisher's (1998) work is an edited one. It is again not totally on resources, though their approach in the whole book has been development oriented, hence resources are an important element in each chapter. But they again like Haggett, give a chapter on 'people and resources'. The name of the chapter itself suggests their approach, it has been related to culture and the importance of resources for people. This approach explains his line of explanation. He tries to see the resource from its utility to us, so he emphasises on the distinction between proven and total resources, on the quality of resources and on the demand and technological level on resources.

Pounds (1972) and Jones (1954) have written about different aspects on the field of political geography, but their importance to my work stems out from the importance they give to food and agriculture. Jones explains the resources from a strategic perspective. His work does not directly deal with resources but in Pound's work, we see that an attempt has been made by him to emphasis on the importance of food as a resource. Based on the foodstuffs available with

nations and their governmental policies towards agriculture, the farmer, and the land he groups governmental policies into four categories which are not however, completely distinct from one another.

### **Geography of World Food Resources**

Under this topic there has been a wide array of subtopics, and the literature referred, makes the task of compiling them coherently, difficult. The chapter on 'geography of world food resources' dealt with the production, consumption, trade and food security perspective. The production perspective has to do with agriculture and related activities which brings in food. Alexandratos (1995) edited a work which was an FAO study. He highlights the outlook for agriculture and the work gives a long-term perspective of world agriculture highlighting the land degradation, water scarcity, but also emphasizing on the positive aspects of improving nutritional levels brought about by increased production, made possible by the Green Revolution. FAO (2002) itself brought out a work on World Agriculture towards 2015/2030 which again gives a long term view of the Agricultural scenario across the regions of the world where it highlights the rising agricultural trade deficits of the developing countries. It says that though production will keep pace with demand, but food insecurity will persist. The scenes for developing countries is not bright. It highlights the role of technology in increasing production. It brings out the implications of liberalization on the agricultural arena, where it says that it is the developing, especially poor countries who are to loose.

Swaminathan (1996) highlights the role of technology in increasing production. He brings to light the role which science and technology could play in bringing the food insecurity under control. He says that there is need for the dissemination of technology to the small farmers so that they too get the benefits of this technological revolution. He however also says that

environmental degradation ought to be kept under control or else diminishing returns from agriculture would set in.

The Geography of food consumption has been dealt very well by Grigg (1995 and 1999). While in the former he brings to light the nutritional transition which western Europe underwent especially after the influence of the industrial revolution. He highlights how the diet was high in starch but low in proteins and fats, especially animal products. But with industrial revolution, incomes rose and this brought a transformation in their diets since 1870s onwards. He says that, 'from 1800 to the 1950s an increase in income led to an increase in the consumption of all food except the starchy staples. Since about 1960, however income has become a less important factor in food choice'. In his later work (1999), Grigg throws light on the changing geography of world food consumption after the Second World War. He says that there were fundamental changes in food consumption in Western Europe, North America and Australia from 1800 to the 1950s 'prompted by rising incomes, increases in agricultural productivity and greater trade in food'. As a result the consumption of starchy staples declined and that of animal foods, sugar, vegetables and fruit increased. He brings to light how since 1961-62 income increases in developing countries have led to increased consumption of all foods, as happened in nineteenth century Western Europe, and even in a few countries the beginnings of a decline of the starchy staples. In contrast, he says, 'income increases in the developed countries have not led to an increase in food consumption'.

The effects of population increase on the food supply system in the developing countries have been highlighted by Bongaarts (1996). He says that since most of the population growth today is occurring in the developing, given the fact that these developing countries lack the appropriate technology to increase production, they might face a severe food shortage. Since most of the developing countries labour force is involved in primary activities, especially agriculture, Bongaarts says that unless the developing countries diversify their

economy and bring in a technological revolution in agriculture besides checking their population, they would face a severe food supply crisis.

The Sixth World Food Survey (FAO, 1996) again comes very handy to me and is very useful in throwing light on the food consumption pattern in the world during 1969-1992. It throws light on the trends in availability and composition of food supply whereby besides the trend it also analyses the dietary energy supply growth in relation to population growth, about the distribution of food in the world and the changes in food composition. This exhaustive survey throws light also on the prevalence and intensity of food inadequacy in developing countries besides giving an assessment also of child and adult undernutrition in developing countries.

The food security aspect has been dealt very well by Chowdhury (2000), but he puts much stress on the supply side perspective and his study which deals with global food security in the 21st century is with reference to cereal. He brings to light how cereal demand is slowing down due to a shift from cereal to non-cereal/cash crop in many developing countries, they will become more dependent on exports. Since much of the cereals in the developed world is going in for animal feed and the developing countries are continuously being unable to produce according to the demand, the food security scenario is to worsen for the developing countries.

### **The Global Food System**

While many scholars have talked about the 'International Food Regime', 'Global Food System' and 'Agro-industrial Commodity Complexes', but the matter has been dealt with in detail and with proper analysis only by Friedmann (1993), McMichael (1993), Jarosz (1996) and Letteron (1993). The global food system 'links the processes of globalization to the production, processing, distribution, marketing and consumption of food'. Food system are linked to farms of capitalist accumulation by Letteron (1993) who has divided them into

three historical periods stretching from the 1870s to the 1990s which coincide with regulation theory's systems of industrial accumulation.

Research on the nature and characteristics of international food system and agrifood complexes first surfaced in the work of Harriet Friedmann. She gives a critical analysis of how the surplus regime was created during the aftermath of the Second World War but she continues with the analysis and highlights how new relations and rules came about after the oil crisis of 1973. She says that though the surplus regime exists nowhere but the food regime remains unhinged. She lights the role of the transnational corporations and says that the private sector wants to regulate the food sector but there is need for 'democratic public regulation' through which food security issues of the poor may be addressed.

Lucy Jarosz (1996) has also made an effort in explaining different aspects of the global food system. Light has been thrown on the globalization of food and the industrialization of agriculture, power and politics in labour relations among both the developed and the developing countries. She also has thrown light on the dualism prevalent between the north and south and compares the agricultural scenario with the case of contract farming. She has also very well analysed the tensions between the diversity of local level experiences and the outcomes of rural change and the global processes of restructuring in agroindustry.

McMichael (1993) shows how the 'World food system' could be under the restructuring under the GATT regime. In an earlier work (1992), he drew the contours of a new food regime by highlighting the tensions between the national and international control of the world food order where he shows the conflicts between not just the states developed and developing - but also the role played by the transnational corporation. In his later work (1993) he shows how the then ongoing negotiations could structure the global food system and

make the food insecurity of many poor countries much worse. He also says how private sector could dominate the global food system, thereby making profit above food security and this could be really worrisome.

Le Heron (1993) says how agriculture is no more related to feed the starving millions but has become a business enterprise. The surplus generation by many developed countries especially US, and the involvement of the multinational corporations has led to the globalization of agriculture. This has prompted the need for more trade especially by the developed countries. He says how the agriculture sector is highly protected in the developed countries whereas they ask for the opening of the developing country market for them. Letteron talks of food regime that came off since 1870s, and which he says still exists, though countries and issues have changed from the limelight but it continues to be there.

There are a few more works like that of Revel and Ribound (1986) and Chakravarthi (1990) which were helpful in building this chapter. Revel and Ribound's work is an old one but throws useful insights on the use of its agricultural surplus as an important tool of foreign policy and of economic diplomacy. They say how US used surplus as a tool while dealing with the European nations after the Second World War through the means of Marshall aid. The Americans used it against USSR and Japan and also many developing countries, but with the emergence of other surplus countries like Brazil, Argentina and Australia, its importance as a tool decreased and slowly surplus instead of a strength became a weakness for America.

Chakravarthi's (1990) focus has been around the then going negotiations of the Uruguay Round. He says how the Third World countries are being forced to come to the table of negotiations and sign agreements which would indeed harm its prospects. He says that even in agriculture, the only area where the developing countries hoped for some advantage as to be given free access to the

## **THE RESOURCE CONCEPT**

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Etymologically, 'resource' refers to two separate words - 're' and 'source' - that indicate any thing or substance that may occur unhindered many more times. The idea of 'resource' became popular when the eminent professor of Economics, Erich W. Zimmermann promulgated his famous "Concept of Resource". "The word resource" says Zimmerman, "does not refer to a thing or a substance but to a function which a thing or a substance may perform or to an operation in which it may take part, namely, the function or operation of attaining a given end such as satisfying a want. In other words, the word resource is an obstruction reflection human appraisal and relating to a function or operation."

So, resource satisfies individual human wants or attains social objectives. It also refers to the positive interaction between man and nature. Man is, of course, the most important and integral part of resource creation, as he is situated in the top of the hierarchy of resource consumption. Only the satisfaction of human beings converts any thing or a substance into resource.

The resource concept is built around three interacting components : resources, obstacles, and inert elements. A resource is anything that can be used to satisfy a need or a desire; it is a means to an end. An obstacle is anything that inhibits the attainment of a need or desire - the opposite of a resource. Inert elements in our surroundings neither help nor hinder that attainment.

Resources are not just material objects. Knowledge is a resource : our farmer has to know when and how to tend crops. Skill and organization may



also be resources. Other nonmaterial resources include inventiveness, good government, useful education, cooperation and adequate social order. Furthermore, material resources are not just natural resources. The farmer's and the miner's tools are culturally desired. In addition, elements in the environment may function as resources, obstacles, and/or inert elements all at the same time. The river is a resource to the farmer, an obstacle to the hiker and an inert element to the miner. Finally, resources are not static or finite.

### **Resources and Culture**

Just like the hiker, the farmer and the miner, diverse cultures have different resources. Each culture group has developed a set of customs, laws and organizations that effectively structure the lines and attitudes of its members. These cultural controls affect the way in which resources are viewed. Perhaps even more important is the role that culture plays in directing economic activity, for resources are basically an economic concept. In almost all cultures certain economic activities or products are socially more acceptable than others. In other words, cultural attitudes tend to direct individuals to use different sets of resources. The Bedouin of the Arabian Desert area nomadic herders because their culture considers herding the highest possible occupation. The existence of large quantities of petroleum under the land means little to them; nor are they impressed by the possibility of becoming basis agriculturists, even though water and good soil may be available and the life of a farmer may be more secure. How different things are in the United States, where urban-oriented, white collar employment is the goal of most Americans.

### **Expansion of Resources**

It is not difficult to comprehend that non-material resources can be constantly created : new ideas and better organization have no limit. We can also see that material resources that can be replenished can be used confidently for years to come if wisely exploited. These, including trees, crops, animals,

soils, and rivers, are known as flow resources, or renewable resources. What may be more difficult to understand is that fund resources, often called nonrenewable resources, can also be created. Examples of fund resources are such non-renewable minerals as coal or petroleum.

Our understanding of resources can also be enhanced by making a distinction between the total resources we believe to exist and proven reserves (Fig. 2.1). Proven reserves are those materials actually available given current prices and current technologies. Technological advances can result in the creation of fund, or nonrenewable resources in two major ways. First, a need may be found for a formerly unused mineral or element, many examples of which can be cited. For instance, the early phases of the Industrial Revolution led to the use of iron in conjunction with other metals to produce steel. In the past hundred years a second, and perhaps more important, means of creating fund resources has been the inclusion of low-quality mineral deposits in the fund resource base (Fig. 2.2).

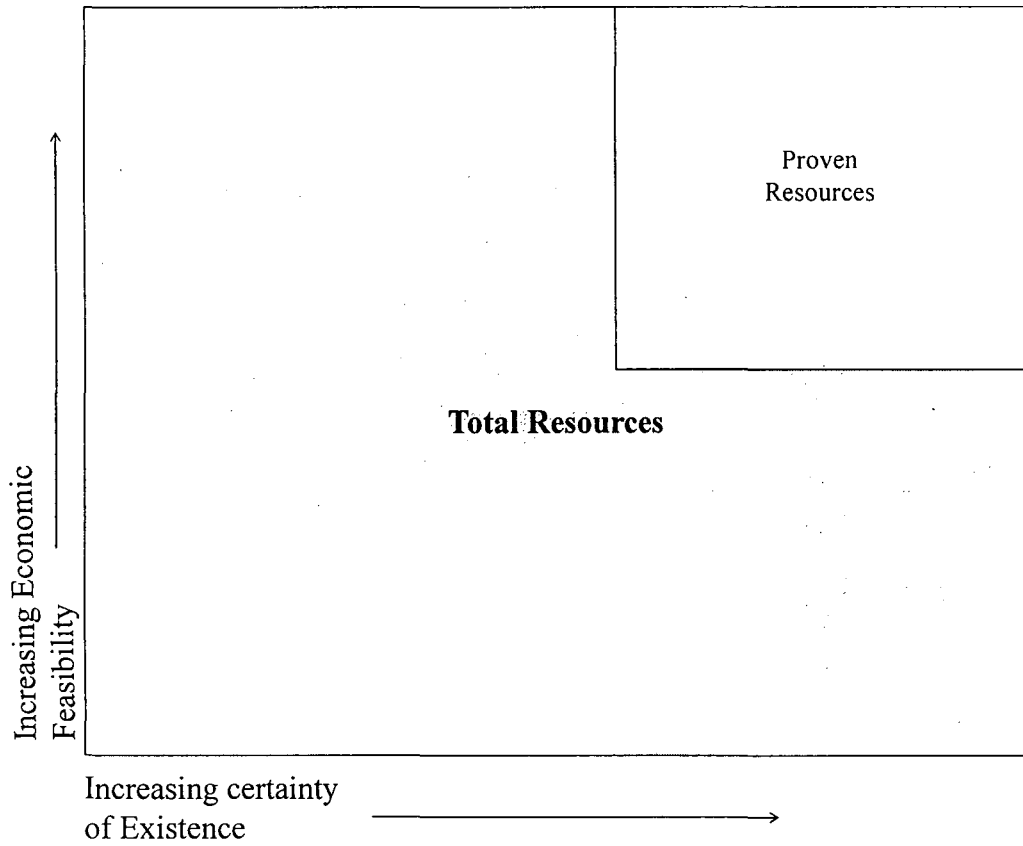
Fund resources can also be expanded by an increase in demand. If the demand for a particular item grows and higher prices are created, new resources are developed.

Technology has also found ways to expand the agricultural resource base. For example, the amount of land that is arable has been increased by the use of improved seeds, mechanized cropping, and irrigation.

### **Classification of Resources**

The resources of an economy are frequently classified into three groups : (i) land, including geographic space as well as natural resources; (ii) labour, or the manual and mental abilities of the economically active population; and (iii) capital comprising both fixed capital, those artifacts deliberately made by man for use in the production process, and investment capital which provides firms

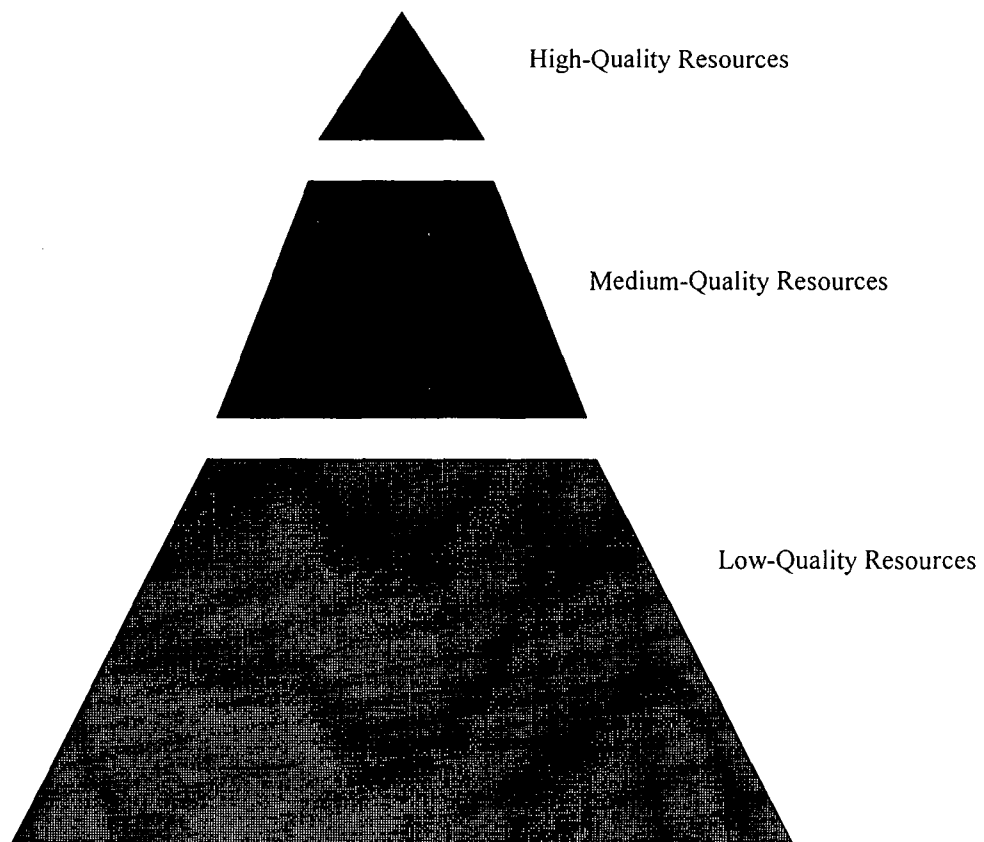
**Fig. 2.1**  
**The Distribution between Proven Reserves and Total Resources**



Source: Clawson, D.L. and Fisher, J.S. (eds.) (1998); World Regional Geography - A development approach, New Jersey: Prentice Hall.

**Fig. 2.2**

**Resource Pyramid. The pyramid concept applies to all types of resources, land, minerals, fish, people, crops. Most of the resources we use are of high quality. As technology improves or demand increases or depletion occurs, we use more medium- and low-quality resources, with the potential for negative environmental consequences**



Source: Clawson, D.L. and Fisher, J.S. (eds.) (1998); World Regional Geography - A development approach, New Jersey: Prentice Hall.

with the ability to extend their claim over fixed capital. Technology - the knowledge of and ability to implement alternative techniques of production - is often considered as a separate resource but the supply of technology may derive from individual inspiration (labour resource) or from a planned process (research and development) designed to increase knowledge. In this latter case technology is more correctly thought of as a capital resource in that it is produced for future use by diverting resources away from the immediate production of consumer goods. In fact, each of the resources used by firms is a combination of the three groups : labour is educated and trained, land is dense and made more accessible, and capital is manufactured by a combination of resources. Whilst it is pedagogically convenient to group resources into typological sets the boundaries of the sets intersect and are very blurred (Fig. 2.3 and 2.4).

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Fig. 2.3

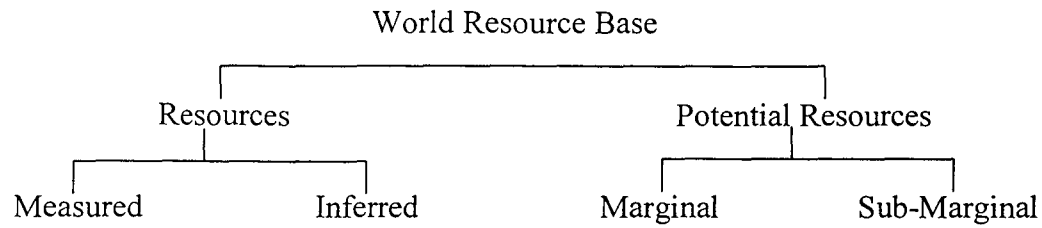
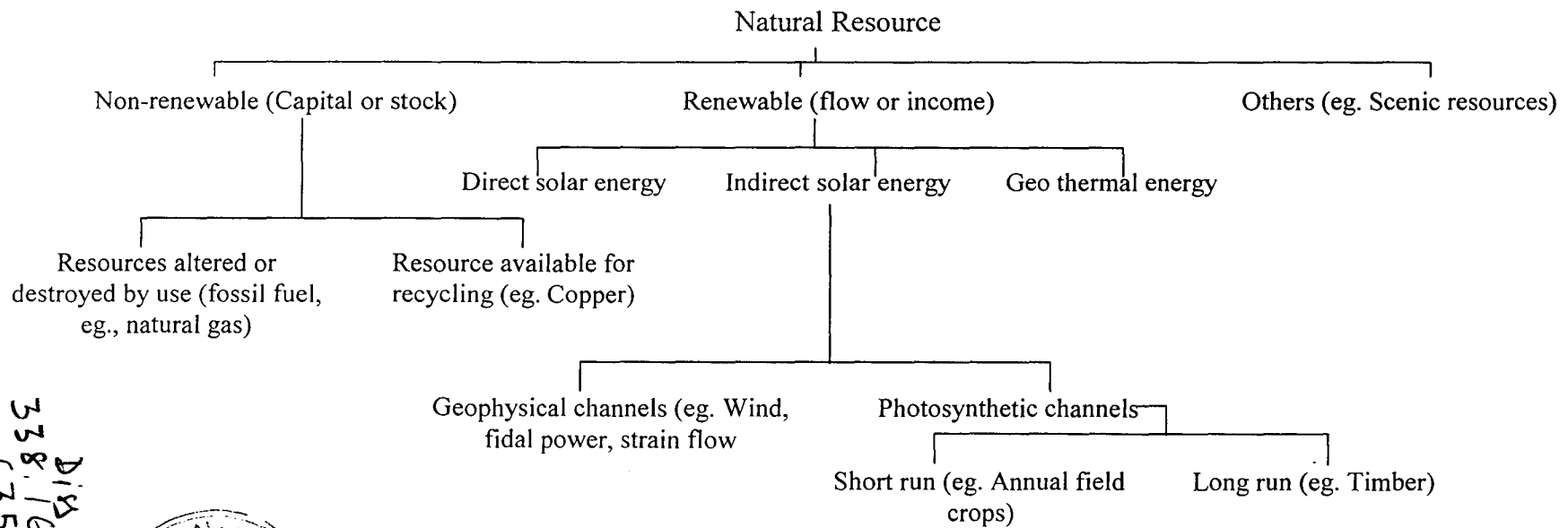


Fig. 2.4



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Source: Haggett, P. (1979): Geography – a modern synthesis, New York: Harper and Row

## **Demand and Supply**

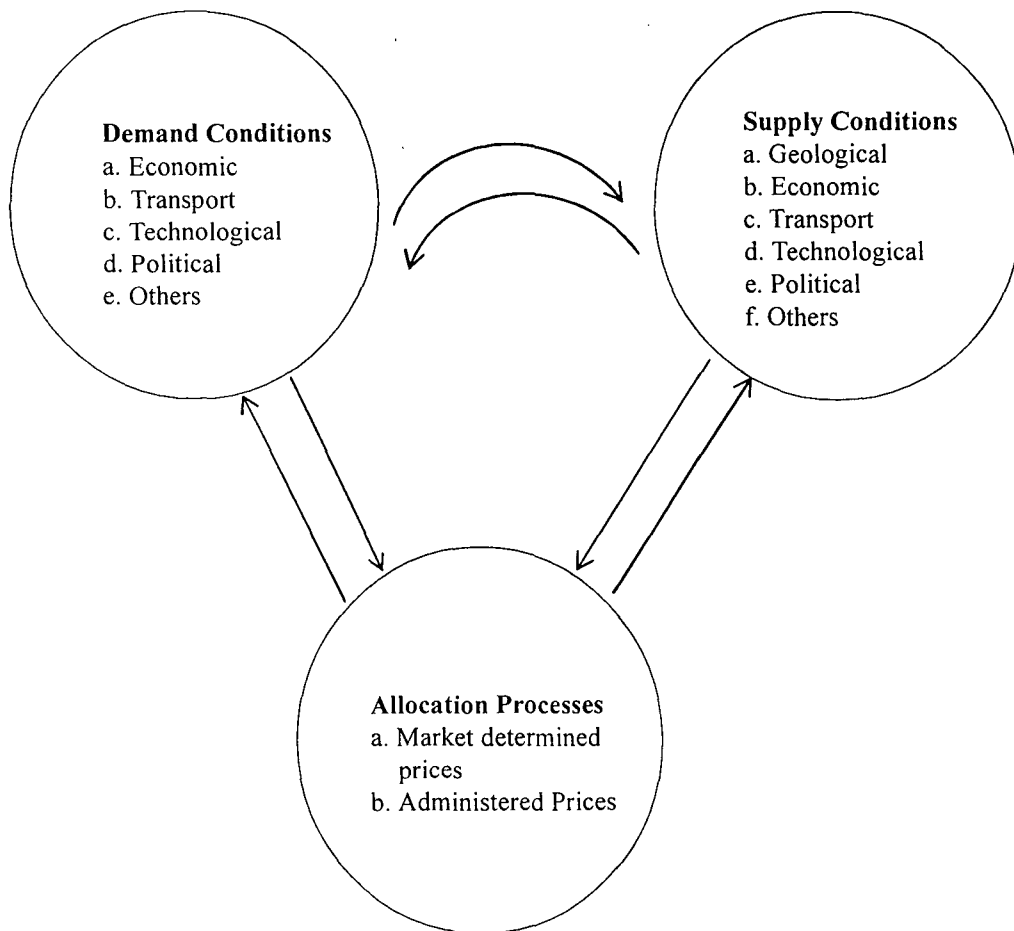
As inputs to the process of production, resources can be of economic service only if there is an effective consumer demand for the goods and services they are employed to produce. But resource creation by such derived demand is effective only if it is sufficiently powerful to provide profit maximizing firms with an incentive to incur the costs of resource use or if by adopting other criteria, governments deem the employment of resources to be worthwhile. Thus, although knowledge about the existence of resources is an essential prerequisite of their employment it is not of itself sufficient. Known stocks of resources have no inherent worth of their own; they are created in the economic sense by the interaction of their derived demand and supply conditions, themselves a complex function of ecological, ethnologic and economic forces (Fig. 2.5).

In the context of political geography, resource may be defined as, “anything a nation has, can obtain, or can conjure up to support its strategy... for resources are as tangible as soil, as intangible as leadership, as measurable as population, as difficult to measure as patriotism.” (Stephen B. Jones).

## **Food Resources**

In the context of the above discussion, the question that arises in our mind is that, how can food be treated as a resource. Then we may say, going by the general definition of resource, that food not only does fulfill the basic criterion of satisfying human want, but it is also one of the basic necessities of human survival; and viewing it from the perspective of political geography, as has been commented by Valkenburg and Stutz (1963), “food is probably the most important of economic elements and has become a powerful political weapon in a world torn by conflicting philosophies and doctrines. Lack of an adequate food supply, resulting in undernourishment, and finally in starvation has been one of the chief causes of unrest throughout history.” To cite few

**Fig. 2.5**  
**Evaluation and Taxonomy of Resources**



Source: Clawson, D.L. and Fisher, J.S. (eds.) (1998); World Regional Geography - A development approach, New Jersey: Prentice Hall.



examples, are the intra-tribal rivalries and civil wars in most of the African states, or one of the greatest events in the political history of the world, the territorial disintegration of the Soviet Union, all can be attributed to paucity of food supplies.

Not all the core States of the world economy are completely self-sufficient in food resources and some of them have to depend on imports from the peripheral and semi-peripheral states. Therefore, no great power is completely self-sufficient in respect of food stuffs because in no instance is the area large enough to embrace the variety of environment necessary to produce the range of food that is now thought desirable. Among the core states, the United States, France and Canada come closest to being self-sufficient, while Great Britain and Japan import about half the total food consumption requirements of its population. Notwithstanding, their heavy dependence on imports of food stuffs, they are core states. The Soviet Union, which emerged from a peripheral status to the semi-peripheral category in the present century, was one of those few great powers in terms of military potentials, was near self-sufficient in varieties of food productions. But recurrent crop failures in the Soviet Union, particularly in the 1980s, led to irregular food supplies to its people which caused heavily to it that it had to depend on imports of food stuffs, mainly from the United States and Canada. However, the paucity of food supply, particularly in the past decade, seems to be one of the prime reasons, for the collapse of the Soviet system, leading to the territorial disintegration of the federation.

China and Brazil, in the semi-peripheral realm of the world economy, have made some significant progress in the production of food grains and other crops within their respective territories. India, an emergent semi-peripheral state, has achieved some 'notable' successes in its agriculture sector, particularly in the field of foodgrain production that a substantial part of Indian people now have access to a well balanced good diet to maintain their good

health. It has an important bearing on the nation's image not only at the regional level but also at the global level.

It is probably true, however, that the United States, Canada, France, China, Brazil and to some extent India, can survive without importing foodstuffs for a considerable period of time if necessary, though diets may become somewhat monotonous and some form of rationing will be unquestionably necessary. These countries have good reserve stocks of foodgrains which they have built up over years, mostly as a result of the sustained agricultural growth, followed by good harvests.

However, a large number of European countries, notably, Britain, Germany, Belgium, Switzerland, Sweden, Holland, Austria, Hungary, Poland, Bulgaria and some other central and eastern European countries are mostly dependent on imported foodstuffs. On the basis of the gross and the net value of agricultural imports, together with the per capita net import, Pounds (1972) attempts a classification of states into:

1. The territorially very large states have a high degree of self-sufficiency in food resources. This is because of the fact that they are large enough to embrace the variety of environment necessary to produce the range of food and that is why the net import in these states is very small or even negative.
2. The industrially developed and densely populated states of West Europe and Japan are heavily dependent on the import of food stuffs. Therefore, the net import in these states is very large.
3. Finally, the developing countries or the peripheral states, most of them are not large states and their import of agricultural products is small and negative, are in the first category states. There is an apparent correlation between low agricultural imports per head and a low per capita national income.

Agriculture is probably more susceptible to government supervision and control than other sectors of the economy. Pounds (1972) attempts to group governmental policies towards agriculture, the farmer, and, the land into four categories which are not however, completely distinct from one another.

1. The traditional view that farming is a way of life which should be protected.
2. In most countries today, the government, through its appropriate ministries, takes steps to improve the quality and efficiency of agriculture. The setting up of cooperatives, the provision of technical help, the resting of soils, and the organization of marketing are some of the many ways in which government controls and assists farming.
3. Related to the last category of government activity is the encouragement, sometimes by subsidy, sometimes by quotas requirement of specific crops where cultivation is judged to be in the national interest.
4. The institution of collective and state farms. These correspond with nationalized industry.

Every country is making determined effort to increase its food resources through the proper management of land and water resources so that it does not necessarily depend on the import of foodstuffs, and can feed its people even in period of extraordinary situations like famine, war and other natural disasters without much troubles.

Food resources does not just mean the resources derived from land but also includes those derived from water. As food is the necessity of life, it plays a very important role in global trade. And it is the control of this essential resource that lies at the case of any country willing to become self-sufficient. The Geopolitics about food resource is not just about control over one particular resource but it is about having a control over the production and supply of them. Since food resources are basic to living, they themselves speak of their importance.

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## **CHAPTER - 3**

# **GEOGRAPHY OF WORLD FOOD RESOURCES: A PRODUCTION PERSPECTIVE**

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Though, food resources, use a very wide arena, but the major emphasis comes on to agriculture. Food resources are not just derived from land, but they include marine based resources also. I would be emphasising more on the agricultural perspective, though not leaving any area untouched. The production perspective includes the long term perspectives of Agriculture, Food and Nutrition, Crop Production, Land Resources, other food resources and the Role of Technology.

The Geographical perspective of world food resources includes within it, the production, consumption and trade of these resources.

### **LONG-TERM PERSPECTIVES**

#### **The Outlook for Agriculture**

So far, world agriculture has been able to respond to the rising demand for crop and livestock products. Although the world's population doubled between 1960 and 2000 and levels of nutrition improved markedly, the prices of rice, wheat and maize-the world's major food staples – fell by around 60 percent. The fall in prices indicates that, globally, supplies not only kept pace with demand, but even outstripped it.

Although global demand for agricultural products has continued to rise, it has done so less rapidly in recent decades. Between 1969 and 1989 demand grew at an average of 2.4 percent a year, but this fell to only 2 percent in the decade from 1989.

Apart from temporary factors (foremost among them a decline in the transition economies in the 1990s), these were two more enduring reasons for the showdown:

- \* The growth rate of world population peaked in the late 1960s at 2 percent a year and slowed thereafter.
- \* A rising proportion of the world's population had reached fairly high levels of food consumption, so the scope for further increase was limited. By 1997-99, 61 percent of the world's population were living in countries where average food consumption per person was above 2700 kcal per day.

#### **Demand for Agricultural Products will Continue to Grow More Slowly**

These factors will continue to influence trends in demand over the next three decades. For example, world population will go on rising, but less rapidly, growing at an average of 1.1 percent a year up to 2030, compared with 1.7 percent a year over the past 30 years.

As a result, future demand for agricultural products is expected to slow further – to 1.6 percent a year for the period 1997-99 to 2015 and to 1.4 percent for 2015 to 2030. In developing countries the slowdown will be more drastic, from 3.7 percent for the past 30 years to an average 2 percent for the next 30.

The forces underlying this slowdown can be seen in the example of China, which has been one of the major engines of growth in the demand for food and agricultural products in the world and in the developing countries over the past few decades. By 1997-99 the Chinese had reached an average daily food consumption of 3040 kcal – only 10 percent short of the level in industrial countries. Over the next three decades the country's aggregate food consumption is expected to grow at only a quarter of the rate seen in the past three decades, while its population will grow at a third of its past rate. Given the sheer size of China's population, these shifts alone will have a huge effect on the global situation. Many other countries, including some of the largest

ones, will be undergoing very similar shifts that will further lower the growth of demand.

India's daily average food energy intake per person is still below 2500 kcal, a level at which there is considerable scope for further increases, while her population will be growing at an average of over 1 percent a year over the next 30 years. Could India take over China's role as a major engine of growth in world agricultural demand? This is not expected, because India's cultural traditions favour vegetarianism, which will hold back the country's demand for meat and animal feeds at rates well below those seen in China.

### **Agricultural Trade Deficits of Developing Countries will Worsen**

Traditionally, the developing countries as a whole have had a net surplus in agricultural trade. In value terms this peaked at US\$17.5 billion in 1977. The trend since then has been for their imports to grow faster than their exports. The agricultural trade balance of the developing countries has gradually divided until, by the mid-1990s, it was more often negative than positive. The highest recorded deficit was US\$6 billion, in 1996<sup>1</sup>.

This overall trend masks a complex picture which varies from one commodity to another and from one country to another. The drastic decline in developing countries' net surplus in sugar, oilseeds and vegetable oils, for example reflect growing consumption and imports in several developing countries and the effects of protectionist policies in the major industrial countries. For commodities produced almost entirely in developing countries and consumed predominantly in the industrial countries, such as coffee and cocoa, slow growth in demand prevented the trade balance of the developing countries from improving. Fluctuating and, on balance, declining prices, further contributed to the problem.

### **Production will Keep Pace with Demand, But Food Insecurity will Persist**

Detailed analysis shows that, globally, there is enough land, soil and water, and enough potential for further growth in yields, to make the necessary

production feasible. Yield growth will be slower than in the past, but at the global level this is not necessarily cause for alarm because slower growth in production is needed in the future than in the past. However, the feasible can only become the actual if the policy environment is favourable towards agriculture<sup>2</sup>.

Globally, producers have satisfied effective market demand in the past, and there is every likelihood that they will continue to do so. But effective demand does not represent the total need for food and other agricultural products, because hundreds of millions of people lack the money to buy what they need or the resources to produce it themselves.

Thus, even if there is sufficient potential for production in the world as a whole, there will still be problems of food security at the household or national level. In urban areas, food insecurity usually reflects low incomes, but in poor rural areas it is often inseparable from problems affecting food production. In many areas of the developing world, the majority of people still depend on local agriculture for food and/or livelihood's but the potential of local resources to support further increases in production is very limited, at least under existing technological conditions. Examples are semi-arid areas and areas with problem soils.

In such areas agriculture must be developed through support for agricultural research and extension and the provision of credit and infrastructure, while other income-earning opportunities are created. If this is not done, local food insecurity will remain widespread, even in the midst of global plenty.

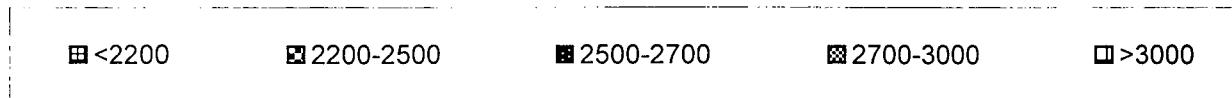
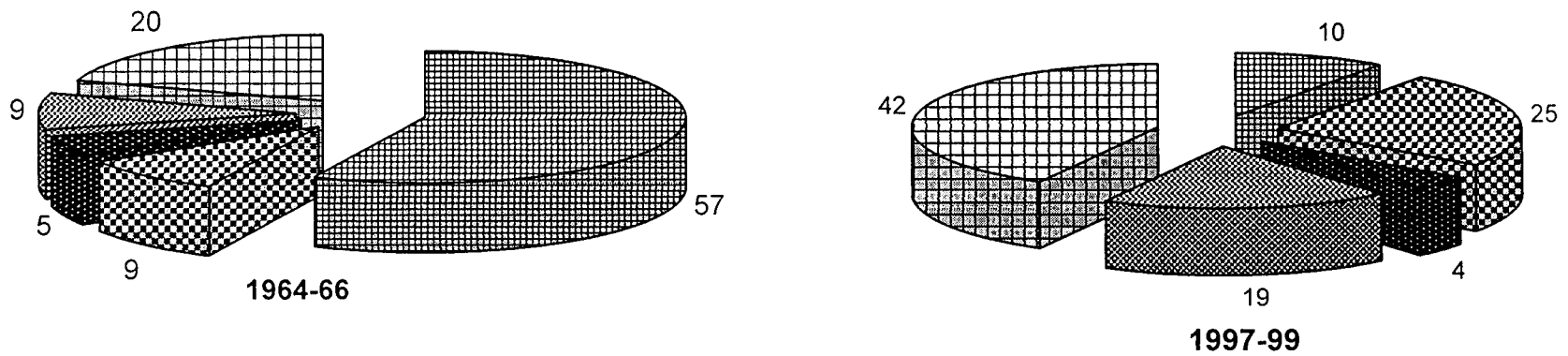
## **Prospects for Food and Nutrition**

### ***Progress in improving nutrition has been significant***

Freedom from hunger is not only a basic human right it is essential for the full enjoyment of other rights, such as health, education and work, and every thing that flows from these.



**Fig. 3.1**  
**Global Progress in Nutrition: Energy intake levels by Percentage of the World's population, 1964-66 and 1997-99**



Source: FAO (2000)

The world has made significant progress in raising nutrition levels over the past three decades. These levels are most commonly measured in terms of kilo calories per person per day. People in developing countries need between 1720 and 1960 kcal per day for basal metabolism and light activity (Table 3.4; Fig. 3.1).

World average food consumption per person has risen by almost or fifth, from 2360 kcal per person per day in the mid-1960s to 2800 kcal per person per day today. The gains in the world average reflect predominantly those of the developing countries, given that the industrial and transition economies had fairly high level of food consumption already in the mid-1960s. Over the period to 1997-99, average daily per capita food consumption in developing countries rose from 2050 kcal to 2680 kcal (Table 3.2).

The proportion of the world's population living in countries with low average food energy intakes has declined dramatically.

**Table 3.1**

**Global progress in nutrition: energy intake levels by percentage of the world's population, 1964-66 and 1997-99**

Kcal	1964-66	1997-99
<2200	57	10
2200-2500	9	25
2500-2700	5	4
2700-3000	9	19
>3000	20	42

Source: FAO

**Table 3.2**  
**Per Capita Food Consumption and Undernourishment**

**Food Consumption (kcal/capita/day)**

	1964-66	1974-76	1984-86	1997-99	2015	2030
World	2358	2435	2655	2803	2940	3050
Developing countries	2054	2152	2450	2681	2850	2980
Sub-Saharan Africa	2058	2079	2057	2195	2360	2540
Idem, excl. Nigeria	2057	2076	2057	2052	2230	2420
Near East and North Africa	2290	2591	2953	3006	3090	3170
Latin America and Caribbean	2393	2546	2689	2824	2980	3140
South Asia	2017	1986	2205	2403	2700	2900
East Asia	1957	2105	2559	2921	3060	3190
Industrial countries	2947	3065	3206	3380	3440	3500
Transition countries	3222	3385	3379	2906	3060	3180

**Incidence of undernourishment, developing countries**

	% Population				Million people			
	1990-92	1997-99	2015	2030	1990-92	1997-99	2015	2030
Developing countries	20	17	11	6	815	776	610	443
Sub-Saharan Africa	35	34	23	15	168	194	205	183
Idem, excl. Nigeria	40	40	28	18	156	186	197	178
Near East and North Africa	8	9	7	5	25	32	37	34
Latin America and Caribbean	13	11	6	4	59	54	40	25
South Asia	26	24	12	6	289	303	195	119
East Asia	16	11	6	4	275	193	135	82

**Population living in countries with given per capita food consumption (million)**

Kcal/capita/day	Population (million)					
	1964-66	1974-76	1984-86	1997-99	2015	2030
Under 2200	1893 <sup>1</sup>	2281 <sup>1</sup>	558	571	462	196
2200-2500	288	307	1290 <sup>2</sup>	1487 <sup>2</sup>	541	837
2500-2700	154	141	1337 <sup>3</sup>	222	351	352
2700-3000	302	256	306	1134	2397 <sup>2</sup>	2451 <sup>2</sup>
Over 3000	688	1069	1318	2464 <sup>3</sup>	3425 <sup>3</sup>	4392 <sup>3</sup>
World total	3325	4053	4810	5878	7176	8229

<sup>1</sup> Includes India and China

<sup>2</sup> Includes India

<sup>3</sup> Includes China

### Developing countries with a given percentage of undernourishment<sup>4</sup>

	Population (million)			Kcal/capita/day			% of population			Million people		
	1997-99	2015	2030	1997-99	2015	2030	1997-99	2015	2030	1997-99	2015	2030
Under 5%	349	1158	5129	3187	3130	3150	2	3	3	8	37	178
5-10%	1989	2162	524	2999	3066	2758	8	6	7	167	134	38
10-25%	1632	1939	948	2434	2644	2411	21	13	16	349	250	155
Over 25%	586	544	239	1988	2085	2149	43	35	30	251	190	72
Total	4555	5804	6840	2681	2850	2980	17	11	6	776	611	443

### *Yet hundreds of millions remain undernourished*

This remarkable achievement has nevertheless left out a massive number of people, who continue to fare badly. In 1997-99 there were still 777 million undernourished people in developing countries – about one person in six. This represents only a modest decline from the figure of 816 million for 1990-92.

In China, huge reductions in poverty raised national average food consumption substantially – and this had a strong effect on the global picture. If China is removed from the picture, it becomes clear that the number of undernourished people actually increased in the other developing countries by almost 40 million.

The region with the largest number of undernourished people in 1997-99 was South Asia, where 303 million or just under a quarter<sup>4</sup> of the population remained undernourished. The region with the highest proportion was sub-Saharan Africa, where over a third of the total population, or 194 million people, were under-nourished.

In 1997-99, some 30 developing countries still had average per capita food consumption of below 2200 kcal per day. War and civil strife were significant factors in no less than half of these countries. In most of these, food

consumption today stands at levels below those attained in the past. Some 23 of the 30 are in sub-Saharan Africa, while only 7 are in other regions.

***Populations and incomes will continue to grow***

Future food consumption patterns are determined by growth in population and in incomes, and by changes in dietary preferences.

The latest projections by the United Nations (UN) shows a continuing slowdown in the growth of the world's population. In the medium UN projection, the 6.1 billion people of 2000 will grow to 7.2 billion in 2015 and 8.3 billion in 2030, heading towards 9.3 billion in 2050. Perceptions of a continuing population explosion are false. In fact it is more than 30 years since the world passed its peak population growth rate, of 2.04 percent a year, in the late 1960s. Since then the growth rate has fallen to 1.35%. This is expected to fall further to 1.1 percent in the period 2010 to 2015 and to 0.8 percent in 2025 to 2030. There will be a corresponding slowdown in the growth of demand for food.

The second major factor determining the demand for food is growth in incomes. The World Bank assessment of future economic growth is less optimistic, but it still projects a rise of 1.9 percent a year in per capita incomes between 2000 and 2015, higher than the 1.2 percent seen in the 1990s.

What will happen to the incidence of poverty under this overall economic scenario is of great importance to food security because poverty and hunger are closely associated. The World Bank has estimated the implications of its economic growth projections for poverty reduction by the year 2015<sup>3</sup>. They are that:

- \* It is possible to achieve the goal of having the proportion of people living in absolute poverty – defined as an income below US\$ 1 per day – by 2015, over the 1990 level.
- \* However, it is unlikely that the number of people can also be halved. This will decline from 1.27 billion in 1990 to 0.75 billion in 2015.

- \* Much of the decline will be due to development in East and South Asia. Indeed about half of the decline of 400 million projected for East Asia has already occurred.
- \* Only in sub-Saharan Africa, where incomes are expected to grow very slowly, are the numbers living in poverty expected to rise, from 240 million in 1990 to 345 million in 2015. By then, two out of five people in the region will be living in poverty.

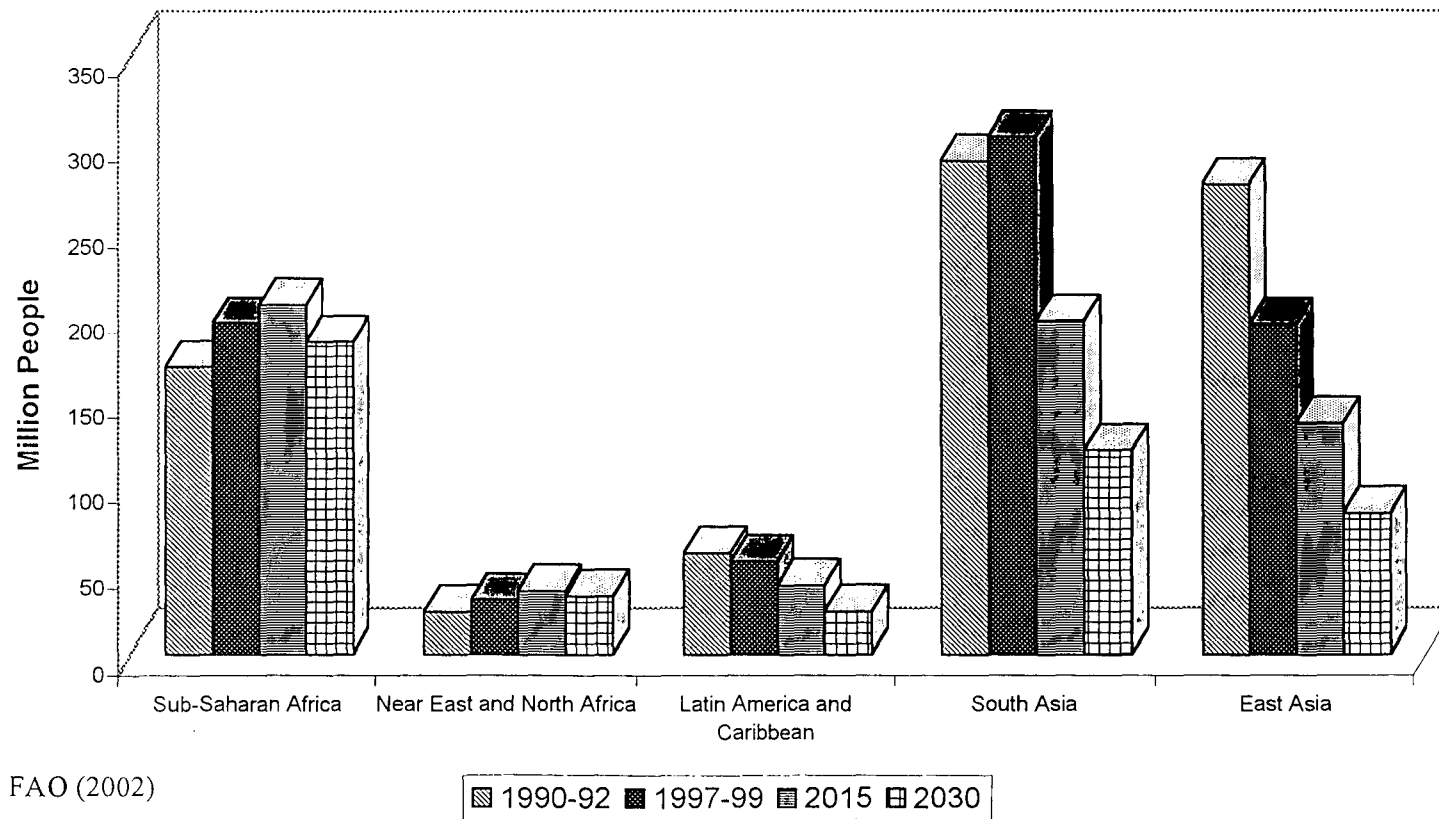
***Average nutrition will improve, but undernourishment will fall only slowly***

In the light of these changes in population and incomes, progress in improving nutrition is expected to continue, though more slowly than in the past. Average per capita food consumption in developing countries is projected to rise by 6.3 percent, from 2680 kcal in 1997-99 to 2850 kcal in 2015. This is a third of the rise achieved between 1974-76 and 1997-99.

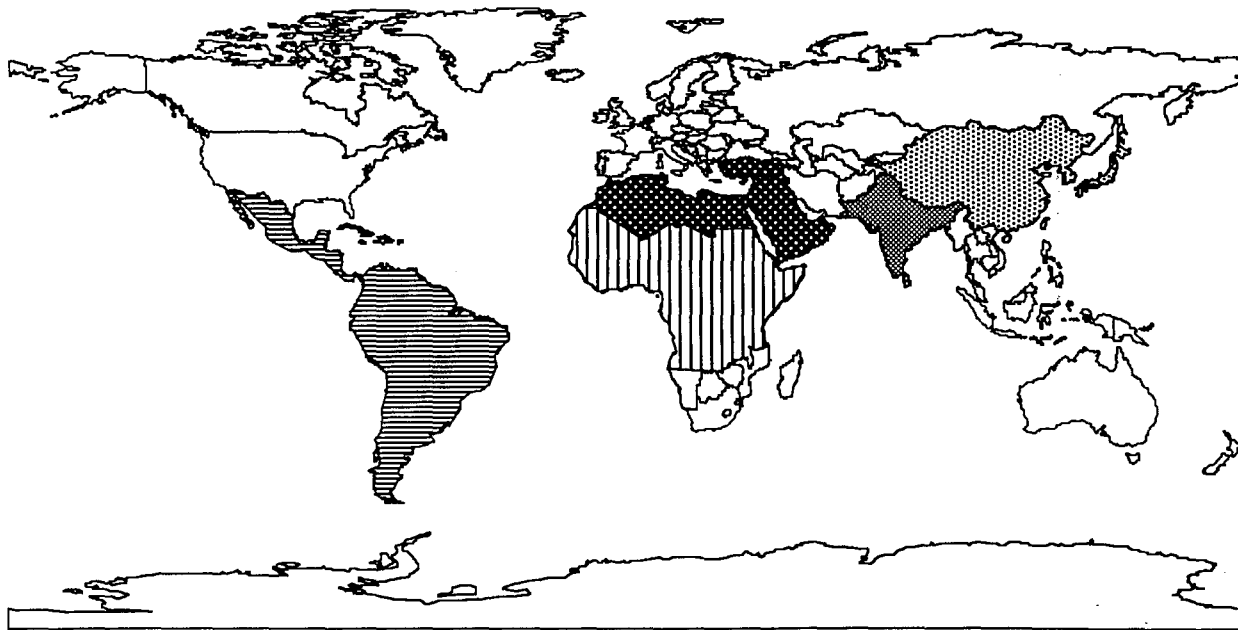
The slowdown is occurring not because of production limits but because many countries have now reached medium to high levels of consumption, beyond which there is less scope than in the past for further increases.

The proportion of the world's population living in countries with per capita food consumption under 2200 kcal per day will fall to only 2.4 percent in 2030. The reduction in the number of undernourished people will be impressive in some regions: In South Asia, for example, it could fall from 303 million in 1997-99 to 119 million in 2030, while in East Asia the number could halve from its current level of 193 million. In contrast, in sub-Saharan Africa and the near East and North Africa, there is likely to be little or no decline in the numbers of undernourished people, although the proportion will approximately halve (Table 3.3 and Fig. 3.2).

**Fig. 3.2.**  
**Number of Undernourished People by Region, 1990-92 to 2030**



**Map 3.1**  
**Depicting Regions as per Fig. 3.2**



-  Latin America & Caribbean
-  South Asia
-  East Asia
-  Near East & North Africa
-  Sub Saharan Africa



**Table 3.3**  
**Number of undernourished people by region, 1990-92 to 2030**

Developing countries	Million people			
	1990-92	1997-99	2015	2030
Sub-Saharan Africa	168	194	205	183
Near East and North Africa	25	32	37	34
Latin America and Caribbean	59	54	40	25
South Asia	289	303	195	119
East Asia	275	193	135	82

The decline in the numbers of undernourished between now and 2030 will be slow for several reasons<sup>4</sup>:

- \* Rapid population growth means that, although the proportion of undernourished may fall, the absolute number will fall much less and may in a few cases even rise. This is an important factor in sub-Saharan Africa and the near East and North Africa.
- \* Economic growth will not be fast enough.
- \* Several countries start from highly adverse conditions, namely low national average food consumption, high incidence of undernourishment and high projected population growth.
- \* In countries where average food intake is currently low and the majority of people are hungry, reducing inequality of access to food has only a small impact on levels of undernourishment.
- \* In the future the threshold for defining undernourishment will rise, as ageing reduces the proportion of children in the population.

The number of undernourished can be reduced more rapidly by affording increased priority to agriculture; increasing national food production and reducing inequality of access to food. These three measures should be combined with continuing interventions to cope with the consequences of local food crises, until the root causes of undernourishment have been removed.

## PROSPECTS BY MAJOR SECTOR

### Crop Production

#### *Cereals: an extra billion tonnes needed*

Cereals are still by far the world's most important sources of food, both for direct human consumption and indirectly, as inputs to livestock production. What happens in the cereal sector is therefore crucial to world food supplies.

Since the mid-1960s the world has managed to raise cereal production by almost a billion tonnes. Over the next 30 years it must do so again.

#### *Growth of cereal demand slows down*

The growth rate of world demand for cereals fell to 1 percent a year in the 1990s, down from 1.9 percent in the 1980s and 2.5 percent in the 1970s. World annual cereal use per person (including animal feeds) peaked in the mid-1980s at 334 kg and has since fallen to 317 kg (1997-99 average).

This rapid decline was thought by some to herald a new world food crisis. It was interpreted as a sign that the world was hitting the limits of its capacity for food production and would soon experience serious threats to food security. The slow down in the growth of world consumption was due not to production constraints but to a series of factors that limited demand. Among these factors, some are ongoing and widespread:

- \* World population growth has been showing.
- \* Many large countries, especially China, are reaching medium to high consumption level such that further rises will be much less rapid than in the past.
- \* Persistent poverty has prevented hundreds of millions of people from meeting their food needs.

Other factors, however, are largely transient. These include:

- \* A fall in demand in the transition economies.

- \* The use of cereals for animal feeds in the EU declined until the early 1990s, as high domestic prices favoured cereal substitutes, which were largely imported. Growth in feed use resumed after EU policy reforms lowered domestic prices.
- \* Consumption grew more slowly in oil-exporting countries after the effect of the initial boom in oil prices on incomes and cereal imports had largely dissipated.
- \* Demand grew more slowly in the second half of the 1990s in the East Asian economies, which were hit by economic crisis.

Nevertheless, the production task facing world agriculture is massive. By 2030, an extra billion tonnes of cereals will be needed each year. Unforeseeable events such as oil price booms, dramatic growth spurts or crises could, of course, after effective demand over short periods, but will not greatly change the big picture (Table 3.4 and Fig. 3.3).

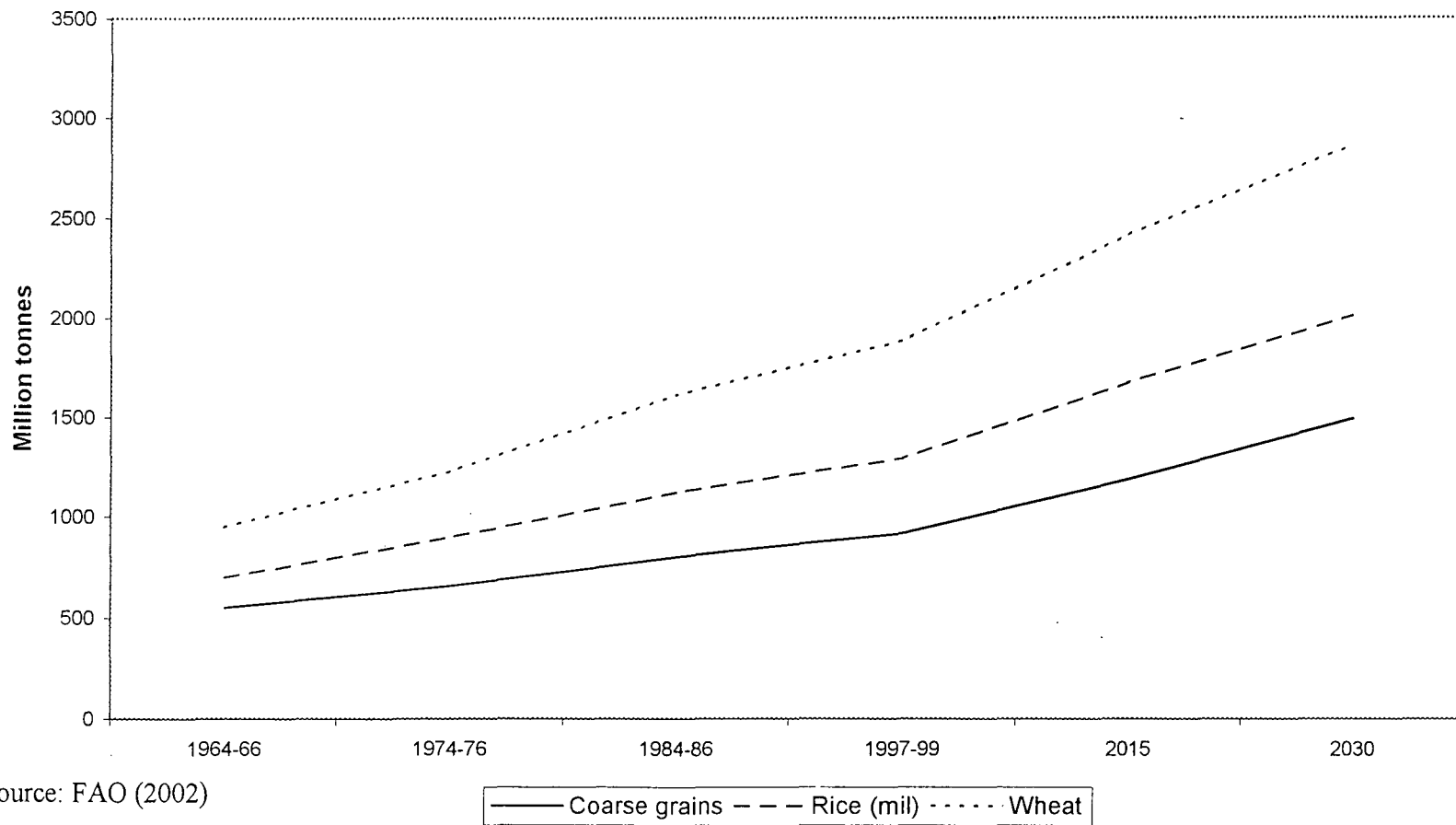
**Table 3.4**  
**World Demand for Cereals, 1965 to 2030**

Year	Demand (million tonnes)		
	Coarse grains	Rice (million)	Wheat
1964-66	550	700	950
1974-76	660	900	1230
1984-86	800	1120	1610
1997-99	920	1290	1880
2015	1185	1670	2410
2030	1490	2005	2860

***Developing countries will become more dependent on imports***

In the developing countries the demand for cereals has grown faster than production. The net cereal imports of these countries rose from 39 million tonnes a year in the mid-1970s to 103 million tonnes a year in the mid-1970s to

**Fig. 3.3**  
**World Demand for Cereals, 1965 to 2030**



103 million tonnes in 1997-99, representing a move from 4 percent of their annual cereal use to 9 percent. This dependence on imports is likely to increase in the years ahead. If raw food prices do not rise, and industry and services grow as previously, then most countries will be able to afford to import cereals to meet their needs. However, the poorest countries with the worst food security also tend to be least able to pay for imports.

### *Exporters can fill the gap*

Can the rest of the world produce the export surpluses needed to fill the gap? It is worth examining the experience of the past quarter century. Between the mid-1970s and 1997-99 the net annual imports of all cereal-importing countries almost doubled, from 89 million tonnes to 167 million tonnes. Cereal exporters coped well with the spurt in demand, doubling their export levels. Traditional exporters such as Australia, North America, Argentina and Uruguay played their part. They have the potential to continue to do so. But about half the total increase in exports came from a new player, the EU. From being a net importer of 21 million tonnes of grain a year in the mid-1970s, the EU became a net exporter of 24 million tonnes a year in 1997-99. Initially, much of this turnaround depended on heavy price support and protectionist policies. Various EU policy reforms have since brought domestic prices broadly in line with international prices, but the EU is likely to remain a significant net exporter even if its trade is further liberalized.

The transition economies are another possible source of future exports. Indeed, they are already moving into surplus. Spare land is plentiful in parts of Eastern Europe and Russia, and the scope for increasing productivity by reducing losses and raising yields is high.

## **Prospects for Key Crops**

### **Food staples**

#### *Wheat*

The world's major cereal crop accounted for 31 percent of global cereal consumption in 1997-99. A growing share of wheat is used for animal feed in the industrial countries – 45 percent of total use in the EU. Wheat use per person in developing countries, overwhelmingly for food, has continued to rise, and most developing countries are increasingly dependent on imports. Among the net importers are some major wheat producers, such as Egypt, Islamic Republic of Iran, Mexico and Brazil. Over the coming years wheat consumption is expected to increase in all regions, including the transition countries as their consumption revives. In several rice-eating countries, increases in wheat consumption go hand in hand with constant or declining consumption of rice. The import dependence of developing countries should continue to grow, from the present level of about 80 million tonnes or year.

#### *Rice*

This crop is overwhelmingly used for direct human consumption, and made up 21 percent of the world's cereal consumption by weight in 1997-99. Average consumption per person in developing countries has been levelling off since the mid-1980s, reflecting economic development and income growth in major East Asian countries. It has, however, been growing in some regions, including South Asia, where it is still low. Consumption is expected to grow more slowly in the future than in the past.

#### *Coarse grains*

These include maize, sorghum, barley, rye, oats and millet, and some regionally important grains such as tef (Ethiopia) or quinoa (Bolivia and Ecuador). About three-fifths of world consumption of coarse grains is used for animal feed, but where food insecurity is high these crops remain very

important in direct human consumption in sub-Saharan Africa, 80 percent of the grain harvest is used in this way. Consumption of coarse grains has been rising fast, driven mainly by growing use as animal feed in developing countries. In the future, consumption may well grow faster than that of rice or wheat, in line with the growth of the livestock sector.

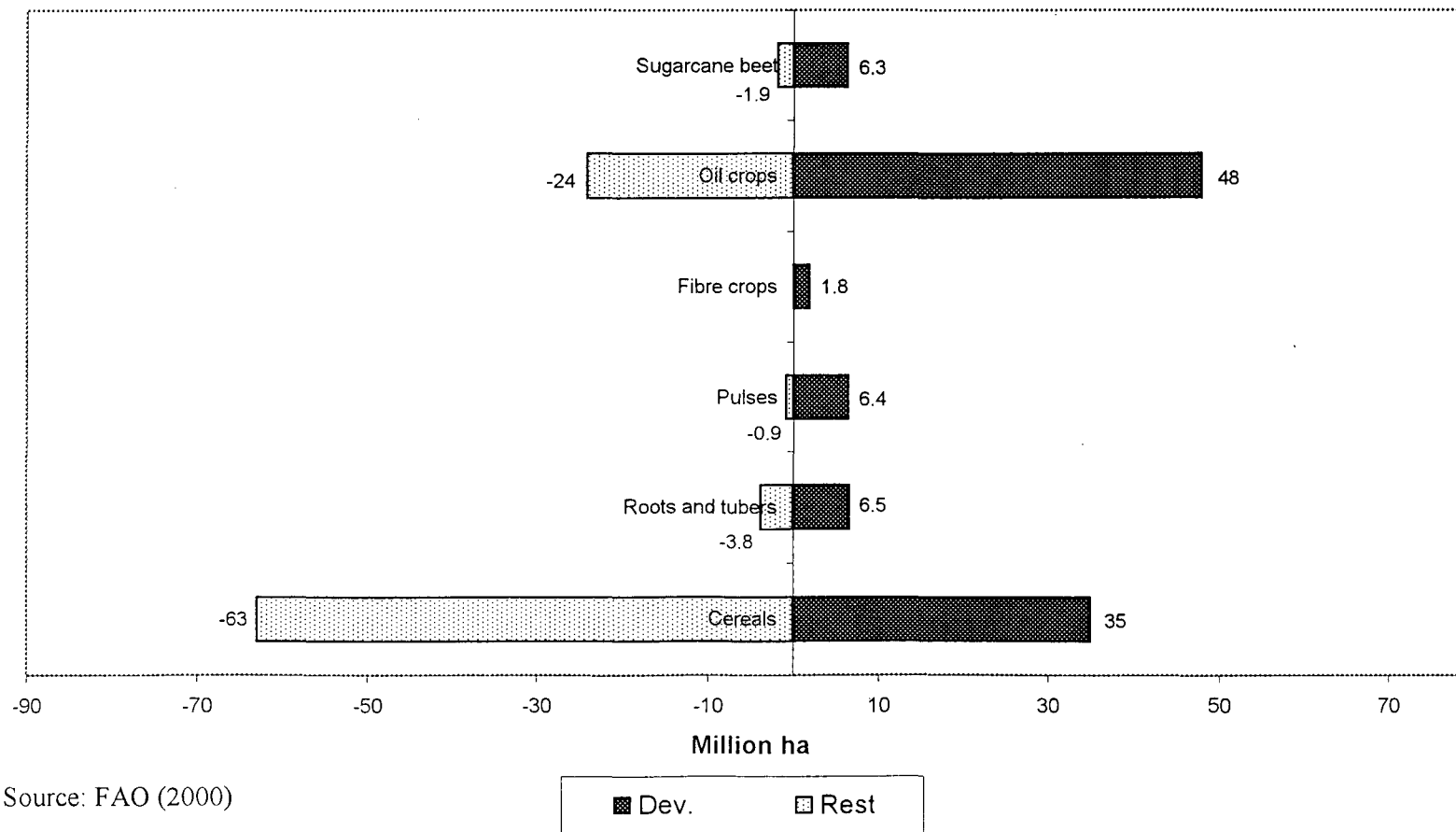
### *Oil crops*

This sector has been one of the world's most dynamic in recent decades, growing at almost double the speed of world agriculture as a whole. It covers a wide range of crops used only for oil but also for direct consumption, animal feeds and a number of industrial uses. Oil palm, soybean, sunflower and rapeseed account for almost three-quarters of world oilseed production, but olive oil, groundnut, sesame and coconut are also significant. The rapid expansion of production has meant that oil crops have accounted for a huge share of the expansion of the world's agriculture land, with a net increase of 75 million ha between 1974-76 and 1997-99 – this at a time when the area under cereals shrank by 28 million ha. With their high energy content, oil crops have played a key role in improving food energy supplies in developing countries. Just over one out of every five kilo calories added to consumption in the developing countries in the past two decades originated in this group of products. The rapid growth in consumption over the past few decades was accompanied by the emergence of several developing countries – China, India, Mexico and Pakistan, among others – as major and growing net importers of vegetable oils. The result has been that the traditional surplus of the vegetable oils / oilseeds complex in the balance of payments of the developing countries has turned into or deficit in recent years (Table 3.5 and Fig. 3.4).

### *Roots, tubers and plantains*

World consumption of these crops as human food has been on the decline, but for 19 countries – all of them in Africa – they still provide more than a fifth, and sometimes as much as half, of all food energy. Since most of

**Fig. 3.4**  
**Expansion of Area Cultivated by Crop, 1974-76 to 1997-99**





these countries have low food consumption overall less than 2200 kcal per person per day – these crops play a crucial role in food security.

**Table 3.5**  
**Expansion of area cultivated by crop, 1974-76 to 1997-99.**

Crops	Million hac.	
	Dev.	Rest
Cereals	+35	-63
Roots and tubers	+6.5	-3.8
Pulses	+6.4	-0.9
Fibre crops	+1.8	-
Oil crops	+48	+24
Sugarcane + beet	+6.3	-1.9

### **Traditional Export Crops**

Beyond these basic food crops, the agriculture and often the whole economy of many developing countries depend to a high degree on the production of one or a few commodities destined principally for export. In this category are commodities such as banana, sugar, natural rubber and tropical beverages (tea, coffee and cocoa). The distinction between export crops and those for the domestic market is not always neat, either across or even within the developing countries. For example, sugar is the export crop par excellence for Mauritius and Cuba but a major import for Egypt, Indonesia and several other countries. The economies of countries dependent on exports of these commodities are subject to changing conditions in the world market. Slow growth in world demand, combined with increasing supplies from the main producing and exporting countries, which compete with one another, have led to declining and widely fluctuating prices in the markets for several commodities.

Looking into the future, the scope for growth in world demand and in the exports of developing countries is greatest for those commodities whose consumption is growing fairly rapidly in the developing countries themselves, several of which are likely to become large importers. In this category belong sugar and vegetable oils and, to a lesser extent natural rubber and tea.

In conclusion, the agriculture, overall economy and food security of several developing countries will continue to depend on several crops for which the world market conditions are not only volatile but also, on balance, on a declining trend as regards real prices. These characteristics of the market could be highly detrimental to the development prospects of these countries. They need to diversify to face this challenge.

### **The scares that went away**

Two countries, China and India, have been the focus of fears that the world might run into serious food shortages. Together they are home to over a third of the world's population. Some analysts feared that China would become a permanent importer on an ever increasing scale. This would raise food prices on the world market, reducing the ability of other poor countries and people to buy food. China was a large importer of cereals in most years up to 1991, with typical net imports of 5 to 15 million tonnes a year. However, in the 1990s the country turned this situation around. In all but two of the eight years from 1992 to 1999, China was a net exporter of cereals, even while domestic use rose from 295 to 310 kg per person per year.

In the 1960s and early 1970s it became common place to warn of impending famine in India and in South Asia as a whole. In the mid-1960s the region imported 10 million tonnes of cereals a year – 11 percent of its consumption – but even so its cereal use per person was low, only 146 kg per year. Thirty-three years on, the region's population had doubled and cereal use had risen to 163 kg per person per year. Yet thanks to the green revolution, imports were only a third of their mid-1960s levels, running at less than 2

percent of consumption. India had become a small net exporter in most years since the late 1970s. However, per capita use is still low in the region, reflecting, among other things, the persistence of widespread poverty and the very low use of cereals as feed, given the low consumption of meat. If consumption had grown faster, it is an open question whether imports would have been contained at such low levels.

### **The environmental issues must be addressed**

A frequently voiced concern is that the additional production required to meet world demand will be unsustainable, involving deepening levels of environmental damage that will undermine the natural resource base. In the developed countries this concern relates mainly to the increased use of fertilizers and other chemical inputs. Past increases have led to serious problems of water and air pollution, and so will future ones unless counter-measures are taken.

Although the overuse of pesticides and other chemical inputs is a problem in some high potential areas, increasing production in the developing world for the most part entails environmental risks of a different kind:

- \* In extensive farming and ranching systems, the major risks are soil erosion, soil mining and deforestation, leading to declining yields and desertification.
- \* In intensive irrigated farming systems, the major risks are salinization, water logging and water scarcities.

Some methods for increasing and sustaining crop production while minimizing environmental damage are already known and practiced in some areas. Such methods need to be researched and extended for all environments, with appropriate policies that will encourage their rapid spread also being devised and implemented.

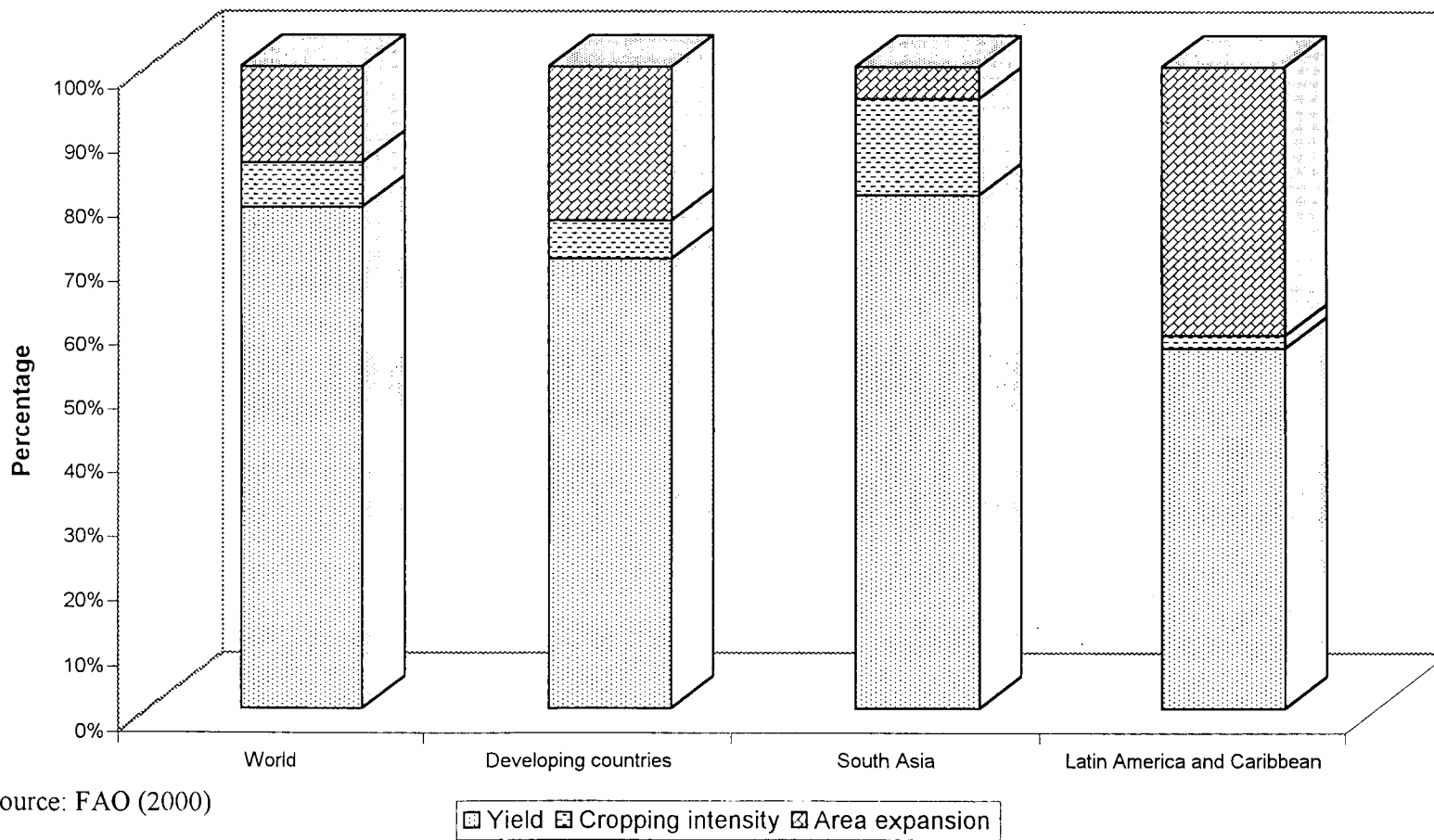
## **Land, water and crop yields**

Although future demand for food and each crops will grow more slowly than in the past, meeting this demand will still require the continued expansion of farmland, together with improvements in yield based on new plant varieties and farming technologies. Questions have been raised about all of these factors. Is there enough suitable land and water to expand the rainfed and irrigated area as much as will be needed, or is the world running short of these vital inputs? Is there scope for the higher yields that will be required, or are yields approaching limits that cannot be breached? Can biotechnology deliver or new generation of higher yielding crops better suited to difficult environments? And are there approaches to farming that can increase and sustain production while improving conservation? The following sections will examine these questions.

### **The sources of production growth**

Increases in crop production derive from three main sources: expansion of arable land, increases in cropping intensity (the frequency with which crops are harvested from a given area) and improvements in yield. Since the early 1960s, yield improvements have been by far the largest source of increase in world crop production, accounting for almost 78 percent of the increase between 1961 and 1999. A further 7 percent of the increase came from increased cropping intensity, while a mere 15 percent came from the expansion of the arable area. Yield improvement was by far the largest factor not just in the developed world but also in the developing countries, where it accounted for 70 percent of increased production. Expansion of the area cultivated accounted for just under a quarter of production growth in these countries. However, in areas with more abundant land, area expansion was a larger contributing factor. This was especially the case in sub-Saharan Africa, where it accounted for 35 percent, and in Latin America, where the figure reached 46 percent (Table 3.6 and Fig. 3.5).

Fig. 3.5.  
Sources of Growth in Production, 1961 to 1999



Source: FAO (2000)

**Table 3.6**  
**Sources of Growth in Production, 1961 to 1999**

	Yield	Cropping intensity	Area expansion
World	78	7	15
Developing countries	70	6	24
South Asia	80	15	5
Latin America and Caribbean	56	2	42

## LAND RESOURCES

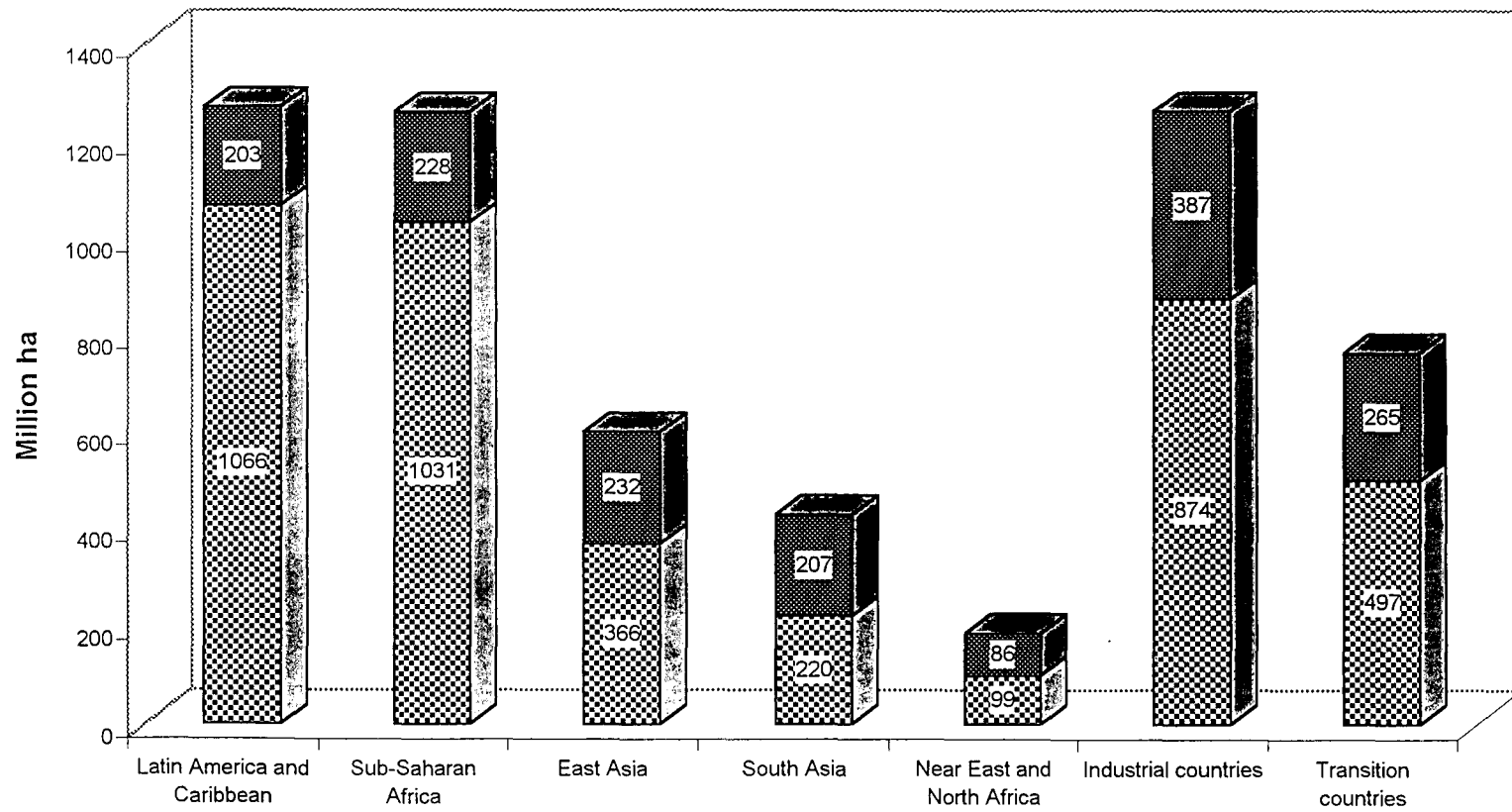
### Is there enough potential cropland for future needs?

It is often suggested that the world may be heading towards shortages of suitable agricultural land. This will not be the case at the global level, although in some regions and areas there are already serious shortages, and these may worsen. Less new agricultural land will be opened up than in the past. Over the period 1961-63 to 1997-99 the expansion of arable land in developing countries totalled 172 million ha, an increase of 25 percent. A slowdown in expansion is expected in all regions, but this is mainly a reflection of the slower growth in demand for crops.

There is still potential agricultural land that is as yet unused. At present some 1.5 billion ha of land is used for arable and permanent crops, around 11 percent of the world's surface area. A new assessment by FAO and the International Institute for Applied Systems Analysis (IIASA)<sup>5</sup> of soils, terrains and climates compared with the needs of and for major crops suggests that a further 2.8 billion ha are to some degree suitable for rainfed production. This is almost twice as much as is currently formed (Table 3.7 and Fig. 3.6).

The pool of unused suitable cropland is very unevenly distributed. By the end of the twentieth century, sub-Saharan Africa and Latin America were still farming only around a fifth of their potentially suitable cropland. More than half the remaining global land balance was in just seven countries in these

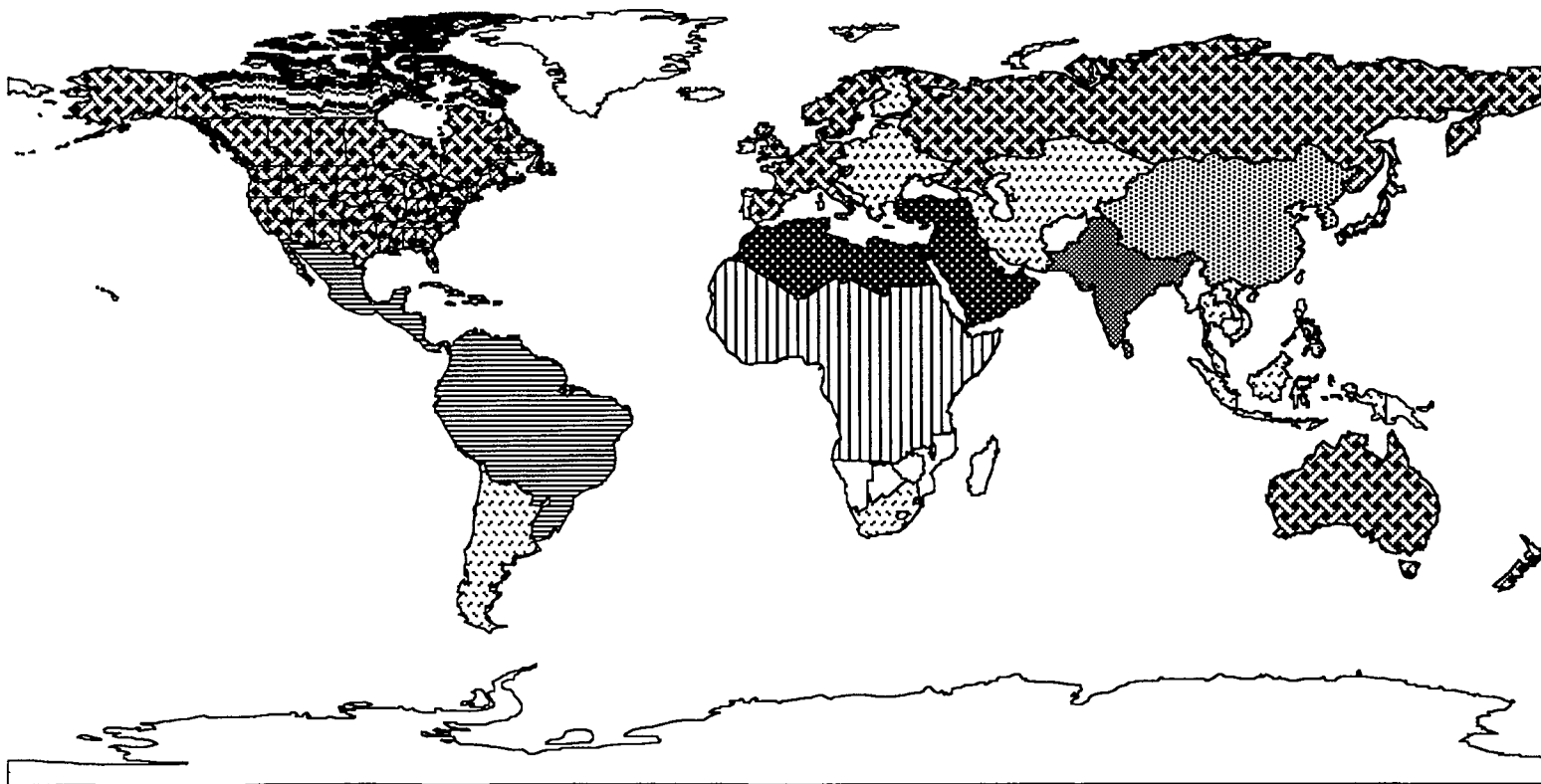
**Fig. 3.6.**  
**Cropland in Use and Total Suitable Land**



Source: FAO (2000), and Fischer et al (2000)

▨ Total suitable for rainfed crop production ■ Arable land in use

**Map 3.2**  
**Depicting Regions as per Fig. 3.6**



-  Transition countries
-  Industrial countries
-  Latin America & Caribbean
-  South Asia
-  East Asia
-  Near East & North Africa
-  Sub Saharan Africa



two regions: Angola, Argentina, Bolivia, Brazil, Colombia, Democratic Republic of Congo and the Sudan. At the other extreme, in the near East and North Africa 87 percent of suitable land was already being formed, while in South Asia the figure was no less than 94 percent. In a few countries of the near East and North Africa, the land balance is negative – that is, more land is being cropped than is suitable for rainfed cropping. This is possible where, for example, land that is too sloping or too dry for rainfed crops has been brought into production by terracing or irrigation.

**Table 3.7**  
**Cropland in Use and Total Suitable Land (million ha)**

	Total suitable for rainfed crop production	Arable land in use
Latin America and Caribbean	1066	203
Sub-Saharan Africa	1031	228
East Asia	366	232
South Asia	220	207
Near East and North Africa	99	86
Industrial countries	874	387
Transition countries	497	265

Source: FAO data and Fischer et al. (2000)

### **Is land becoming scarcer?**

There is widespread concern that the world may be running out of agricultural land. The trend towards scarcity associated with population growth is aggravated by the conversion of farmland to urban uses, by land degradation and by other factors. Despite these losses, there is little evidence to suggest that global land scarcities lie ahead. Between the early 1960s and the late 1990s, world cropland grew by only 11 percent, while world population almost doubled. As a result, cropland per person fell by 40 percent, from 0.43 ha to only 0.26 ha. Yet, over this same period, nutrition levels improved considerably and the real price of food declined<sup>6</sup>. The explanation for this paradox is that productivity growth reduced the amount of land needed to

produce a given amount of food by around 56 percent over this same period. This reduction, made possible by increases in yields and cropping intensities, more than matched the decline in area per person, allowing food production to increase. Land scarcity and the problems associated with it do of course exist at country and local levels, with serious consequences for poverty and food security. In many places these are likely to worsen unless remedial action is taken.

### **Irrigation and water resources**

A large share of the world's crops is already produced under irrigation. In 1997-99, irrigated land made up only about one-fifth of the total arable area in developing countries. However, because of higher yields and more frequent crops, it accounted for two-fifths of all crop production and close to three-fifths of cereal production. Since the early 1960s, no less than 100 million ha of new irrigated land have been created and the figure for the developing countries as a whole reached 202 million ha in 1997-99. The developed countries account for around a quarter of the world's irrigated area. Irrigation in this group of countries grew very rapidly in the 1970s but by the 1990s the pace of growth had slowed to only 0.3 percent per year.

### **Is there enough irrigable land for future needs**

As with land in general, it has been suggested that the world may soon experience shortages of land suitable for irrigation. Once again, at global level these fears seem exaggerated, though serious problems may occur at local level. The total irrigation potential in developing countries is nevertheless estimated at some 402 million ha. Of this around half was in use in 1997-99, leaving an unused potential of 200 million ha. The chances of taking this into use in the near future would be at a very slow pace. In some regions, however, irrigation will come much closer to its full potential: by 2030, East Asia and the near East and North Africa will be using three-quarters of their irrigable area, and South Asia (excluding India) almost 90 percent.

### Is these enough water

Another frequently voiced concern is that much of the world is heading for water shortages. Since agriculture is responsible for about 70 percent of all the water withdrawn for human use, it is feared that this will affect the future of food production. Once again, at global level there seems to be no cause for alarm, but at the level of some localities, countries and regions, serious water shortages appear highly likely to arise. There are large regional differences in water use efficiency. Generally, efficiency is higher where water availability is lower: in Latin America, for example, it is only 25 percent, compared with 40 percent in the near East and North Africa and 44 percent in South Asia. In the developing countries as a whole, only about 7 percent of renewable water resources were withdrawn for irrigation in 1997-99. But because of differences in efficiency and in water availability, some regions were using a much higher proportion than others. In sub-Saharan Africa, where irrigation is less widespread only 2 percent were used, and in water rich Latin America a mere percent. In contrast, the figure in South Asia was 36 percent and in the near East and North Africa no less than 53 percent (Table 3.8 and Fig. 3.7).

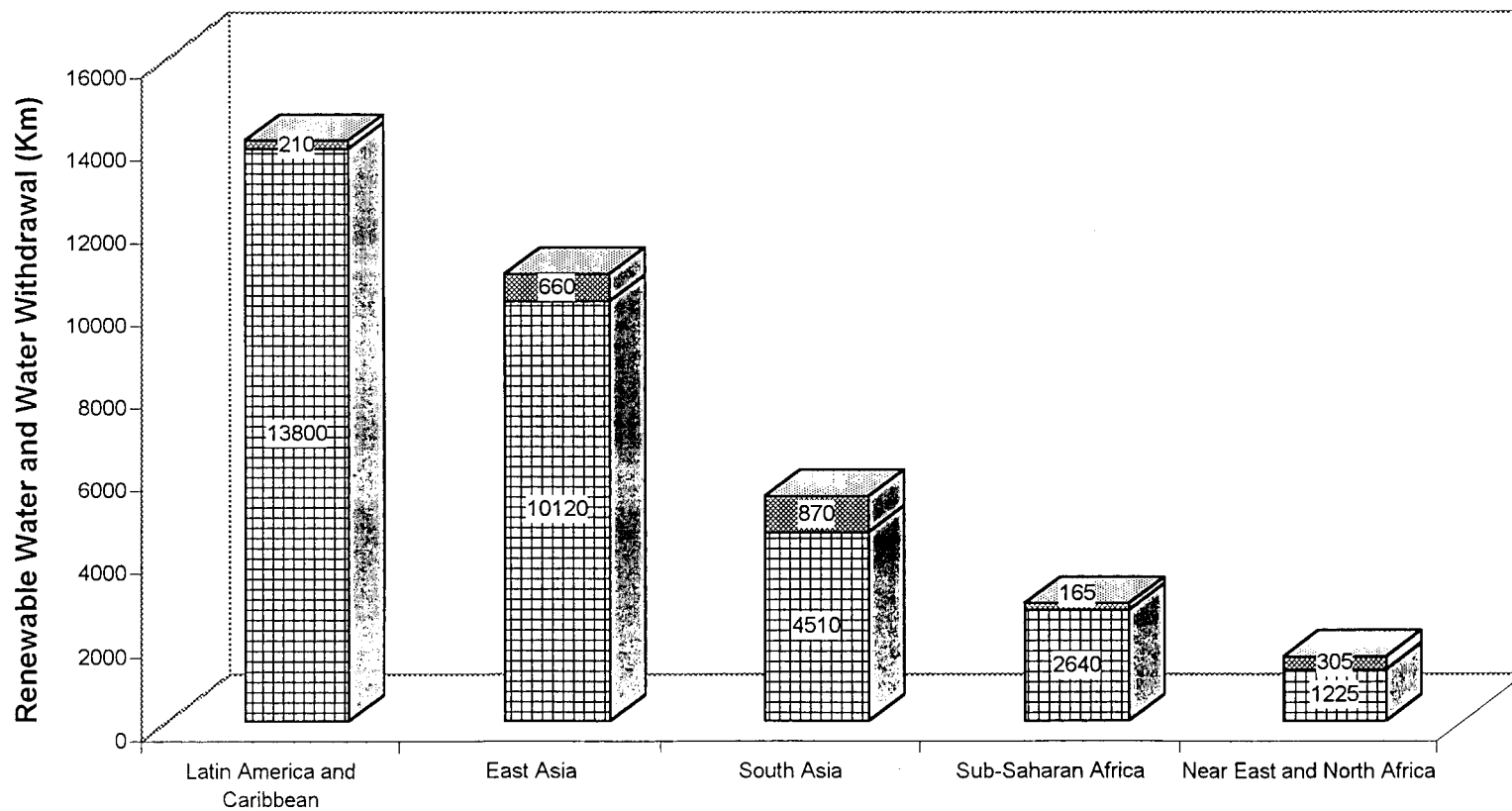
**Table 3.8**  
**Irrigation and Water Resources, 1997-99**

	Renewable water resources	Water withdrawal 1997-99
Latin America and Caribbean	13800	210
East Asia	10120	660
South Asia	4510	870
Sub-Saharan Africa	2640	165
Near East and North Africa	1225	305

### Potential for yield growth

Most future increases in crop production will be achieved through improved yields. Yield advances have been uneven over the past three decades. Global cereal yields grew rapidly between 1961 and 1999, averaging 2.1

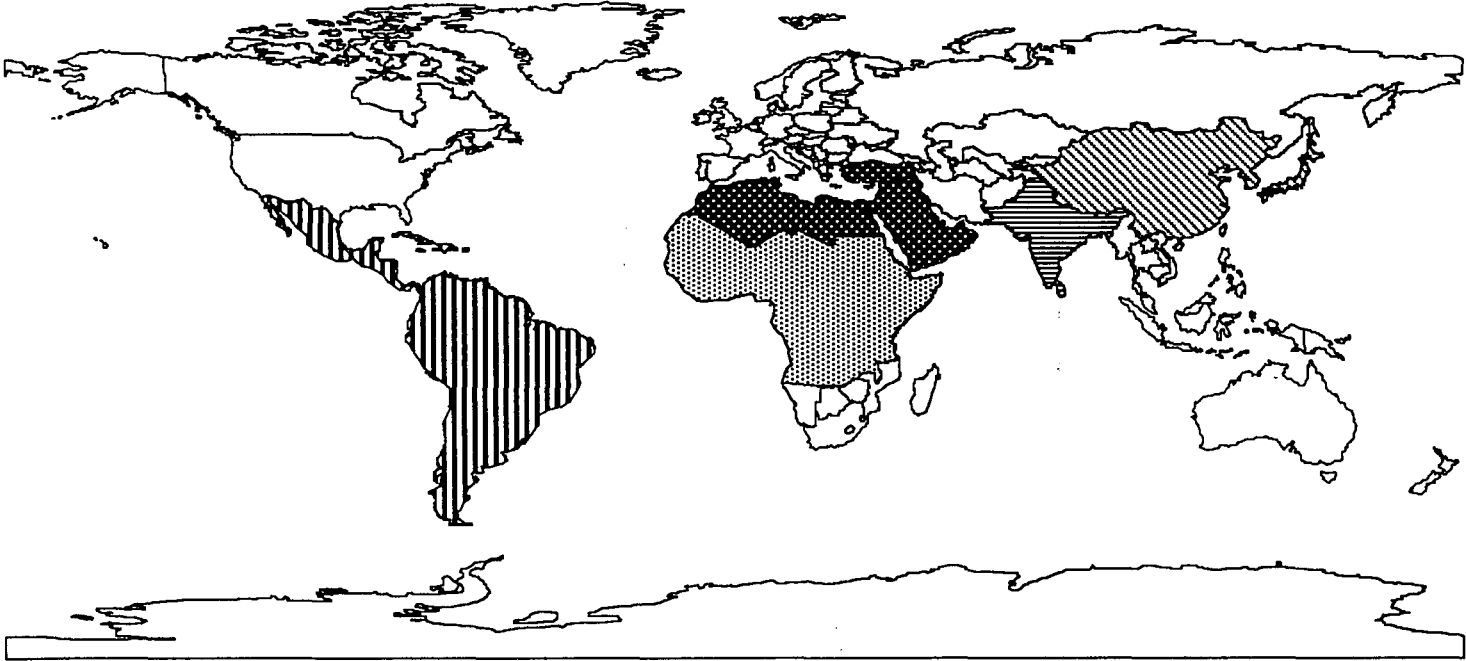
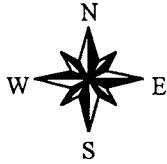
Fig. 3.7.  
Irrigation and Water Resources, 1997-99



Source: FAO (2000)

□ Renewable water resources    ▒ Water withdrawal 1997-99

**Map 3.3**  
**Depicting Regions as per Fig 3.7**



-  Latin America & Caribbean
-  South Asia
-  East Asia
-  Near East
-  Sub Saharan Africa

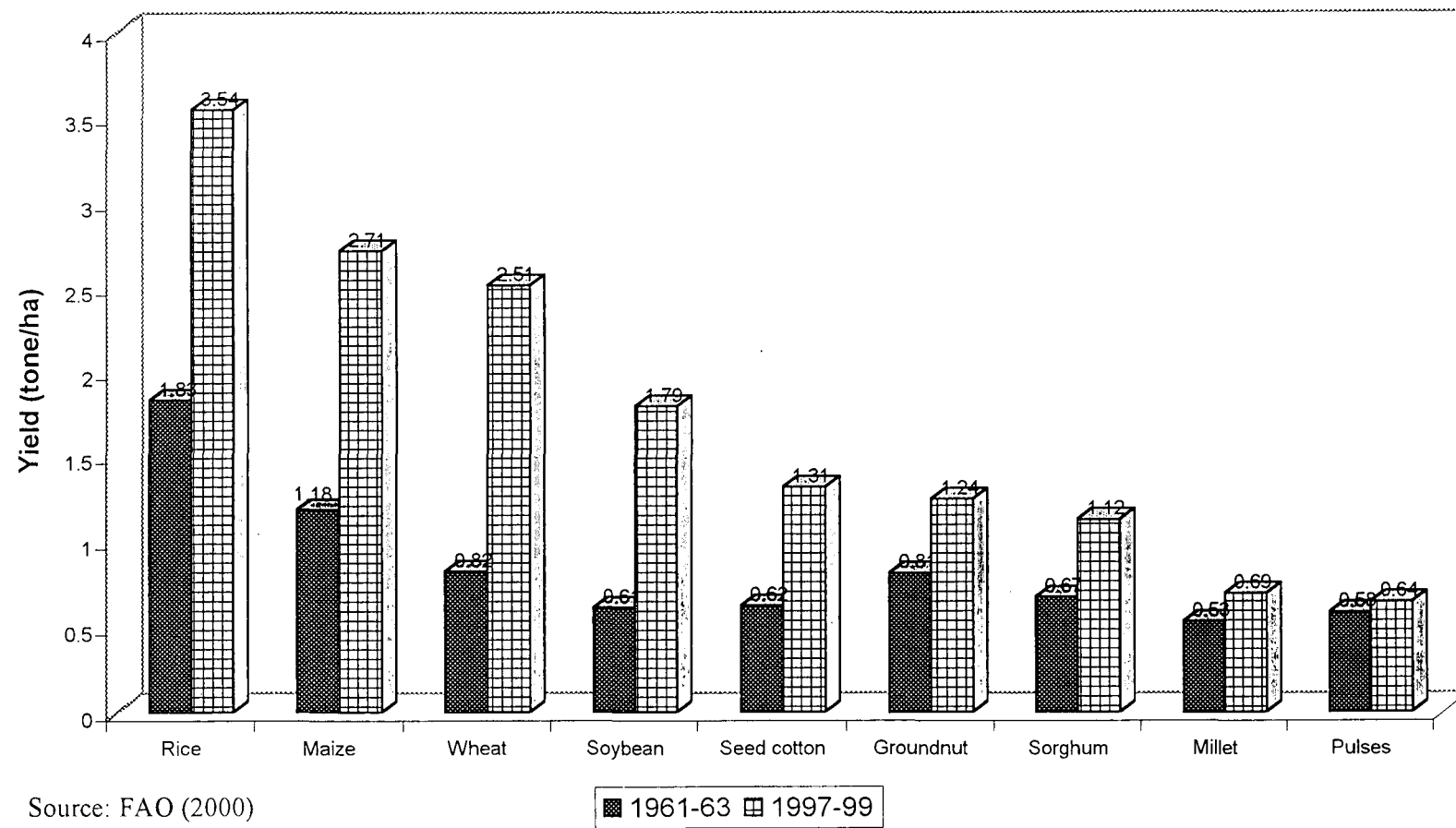
percent a year. Thanks to the green revaluation, they grew even faster in developing countries, at an average rate of 2.5 percent a year. The fastest growth rates were achieved for wheat, rice and maize which as the world's most important food staples, have been the major focus of international breeding efforts. Yields of the major cash crops, soybean and cotton, also grew rapidly. At the other end of the scale, yields of millet, sorghum and pulses saw only slow growth. These crops, grown mainly by resource-poor farmers in semi-arid areas, are ones for which international research has not so far come up with varieties that deliver large yield gains under farm conditions. Overall growth in cereal yields slowed in the 1990s. Maize yields in developing countries maintained their upward momentum, but gains in wheat and rice slowed markedly. Wheat yields grew at an average of 3.8 percent per year between 1961 and 1989, but at only 2 percent a year in 1989 to 1999. For rice the respective rates fell by more than half, from 2.3 percent to 1.1 percent. This largely reflects the slower growth in demand for these products (Table 3.9 and Fig. 3.8).

**Table 3.9**  
**Crop Yields in Developing Countries, 1961-63 to 1997-99**

Crop	Yield tonnes/hac	
	1961-63	1997-99
Rice	1.83	3.54
Maize	1.18	2.71
Wheat	0.82	2.51
Soybean	0.61	1.79
Seed cotton	0.62	1.31
Groundnut	0.81	1.24
Sorghum	0.67	1.12
Millet	0.53	0.69
Pulses	0.58	0.64

Source: FAO data

Fig. 3.8  
Crop Yields in Developing Countries, 1961-63 to 1997-99



Source: FAO (2000)

Nevertheless, increased yields will be required. One way of judging is to look at the difference in performance between groups of countries. Some developing countries have attained very high crop yields. In 1997-99, for example, the top performing 10 percent had average wheat yields more than six times higher than those of the worst performing 10 percent and twice as high as the average in the largest producers, China, India and Turkey. For rice the gaps were roughly similar. National yield differences like these are due to two main sets of causes<sup>7</sup>.

- \* Some of the differences are due to differing conditions of soil, climate and slope. Yield gaps of this kind, caused by agro-ecological differences, cannot be narrowed.
- \* Other parts of the yield gap, however, are the result of differences in crop management practices, such as the amount of fertilizer used. These gaps can be narrowed, if it is economic for farmers to do so.

## **THE ROLE OF TECHNOLOGY**

The development and dissemination of new technology is an important factor determining the future of agriculture, the major provider of food. My study investigates three areas that are particularly critical, namely biotechnology, technologies in support of sustainable agriculture, and the directions that should be taken by future research.

### **Biotechnology: issues and prospects**

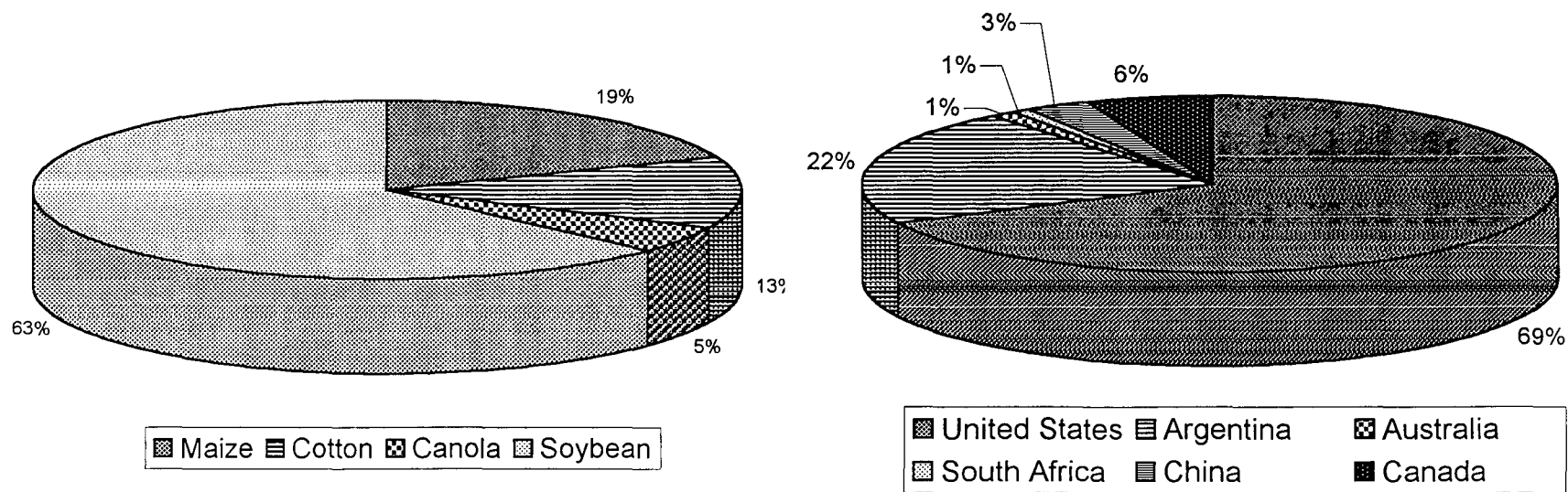
For thousands of years, human beings have been engaged in improving the crops and animals they raise. Over the past 150 years, scientists have assisted their efforts by developing and refining the techniques of selection and breeding. Though considerable progress has been achieved, conventional selection and breeding are time-consuming and bear technical limitations. Modern biotechnology has the potential to speed up the development and deployment of improved crops and animals. Genetic engineering – manipulating an organism's genome by introducing or eliminating specific genes – helps transfer desired traits between plants more quickly and accurately



than is possible in conventional breeding. This technique promises considerable benefits but has also aroused widespread public concerns. These include ethical misgivings, anxieties about food and environmental safety, and fears about the concentration of economic power and technological divide between developed and developing countries. The spread of genetically modified (GM) crops has been rapid. Their area increased by a factor of 30 over the 5 years to 2001, when they covered more than 52 million ha. Considerable research to develop more GM varieties is under way in some developing countries. China for instance, is reported to have the second largest biotechnology research capacity after the United States. However, the spread so far is geographically very limited. Just four countries account for 99 percent of the global GM crop area: the United States with 35.7 million ha, Argentina with 11.8 million ha, Canada with 3.2 million ha and China with 1.5 million ha (Fig. 3.9). The number and type of crops and applications involved is also limited: two thirds of the GM area is planted to herbicide – tolerant crops. All commercially grown GM crops are currently either non-food crops (cotton) or are heavily used in animal feed (soybean and maize)<sup>8</sup>.

Globally, agricultural production could probably meet expected demand over the period to 2030 even without major advances in biotechnology. However, biotechnology could be a major tool in the fight against hunger and poverty, especially in developing countries. Because it may deliver solutions where conventional breeding approaches have failed, it could greatly assist the development of crop varieties able to thrive in the difficult environments where many of the world's poor live and farm. Some promising results have already been achieved in the development of varieties with complex traits such as resistance or tolerance to drought, soil salinity, insect pests and diseases, helping to reduce crop failures. Several applications allow resource-poor farmers to reduce their use of purchased inputs such as pesticides or fertilizers, with benefits to the environment and human health as well as farmers incomes. Most biotechnology is generated and controlled by large private-sector

**Fig. 3.9.**  
**Area of GM Crops for Different Commodities and Countries**



Source: ISAAA (2001)

companies, which have so far mainly targeted the commercial farmers who can afford their products. Nevertheless, there is some public sector work directed towards the needs of resource-poor farmers. In addition, most of the technologies and intermediate products developed through private-sector research could be adapted to solve priority problems in the developing countries. If the poor of these countries are to reap this potential, national and international action is needed to foster private-public partnership at affordable prices. This is the main policy challenge for the future.

The rapid progress made in both generating and extending new biotechnology applications, together with the uncertain public response to these applications, make it difficult to predict the long-term prospects for these technologies, including their impact on future production. The success of Bt cotton in China has paved the way for further expansion of GM crops in this country, which has considerable potential for GM products. China is a major producer of soybean, maize and tobacco—all crops for which GM traits have been developed elsewhere. Wide-scale adoption of GM technology in China could well provide the impetus for other developing countries to follow suit. While the adoption rates for GM technologies in developing countries are likely to rise, they are expected to show in the developed world. This mainly reflects the impressive growth of the past, which limits the remaining potential. GM soybean, for instance, already accounts for two-thirds of the soybean area worldwide and for an even larger share of the area in developed countries. As the global area of such crops expands, other, more sophisticated biotechnology applications may gain importance.

### **Towards sustainable agriculture**

Given a conducive policy environment, the next three decades should see the spread of farming methods that reduce environmental damage while maintaining or even increasing production. In some cases these technologies will also reduce the costs of production. One of these methods currently

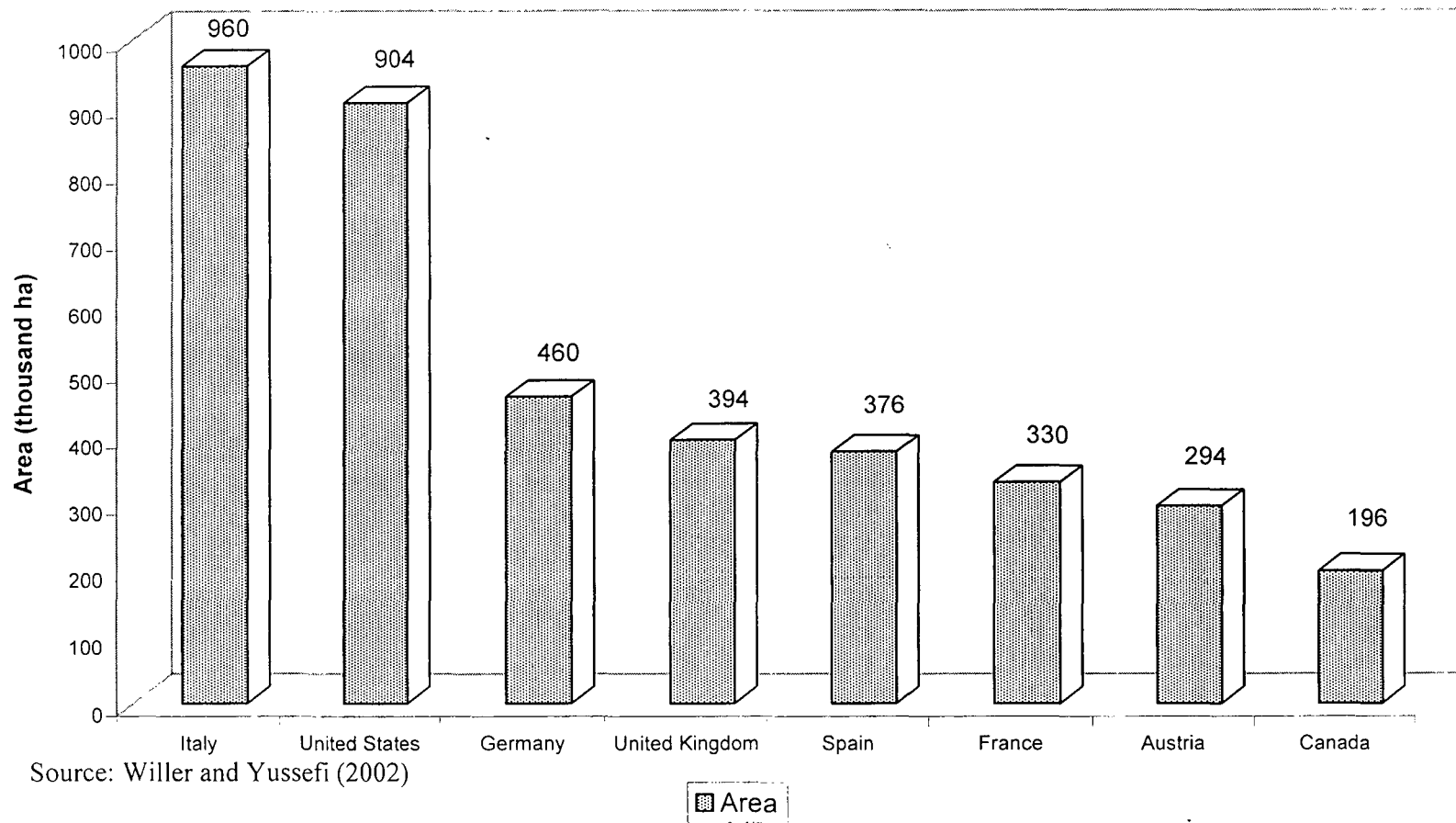
gaining ground around the world is organic agriculture. It is a set of practices in which the use of external inputs is minimized. Synthetic pesticides, chemical fertilizers, synthetic preservatives, pharmaceuticals, GM organisms, sewage sludge and irradiation are all excluded.

Interest in organic agriculture has been boosted by public concerns over pollution, food safety and human and animal health, as well as by the value set on nature and the country side. Consumers in developed countries have shown themselves willing to pay price premiums of 10 to 40 percent for organic produce, while government subsidies have helped to make organic agriculture economically viable. As a result, organic agriculture has expanded rapidly in Western countries. Between 1995 and 2000, the total area of organic land in Europe and the United States tripled, albeit from a very low base. In 2001, some 15.8 million ha were under certified organic agriculture globally. Almost half of this was in Oceania, just under a quarter in Europe and a fifth in Latin America. About two-thirds of the area is organic grassland. As a percentage of total agricultural land, organic agriculture is still modest – an average of 2 percent in Europe. However, many European countries have ambitious targets for expansion, with the result that Western Europe may have around a quarter of its total agricultural land under organic management in the coming three-four decades<sup>9</sup> (Table 3.10 and Fig. 310).

**Table 3.10**  
**Land Area under Organic Management**

Country	Area (thousand ha)
Italy	960
United States	904
Germany	460
United Kingdom	394
Spain	376
France	330
Austria	294
Canada	196

**Fig. 3.10.**  
**Land Area Under Organic Management**



With a number of large supermarket chains now involved, the market for organic foods is booming and potential demand for outstrips supply. In many industrial countries, sales are growing at 15 to 30 percent a year. The total market in 2000 was estimated at almost US\$ 20 billion – still less than 2 percent of total retail food sales in industrial countries but a sizeable increase over the value a decade ago. Demand is expected to continue to grow, perhaps even faster than the 20 percent or so achieved in recent years. The supply short fall offers opportunities for developing countries to fill the gap, especially with out-of-seas produce. In industrial countries, organic agriculture is based on clearly defined methods enforced by inspection and certification bodies. Most developing countries, in contrast, do not yet have their own organic standards and certification systems. In these countries, organic agriculture may in fact be more widespread than in the developed world but is practiced by necessity, since the majority of farmers are unable to afford or cannot obtain modern inputs. Most organic crops for local consumption are sold at the same price as other produce. However, many developing countries are now producing organic commodities in commercial quantities for export to developed country markets. These exports can be expected to increase in the coming years.

Although yields are often 10 to 30 percent lower than in conventional farming, organic agriculture can give excellent profits. In industrial countries, consumer premiums, government subsidies and agritourism boost incomes from organic farms. In developing countries, well-designed organic systems can give better yields, profits and returns on labour than traditional systems. In Madagascar, hundreds of farmers have found they can increase their rice yields fourfold, to as much as 8 tonnes per ha, by using improved organic management practices. In the Philippines, organic rice yields of over 6 tonnes per ha have been recorded. Experience of organic production in low-potential areas such as Northern Potosi (Bolivia), Wardha (India) and Kitale (Kenya) have shown that yields can be doubled or tripled over those obtained using traditional practices. Organic agriculture also has social benefits. It uses cheap,

locally available materials and usually requires more labour, thereby increasing employment opportunities. This is a considerable advantage in areas where, or at times when, there is a labour surplus. By rehabilitating traditional practices and foods, organic agriculture can promote social cohesion<sup>10</sup>.

Certain policy measures are essential if the progress of organic agriculture is to continue. Support for agriculture is increasingly shifting from production goals to environmental and social goals, a trend that could favour organic agriculture. Agreed international standards and accreditation are needed to remove obstacles to trade.

### **Directions for research**

The green revolution has played a key role in the major improvements in food supply over the past 40 years. The yields of rice, wheat and maize in developing countries have risen by 100 to 200 percent since the late 1960s. Yield gains were the primary focus of the green revolution. Breeding and selection led to the development of improved crop varieties, but greatly increased use of inputs, such as fertilizer, pesticides and irrigation water, were needed to get the best out of these varieties. The green revolution achieved its aims not just through research but through or package of methods and inputs pushed by national and international agencies, extension services and private-sector companies<sup>11</sup>. But this first green revolution had its short comings<sup>12</sup>.

It was heavily geared to the world's three leading cereal crops, which were suited to its emphasis on maximizing yields. Other crops, including many that are important in sub-Saharan African, such as cassava, millet, sorghum, banana, groundnut and sweet potato, needed a different approach.

- \* It was suited only to areas with good soils and water supplies, and largely neglected the more marginal rainfed areas with problem soils and uncertain rainfall.
- \* It relied on farmers being able to afford inputs, and did little for poor smallholders with insufficient funds or access to credit.

- \* Finally, it largely ignored the possible environmental consequences of high input use, such as the pollution of water and soils with nitrates and pesticides.

A second, doubly green revolution is now needed. Its goals, as with the first, must include increased productivity. But it must also aim for sustainability – minimizing or reducing the environmental impacts of agriculture – and for equity – making sure that the benefits of research spread to the poor and to marginal areas<sup>13</sup>. Research towards this second green revolution is already underway in some locations. Its first fruits have shown that it can be successful, especially when farmers participate actively in the design and testing of new technology. However, the research effort needs to be greatly strengthened and the challenge of scaling up the results of research has yet to be adequately addressed.

Some of the key questions for researchers are:

- \* Will the technology lead to higher productivity across all farms, soil types and regions, not just well-endowed ones?
- \* How will the technology affect the seasonal and annual stability of production?
- \* How will the technology affect the ecosystem and the sustainability of farming?
- \* Who will be the winners and losers from the technology – and how will it affect the poor?

## **LIVESTOCK: INTENSIFICATION AND ITS RISKS**

Livestock production currently accounts for some 40 percent of the gross value of world agricultural production, and its share is rising. It is the world's largest user of agricultural land, directly as pasture and indirectly through the production of fodder crops and other feedstuffs. In 1999 some 3460 million ha were under permanent pasture – more than twice the area under arable and permanent crops.



Livestock provide not only meat, but dairy products, eggs, wool, hides and other goods. They can be closely integrated into mixed farming systems as consumers of crop by products and sources of organic fertilizer, while larger animals also provide power for ploughing and transport. Livestock has a considerable impact on the environment. Growth of the livestock sector has been a major factor contributing to deforestation in some countries, particularly in Latin America. Overstocking land with grazing animals can cause soil erosion, desertification and the loss of plant biodiversity. Public health hazards are increasing with the intensification of urban and peri-urban livestock production.

The past three decades have been major shifts in human diets. The share of animal products has risen, while that of cereals and other staples has fallen. As incomes rise, people generally prefer to spend a higher share of their food budget on animal protein, so meat and dairy consumption tends to grow faster than that of food crops. As a result, the past three decades have seen buoyant growth in the consumption of livestock products, especially in newly industrializing countries. Annual meat consumption per person in developing countries as a whole more than doubled between 1964-66 and 1997-99, from only 10.2 kg per year to 25.5 kg – a rise of 2.8 percent a year. The overall rise was unevenly spread: in China meat consumption has quadrupled over the past two decades, whereas in sub-Saharan Africa it has remained stagnant, at under 10 kg per person. In developed countries the scope for increased demand is limited. Population growth is slow and the consumption of livestock products is already very high. Total meat consumption in the industrial countries has risen by only 1.3 percent a year over the past ten years. In developing countries the demand for meat has grown rapidly over the past 20 years, at 5.6 percent a year. Over the next two decades this rate is projected to slow by half. Part of this slow down will be due to slower population growth and part of it to the fact that countries which have dominated past increases, such as China and Brazil, have now reached fairly high levels of consumption and so have less scope for

further rises. In India, which will rival China as the most populous country in the world in the 2040s, the growth of meat consumption may be limited by cultural factors in addition to the continued prevalence of low incomes, since many of India's people are likely to remain vegetarians. However, India's consumption of dairy products is projected to continue to rise rapidly, building on the successes achieved over the past 30 years. In sub-Saharan Africa, slow economic growth will limit increases in both meat and dairy consumption<sup>14</sup>.

A continued shift in production methods can be expected, away from extensive grazing systems and towards more intensive and industrial methods. Grazing on pasture still provides 30 percent of total beef production, but its market share is declining. In South and Central America, grazing is after pursued on land cleared from rainforests, where it fuels soil degradation and further deforestation. In semi-arid environments, overstocking during dry periods frequently brings risks of desertification, although it has been shown that pastures do recover quickly if stock are taken off and good rains return. Mixed farming, in which livestock provide manure and draught power in addition to milk and meat, still predominates for cattle. As population and economies grow, these multipurpose types of farming will tend to give way to more specialized enterprises. More industrial and commercial farms of production will gradually increase in both number and scale. At the beginning of the 21<sup>st</sup> Century, industrial enterprises accounted for 74 percent of the world's total poultry production, 68 percent of its eggs and 40 percent of its pigment. Current trends towards industrial and commercial production could pose a threat to the estimated 675 million rural poor whose livelihoods depend on livestock. Without special measures, the poor will find it harder to compete and may become marginalized descending into still deeper poverty. Yet, if the policy environment is right, the future growth in demand for livestock products could provide an opportunity for poor families to generate additional income and employment. Policy measures that will help the poor enter and stay in the expanding market for livestock products include the provision of low-cost

credit, technical support – especially in animal health and quality matters – and better access to markets through improved infrastructure and institutions.

Biotechnology will have a profound effect on the future of livestock production. Some biotechnology applications are already in use, while others are still under research. Artificial insemination, already routine in developed countries, will spread in developing countries. It can greatly increase the efficiency of animal breeding. The cloning of mammalian cells could also boost productivity and output, particularly for dairy cattle in developed countries. Rapid advances in understanding the genetic make-up of animals will provide additional potential for productivity growth. These applications could prove especially useful in developing countries.

#### **Cereals used as feed: threat or safety valve?**

Globally, some 660 million tonnes of cereals are used as livestock feed each year. This represents just over a third of total world cereal use. This use of cereals is often perceived as a threat to food security, since it appears to remove from the market supplies of essential foods that would otherwise be available to poor countries and families, thereby raising food prices. However, it is important to realize that if these cereals were not used as feed, they would probably not be produced at all, so would not be available as food in any case. The use of cereals as feed may actually help food security. The commercial livestock sector is responsive to the price of cereals: whenever shortages raise prices, livestock producers tend to switch to other feeds, releasing more cereals for food use. As a result, the food use of cereals may contract less than it would have done otherwise. In short, the use of cereals as feed serves as a buffer, protecting food intakes from supply variations. In recent years the use of cereals as feeds has declined in relative terms. One reason is the growing use of cereal substitutes in livestock feed rations. Another is the collapse of the livestock sector in the transition countries, which led to reduced demand for feed in these countries. A third factor is the shift of meat production to poultry, which are much more efficient converters of feed than other livestock species.

## **WORLD FISHERIES: A CHOICE OF FUTURES**

Fisheries play an important role in the world food economy. Worldwide, more than 30 million fisheries and fish farmers and their families gain their livelihoods from fisheries. Most of them are poor artisanal fisher families in developing countries. Globally, fish provide about 16 percent of the animal protein consumed by humans, and are a valuable source of minerals and essential fatty acids. Over the past three decades world production of fish has more than kept pace with human population growth, with the result that the amount of fish available per person has increased. The recent stagnation of capture fisheries has been balanced by the rapid building of aquaculture. Total annual fish production almost doubled between 1970 and 1999, from 65 million tonnes to 125 million tonnes. This rise was the outcome of two contrasting trends.: growth in capture fisheries followed by a levelling off in the 1990s, and dramatic growth in aquaculture during the 1990s. The continuing rise in overall fish production was made possible by the growth of aquaculture at 10 percent per year during the 1990s. The contribution of aquaculture to world fish production doubled over the decade, reaching 26 percent in 1999. So far, aquaculture has been heavily concentrated in Asia, which provided 89 percent of world production in 1999.

The overall increase in fish production has been paralleled by a steady growth in consumption. Fish now account for an average of 30 percent of the animal protein consumed in Asia, approximately 20 percent in Africa and around 10 percent in Latin America and the Caribbean. By 1999 global average intake of fish, crustaceans and molluscs reached 16.3 kg per person, an increase of more than 70 percent over the 1961-63 level. Fisheries are also a significant source of livelihoods. In developed countries, employment in fishing has declined due to improvements in productivity and the collapse of some important fisheries. In contrast, in developing countries fisheries employment has continued to expand. Over 90 percent of the people fully employed in the

fisheries sector in the early 1990s were in the developing or transition economies.

Nearly 40 percent of all fish production is now internationally traded. As a result, fisheries are increasingly seen as a powerful means of generating hard currency. Developing countries' gross earnings from fish exports have grown rapidly, from US\$5.2 billion in 1985 to US\$15.6 billion in 1999, a level that far exceeds earnings from commodities such as coffee, cocoa, banana or rubber.

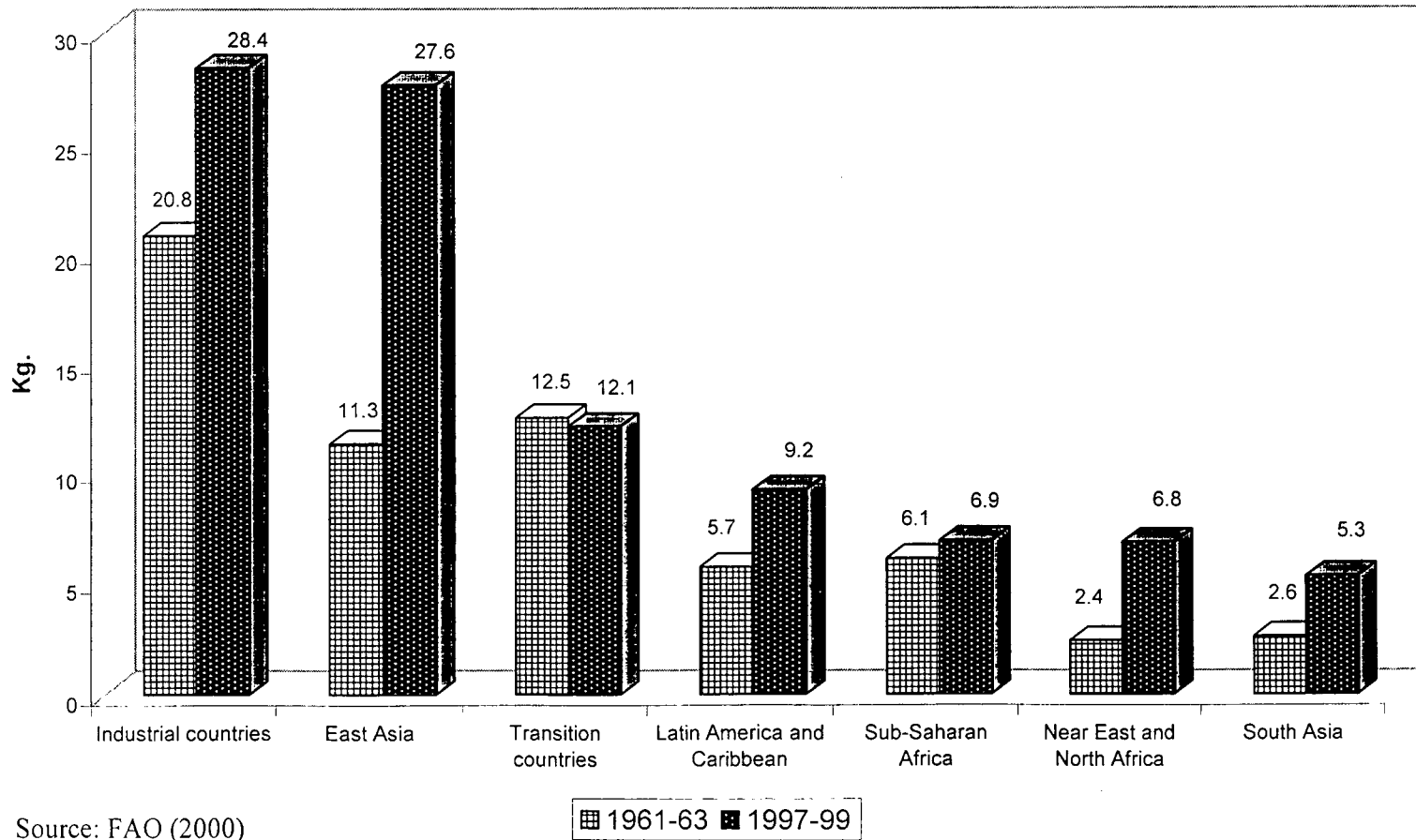
Fish consumption per person is expected to continue to rise. Health and diet quality concerns will boost consumption in North-America, Europe and Oceania, but slow population growth will mean slow increase in overall demand. In sub-Saharan Africa and the near East and North Africa, fish consumption per person may stagnate or even decline, despite current low levels. In Africa, local wild stocks are almost fully exploited and, except in Egypt, aquaculture has barely begun. Per capita demand in South Asia, Latin America and China may increase only gradually, while in the rest of East Asia it will almost double, reaching 40 kg by 2030 (Table 3.11 and Fig. 3.11).

**Table 3.11**  
**Fish Consumption by Region, 1961-63 and 1997-99**

Regions	Kg/Capita	
	1961-63	1997-99
Industrial countries	20.8	28.4
East Asia	11.3	27.6
Transition countries	12.5	12.1
Latin America and Caribbean	5.7	9.2
Sub-Saharan Africa	6.1	6.9
Near East and North Africa	2.4	6.8
South Asia	2.6	5.3

Over the coming decades, the world's fisheries will meet demand by continuing the shift from fish capture to fish cultivation that gained momentum in the 1990s. The share of capture fisheries in world production will continue to

**Fig. 3.11.**  
**Fish Consumption by Region, 1961-63 and 1997-99**

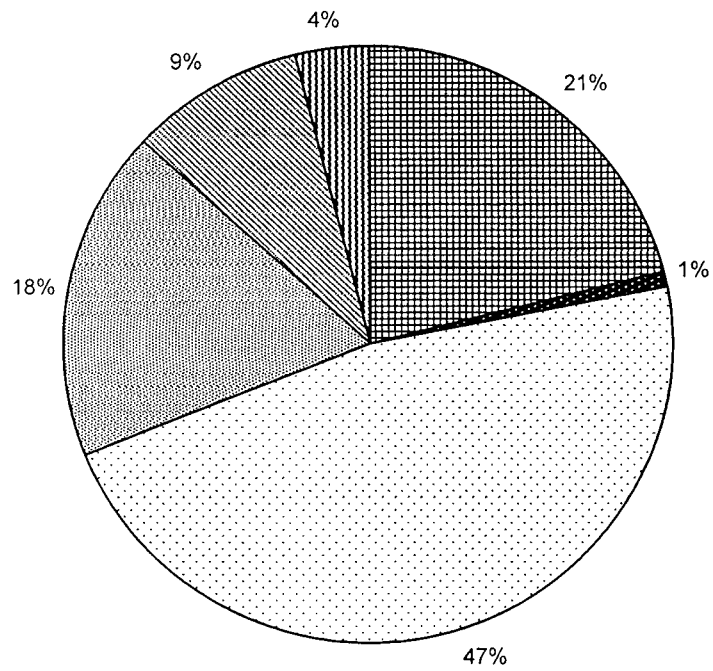


Source: FAO (2000)

decline. The maximum sustainable marine production has been estimated at around 100 million tonnes a year. As in the 1990s, most of the short fall will be made up by aquaculture, which will probably continue to grow at rates of 5 to 7 percent a year, at least until 2015. Environmental concerns will probably shift the focus of aquaculture away from coastal zones into more intensive inland systems. Social and political pressure will also drive efforts to reduce the impact of capture fisheries, for example by making use of the unwanted catch of non-target species and by using more selective fishing gear and practices. Increasing use of eco-labels will enable consumers to choose sustainably harvested fish products, a trend which will encourage environmentally sensitive approaches in the industry.

The single most important influence on the future of wild capture fisheries is their governance. Although in theory renewable, wild fishery resources are in practice finite for production purposes. If they are overexploited, production declines and may even collapse. Resources must therefore be harvested at sustainable levels (Fig. 3.12). In addition, access must be equitably shared among producers. As fish resources grow increasingly scarce, conflicts over access are becoming more frequent. The principal policy challenge is to bring the capacity of the global fishing fleet back to a level at which fish stocks can be harvested sustainably. Laws and institutions need to be established or strengthened to limit and control access to marine fish stocks, both by larger ocean-going vessels and by local artisanal fishers. Traditional arrangements in fishing communities can be incorporated into new management regimes. However, the need to control entry into artisanal fisheries will become more pressing. Indeed, if this issue is not tackled, a large number of fisher households may be forced out of fishery and, unless there are alternative livelihoods, into poverty. If the world's fisheries are to achieve their full potential, the major policy and management challenges must be met, and the cultural and social concerns of all stakeholder groups must be addressed. These are enormous challenges, yet they are not insurmountable.

**Fig. 3.12.**  
**State of the World's Fishery Stocks, 1998**



■ Moderately exploited ■ Recovering □ Fully exploited ■ Over exploited ■ Depleted ■ Under exploited

Source: FAO (2000)



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**CHAPTER - 4****GEOGRAPHY OF WORLD FOOD RESOURCES:  
CONSUMPTION, SECURITY, AND TRADE  
PERSPECTIVE**

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The discussion of food consumption during the last half century has been dominated by world food supplies and population growth, and the extent of under nutrition in the developing countries<sup>1</sup>. Much has also been written on changing patterns of food consumption in the developing world<sup>2</sup>, whilst there is a large literature on nutrition and health in industrial countries. But there has been little study of the geography of food consumption.

**Measuring Food Consumption**

One of the most obvious ways of comparing food consumption in different countries or at different periods is in written description. Unfortunately, such texts are rarely representative of a whole nation or region, allow no meaningful comparison of the relative importance of foods and frequently emphasize the unusual: frogs do not feature largely in the French diet, nor do limes among British drinks. Thus any attempt at comparison, whether between classes or between town and country or nation and nation, requires some index that can be measured. Several methods have been used. A relatively modern technique, used primarily by anthropologists, is to ask survey respondents to list the frequency particular foods have been eaten in some specific period. This is a simple technique but may not capture the essentials of differences in food habits. A long-established method is to ask for information about expenditure on different foods. This, of course, is essential for the economist, whether at the household or national level: it is a question asked in the British National Food Survey which began in 1940 and which is the oldest of present day food surveys<sup>3</sup>. This information allows comparison of countries or regions,

and the relative importance of different foods is measured in money. A third measure is weight. The foods purchased for a household or institution are weighed, which forms the basis of comparison. There are some difficulties here – beverages and milk are often recorded by volume and can not be compared with other foods. This defect is overcome by reducing weights and volumes of food and drink to some common nutritional unit using conventional tables which give such values. Thus the fourth, and probably the most useful measure, is the calorific content of foods. This is certainly the one most commonly used, and it requires, of course, figures on the weight of available foods.

The four measures of food consumption can be applied at a variety of scales. The household level is the most common, and sampled households form the basis of food consumption surveys in countries such as the United Kingdom, the United States of America, and the Netherlands. For some countries, food consumption data based on household surveys are available at the regional level, but this is mainly confined to western Europe. International comparisons of food consumption data are available from two international agencies, the OECD and FAO. The FAO publishes food balance sheets for nearly all its member countries. These are based on agricultural production and trade statistics, and they provide information on the availability per capita per day of over one hundred different foods, measured in kilograms, calories and grams of fats and protein. In spite of the drawbacks<sup>4</sup>, these balance sheets are the most important source for the study of food consumption differences between nations.

### **Industrialization and the transformation of Western diets**

In the early nineteenth century there were regional variations in food consumption in Western Europe, but in nutritional terms there was a broad similarity between the regions. First, the total calorie was low, most countries having between 1800 and 2300 K calories per capita per day. Diets were dominated by cereals and potatoes, which provided two-thirds to four-fifths of

the total energy supply. Livestock products rarely provided more than 15 percent of total calorie intake, and sugar, vegetables and fruit were eaten in only small quantities; vegetable oils and animal fats made a minor contribution to total energy supplies. Cereals not only provided a majority of the calories, but together with pulses, most of the protein<sup>5</sup>. The composition of the diet – France had the best statistics – was similar to that of the developing countries in the early 1960s, although with more calories per capita and a higher intake of animal foods (Table 4.1). There were two reasons for this:

- \* Most people in both periods were too poor to buy large amounts of any but the cheapest foods, and secondly
- \* Cereals and roots were and are the cheapest sources of calories and with pulses, of protein.

In contrast, livestock products were and are more expensive per calorie than nearly all plant foods and so were of small importance in France in the 1820s and developing countries in the 1960s<sup>6</sup>.

In the nineteenth century, food consumption in Western Europe was transformed by a number of economic and technological changes:

- \* The rapid growth of agricultural productivity allowed production and consumption to outpace population growth which led to a long-term decline in the real price of food;
- \* The improvement in transport reduced the cost of moving foods, together with the introduction of refrigeration in the 1870s which allowed the import of cheaper foods, although with the exception of the United Kingdom, European countries continued to rely mainly on home-produced food; and
- \* The growth of real incomes, which followed industrialization beginning in North West Europe in the later nineteenth century, but reaching Eastern and Southern Europe only after 1945.

Table 4.1

## Food consumption in France 1815-1824 and the developing regions in 1961-62

	Total	Cereals & Roots	Sweetens	Pulses	Oil crops any vegetables oils	Fruit and vegetables	Other foods	All plant foods	Meat	Animal fats	Milk and eggs	Fish	All animal foods
France	100.0	76.7	0.6	2.8	1.6	2.5	0.1	84.3	6.3	3.5	4.6	0.3	14.7
Developing Countries	100.0	68.5	6.3	5.9	6.2	4.0	1.6	92.5	2.7	1.5	2.8	0.5	7.5

(Calories per capita / day)

	Total	Cereals & Roots	Sweetens	Pulses	Oil crops any vegetables oils	Fruit and vegetables	Other foods	All plant foods	Meat	Animal fats	Milk and eggs	Fish	All animal foods
France	2291	1557	13	57	32	50	-	1709	126	49	109	7	291
Developing Countries	1909	1318	122	113	120	76	23	1772	52	20	55	10	137

Sources: Toutain, 1971: 1994-5, 1997-8; FAO, 1996b

These changes transformed the European diet between 1800 and the 1990s. The consumption of nearly all foods increased as incomes rose and so total calorie consumption increased by over 50 percent in France between 1800 and 1900. The initial response to increased incomes was to eat more bread and more potatoes – the starchy staples – to reduce hunger. Once this need has been satisfied the population ate more sugar, oils and fats, fruits and vegetables, and especially meat and dairy products; the consumption of the starchy staples then began to decline, an important turning point in nutritional history<sup>7</sup>. The proportion of total calories derived from livestock foods rose from less than 15 percent in the early nineteenth century to over 30 percent in Northern Europe in the early 1960s<sup>8</sup>. Protein came largely from cereals and pulses in the 1820s, but by the 1960s half the protein consumed in France and Britain came from animal foods<sup>9</sup>. Fats also became more important; in France they were less than ten percent of all calories in the early nineteenth century, over 40 percent by the 1960s. Thus, from 1800 to the 1950s an increase in income led to an increase in the consumption of all foods except the starchy staples. Since about 1960, however, income has become a less important factor in food choice.

### **The geography of food consumption in early 1960s**

The second World War disrupted both production and consumption, and output did not recover until the early 1950s. By 1961-62 incomes were rising in Western Europe, but there was still a gap between Western and the rest of Europe whilst little economic progress had been made in Afro-Asia and Latin America. Patterns of food consumption reflected this. In 1961-62, the world's population relied on plant foods for its calorie supply; only 15 percent of calories were derived from animal foods, only five percent from meat (Table 4.2). The supply of protein was equally dependent upon plants; less than one-third came from animal foods. The most important source of calories was the starchy staples that provided over half the total. There was, however, a marked difference between the developed and the developing countries (Table 4.2).

Total calorie intake per capita in the developed countries was 55 percent greater than in the developing, protein consumption 83 percent more, but consumption of the starchy staples less than half of total calorie intake, compared with over two-thirds in the developing countries. As incomes increase the proportion of all calories derived from starchy staples decreases and that from livestock products increases. This leads to a change in the source of protein. In the developing countries in 1961-62 less than one-fifth of all protein was obtained from animal foods, in the developed one-half. The differences between the richest and poorest regions were very pronounced. In Africa and Asia less than one-tenth of all calories were obtained from animal foods; in contrast in North America and Australasia they provided over one-third. Eastern Europe, the USSR and Latin America formed an intermediate group where animal foods ranged from 15 to 23 percent of all calories, and cereals and roots from 47 to 56 percent.

**Table 4.2**  
**Calories, proteins and starchy staples by developed and developing regions, 1961-62**

	Calories		Protein		Starchy staples	
	Total per capita / day	Animal calories (as % all calories)	Total grams per capita/day	Animal protein (as % all protein)	Calories per capita / day	As % all calories
Developed regions	2982	26.2	90.3	51.5	1305	44.1
Developing regions	1925	7.2	49.1	17.5	1318	68.5
World	2260	15.4	62.2	31.7	1313	58.1

Source: FAO, 1996b

### **The changing geography of food consumption, 1960s-1990s**

Since the early 1960s there have been increases in income per capita in the developing countries. The most rapid have been in parts of East and South East Asia, the least in Sub-Saharan Africa; indeed in the 1980s many African countries had a decline in real income per capita<sup>10</sup>. These increases have led to changes in food consumption similar to those in Western Europe in the

nineteenth century. In the developed countries income growth continued after 1945, but the greatest changes occurred in Eastern Europe and the USSR, which in the 1930s were still predominantly agrarian, with a low Gross Domestic Product per capita and with pre-industrial food consumption patterns. Income growth, although less than in the market economies, was sufficient to radically transform food consumption. There was also a notable change in the diet of Mediterranean Europe where with increased incomes more livestock products were consumed. By the 1960s, malnutrition, which had been widespread in Europe and North America in the 1930, was confined to a very small minority.

Until the 1960s the consumption of food in North America, Western Europe and Australasia was largely determined by incomes and the real cost of foods. By the 1960s, however, the consumption of some foods had reached saturation point, and further increases in income did not lead to further increases in consumption because:

- \* an increasing proportion of food expenditure went not on purchasing more basic foods, but on eating prepared foods in restaurants and ready-to-cook meals for eating at home;
- \* demographic and occupational changes led to changes in demand. The decline of heavy industry and the growth of sedentary occupations has reduced the need for high-energy diets, whilst the spread of central heating has meant less energy is needed to keep warm<sup>11</sup>. The ageing of Western populations has also reduced the demand for food;
- \* there has been growth in the number of single person households and an increase in the number of working wives<sup>12</sup>.
- \* of the increasing importance of social and cultural factors as the importance of income has declined<sup>13</sup>. Cultural determinants of food choice are perhaps most obvious in cross-section analysis; the influence of religious taboos on the consumption of animal foods for example, or



the social factors that affect differences in the consumption of sugar between France and the United States<sup>14</sup> but such influences have also had some impact on historical trends. The place of rice in Japanese food choices is one such example whilst immigrants have influenced consumption in parts of Western Europe<sup>15</sup>.

Perhaps the most powerful influence on the consumption of food in the developed countries, since 1960, has been concern about the influence of the consumption of certain foods on health.

### **Trends in availability and composition of food supplies**

#### ***Trends in Dietary energy supply***

Worldwide, per caput dietary energy supply (DES) increased by 11 percent – from 2440 to 2720 Kcal/day – during the 21 year period between 1969-71 and 1990-92 (Table 4.3). This translates into an average annual growth rate of about 0.5 percent over the two decades. It is worth noting several aspects of this overall performance, some of which signify positive achievements and others which do not. The positive achievements can be enumerated as follows:

- \* First and foremost these figures indicate that, in the world as a whole, food production has continued to outstrip population growth, although not universally so.
- \* Second, the developing countries as a group have continued to increase their per caput DES at a faster rate than the developed countries in spite of experiencing a much higher rate of population growth. In the 1980s, for example, the annual average growth rate of per caput DES was 0.7 percent in the developing countries as against 0.2 percent in the developed countries (Table 4.3). This was partly because the former had started from a much lower base, but it may also be a reflection of the fact that, owing to technological and other advances, they were able to

make good use of available resources in an effort to keep ahead of population growth.

Against these positive achievements, one must also weigh two disconcerting developments: the worldwide slowdown in the growth of per caput DES and the absolute decline in per caput DES in large parts of the world.

Both the developed and the developing regions experienced a slight slowdown in the growth of per caput DES in the 1980s compared with the 1970s – from 0.3 to 0.2 percent and from 0.9 to 0.7 percent, respectively (Table 4.3). There were, however, significant intra-regional variations. In the developed world, the slowdown was exclusively confined to the transition economies where the annual growth rate in fact turned negative in the 1980s from a small but positive rate (0.2 percent) achieved in the 1970s. By contrast, the annual growth rate of per caput DES in the industrialized countries increased from 0.3 percent to 0.5 percent during the same period<sup>16</sup>.

There were also variations within the developing world. Considering the geographical classification first, the slow down in the growth of per caput DES was confined mostly to East and Southeast Asia and the Latin American and Caribbean countries. Sub-Saharan Africa continued to experience a virtually unchanged negative growth, while South Asia emerged as an exception by experiencing a change from almost zero growth in the 1970s to an average annual rate of 0.9 percent in the 1980s (Table 4.3). The sharpest decelerations in annual growth in per caput DES were mostly confined to the two regions which had already attained a fairly high level of per caput DES by the end of the 1970s (the near East and North Africa and Latin America and the Caribbean), while the countries in the "low-income" and "low-income food deficit" groups on the whole maintained steady growth. These countries either

experienced a slight acceleration in the growth of per caput DES or maintained a steady growth. However, this is not true for all countries in these regions, especially those that belong to the group of least developed countries (LDCs).

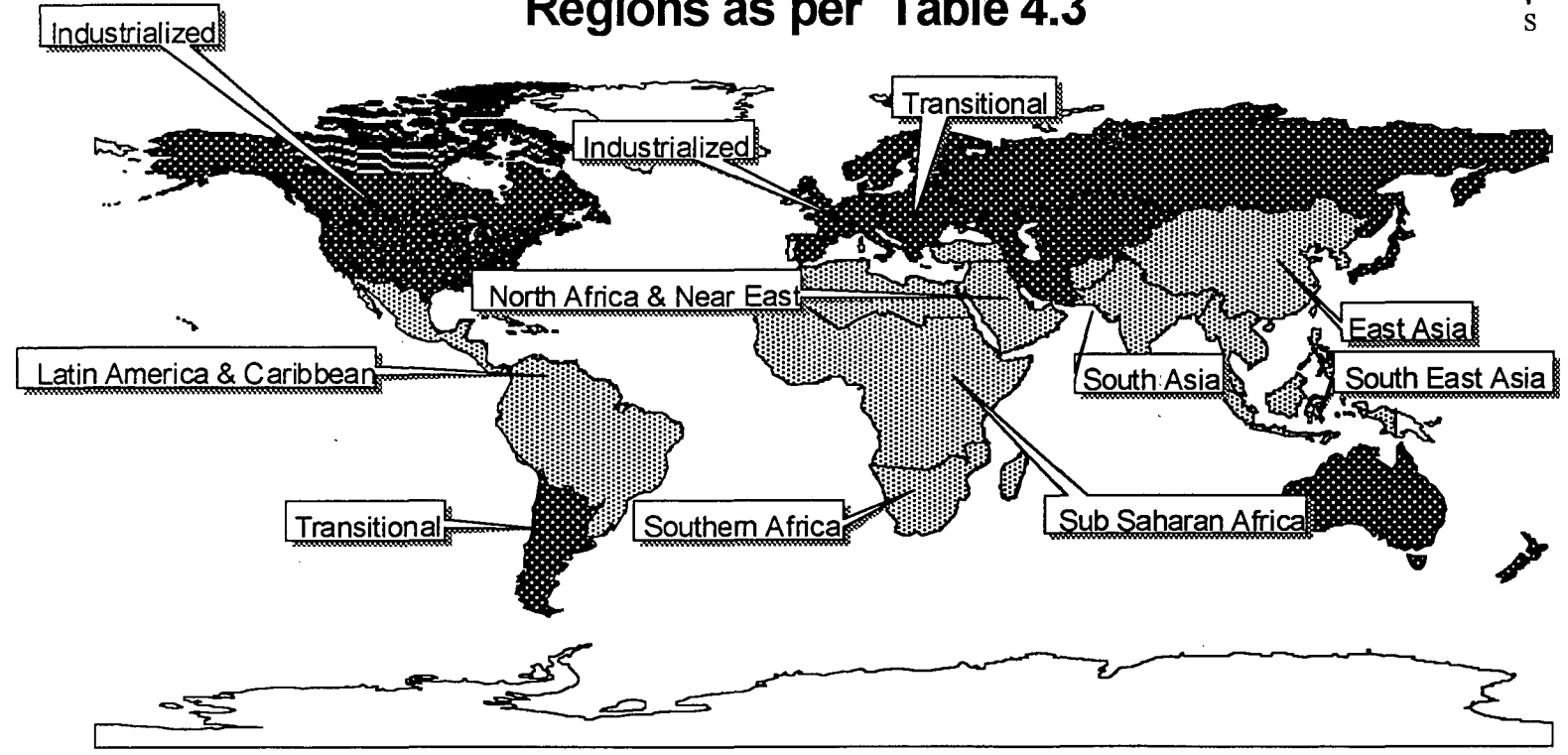
**Table 4.3**  
**Per Caput Des by Region and Economic Group, 1969-71, 1979-81**  
**and 1990-92**

Region/economic group	Per caput DES			Average annual rate of increase	
	1969-71	1979-81	1990-92	1969-71 to 1979-81	1979-81 to 1990-92
	(kcal/day)			(Percentage)	
Developed countries	3190	3280	3350	0.3	0.2
Industrialized countries	3120	3220	3410	0.3	0.5
Transition economies	3330	3400	3230	0.2	0.5
Developing countries	2140	2330	2520	0.9	0.7
Latin America and the Caribbean	2510	2720	2740	0.8	0.0
Sub-Saharan Africa	2140	2080	2040	-0.3	-0.2
Near East and North Africa	2380	2850	2960	1.8	0.3
East and Southeast Asia	2060	2370	2680	1.4	1.1
South Asia	2060	2070	2290	0.0	0.9
Economic groups of developing countries					
Least developed	2060	2040	2040	-0.1	0.0
Low-income food-deficit	2060	2230	2450	0.8	0.8
Low-income	2060	2210	2430	0.7	0.9
Middle-income	2360	2670	2760	1.2	0.3
World	2440	2580	2720	0.5	0.5

Source: FAO, 1996a

\* Even more disconcerting than the phenomenon of declining growth in per caput DES is that it failed to grow at all in many parts of the world, and, in some parts, even declined in absolute terms. Considering the two decades together, there was an absolute decline in per caput DES in sub-Saharan Africa and the transition economies and stagnation in the LDCs as a whole (Table 4.3). The problem seems to have become endemic in sub-Saharan Africa, where the per caput DES declined in each of the

**Map4.1**  
**Depicting Developed & Developing**  
**Regions as per Table 4.3**



 Developed countries

 Developing countries

two decades, whereas for the transition economies the decline was more marked in the 1980s. The same decade also brought stagnation to the indebted Latin American and Caribbean countries, which had done reasonably well in the preceding decade.

### ***DES Growth in Relation to Population Growth***

The growth of world food supplies slowed down over time—from an annual rate of 2.4 percent in the 1970s to 2.2 percent in the 1980s – and, despite this slowdown, a constant rate of growth in per caput DES was maintained because population growth also slowed down correspondingly from 1.9 to 1.7 percent per annum. This affecting slowdown in the growth of DES and population is also evident in most of the broad regions but there are some notable variations in pattern<sup>17</sup>.

- \* In the transition economies, the growth of DES slowed down more than population growth, resulting in negative growth of per caput DES in the 1980s.
- \* The LDCs, and especially the countries of sub-Saharan Africa, experienced the opposite phenomenon of high DES growth being offset by high population growth. Contrary to the overall trend, both the DES and the population grew faster in the second decade in these regions but DES growth was again offset by population growth. Thus, although both the transition economies and sub-Saharan Africa experienced negative growth in per caput DES in the 1980s, this was explained by different sets of forces in each case.
- \* South Asia and to a lesser extent, the industrialized world, diverged from the overall pattern of DES and population growth. In these regions, the rate of DES growth accelerated while population growth declined, thus producing a higher rate of growth in per caput DES in the 1980s compared with the 1970s.

The analysis of DES growth in relation to population growth throws an interesting light on the comparative experiences of South Asia and sub-Saharan Africa – the two most impoverished regions of the world. In the two decades whether taken together or separately, these regions did not differ much in terms of growth of aggregate DES but, in South Asia, population growth was lower and declining while in sub-Saharan Africa, it was higher and on the rise (Table 4.4). As a result, per caput DES rose in South Asia, especially in the 1980s, while it declined in sub-Saharan Africa in both decades. In addition to relating DES growth to population growth, it is useful to relate DES growth with initial levels of per caput DES. The higher the initial level, the more difficult it is to achieve a given rate of growth. This means that a low rate of growth at higher levels of per caput DES is a qualitatively different phenomenon from slow growth at lower initial levels; it is necessary to distinguish between the two in order to identify the nature of constraints affecting per caput DES growth. A proper analysis requires the classification of countries according to initial levels of per caput DES and population growth. Such a two-way classification according to the initial per caput DES level was made, taking 2500 Kcal/day as the dividing line on the grounds that no developed country has a per caput DES below this level, while the classification according to population growth was made with 2 percent per annum as the dividing line. A comparison of per caput DES growth rates of developing countries classified in this manner produces the following results (Table 4.5). A few countries experienced slow growth in per caput DES despite having relatively low rates of population growth as well as low initial levels of per caput DES. Prime examples are Haiti, Afghanistan and Cambodia, where the per caput DES actually declined over the two decades. At the opposite end of the scale, a few countries (notably Mexico, Egypt and Turkey) registered relatively high rates of growth in per caput DES, despite experiencing a high initial per caput DES and high rate of population growth.

Table 4.4

**DES and Population Growth by Region and Economic Group, 1969-71 to  
1979-81 and 1979-81 to 1990-92**

Region/economic group	Average annual rate of increase		
	DES	Population	Per Caput DES
	(Percentage)		
Developed countries			
1969-71 to 1979-81	1.1	0.8	0.3
1979-81 to 1990-92	0.9	0.7	0.2
Industrialized countries			
1969-71 to 1979-81	1.1	0.8	0.3
1979-81 to 1990-92	1.2	0.7	0.5
Transition economies			
1969-71 to 1979-81	1.1	0.9	0.2
1979-81 to 1990-92	0.2	0.7	-0.5
Developing countries			
1969-71 to 1979-81	3.1	2.2	0.9
1979-81 to 1990-92	2.8	2.1	0.7
Latin America and the Caribbean			
1969-71 to 1979-81	3.2	2.4	0.8
1979-81 to 1990-92	2.1	2.1	0.0
Sub-Saharan Africa			
1969-71 to 1979-81	2.6	2.9	-0.3
1979-81 to 1990-92	2.9	3.1	-0.2
Near East and North Africa			
1969-71 to 1979-81	4.5	2.7	1.8
1979-81 to 1990-92	3.1	2.8	0.3
East and Southeast Asia			
1969-71 to 1979-81	3.4	2.0	1.4
1979-81 to 1990-92	2.7	1.6	1.1
South Asia			
1969-71 to 1979-81	2.3	2.3	0.0
1979-81 to 1990-92	3.1	2.2	0.9
Economic groups of developing countries			
Least developed			
1969-71 to 1979-81	2.5	2.4	-0.1
1979-81 to 1990-92	2.6	2.6	0.0
Low income food-deficit			
1969-71 to 1979-81	3.0	2.2	0.8
1979-81 to 1990-92	2.9	2.1	0.8
Low income			
1969-71 to 1979-81	2.8	2.1	0.7
1979-81 to 1990-92	2.9	2.0	0.9
Middle-income			
1969-71 to 1979-81	3.7	2.5	1.2
1979-81 to 1990-92	2.5	2.2	0.3
World			
1969-71 to 1979-81	2.4	1.9	0.5
1979-81 to 1990-92	2.2	1.7	0.5

Source: FAO, 1996a

**Table 4.5**  
**Distribution of 98 Developing Countries by per caput DES in 1969-71 and its growth from 1969-71 to 1990-92, and by population growth**

Per caput DES 1969-71: Annual population growth rate, 1969-71 to 1990-92: Per caput DES annual growth rate, 1969-71 to 1990-92:	<2500 kcal/day				>2500 kcal/day			
	>2%		≤2%		>2%		≤2%	
	≤0.5%	>0.5%	≤0.5%	>0.5%	≤0.5%	>0.5%	≤0.5%	>0.5%
	Number of Countries							
Developing countries	45	28	5	6	3	3	5	3
Latin America and the Caribbean	7	5	2	2	1	1	5	1
Sub-Saharan Africa	31	7	0	1	0	0	0	0
Near East and North Africa	1	9	1	1	2	2	0	0
East and Southeast Asia	4	4	1	2	0	0	0	2
South Asia	2	2	1	0	0	0	0	0
Economic groups of developing countries								
Least developed	23	8	3	0	0	0	0	0
Low-income food-deficit	37	18	4	2	0	1	0	0
Low-income	32	9	5	1	0	1	0	0
Middle-income	13	19	0	5	3	2	5	3

Source: FAO, 1996a

### *Trends in availability of Dietary protein and fats*

As changes in food supply levels are usually accompanied by modifications in food consumption patterns, the changes in protein and fat supply levels can differ to a certain extent from those in energy supply. Specific information on dietary protein and fats for 1969-71, 1979-81 and 1990-92 is presented in Tables 4.6 and 4.7.



**Table 4.6**  
**Total and Animal Protein Supplies by Region and Economic Group**  
**1969-71, 1979-81 and 1990-92**

Region/economic group	Total protein			Animal protein		
	1969-71	1979-81	1990-92	1969-71	1979-81	1990-92
	(g / per caput / day)					
<b>Developed countries</b>	95	99	102	51	56	59
Industrialized countries	93	97	103	54	58	63
Transition economies	100	103	100	44	51	51
<b>Developing countries</b>	53	57	62	10	12	15
Latin America and the Caribbean	65	68	68	25	29	29
Sub-Saharan Africa	54	51	49	11	12	10
Near East and North Africa	66	77	80	14	18	18
East and Southeast Asia	49	56	65	7	9	16
South Asia	51	50	55	7	7	10
<b>Economic groups of developing countries</b>						
Least-developed	52	51	50	10	10	9
Low-income food-deficit	50	53	59	8	9	12
Low-income	51	53	59	7	8	12
Middle-income	59	66	69	18	21	23
World	65	68	71	22	23	25

Source: FAO, 1996a

**Table 4.7**  
**Total and Animal Fat Supplies by Region and Economic Group**  
**1969-71, 1979-81 and 1990-92**

Region/economic group	Total Fats			Animal Fats		
	1969-71	1979-81	1990-92	1969-71	1979-81	1990-92
	(g / per caput / day)					
<b>Developed countries</b>	108	118	125	68	73	73
Industrialized countries	117	127	138	72	75	76
Transition economies	89	100	98	61	69	67
<b>Developing countries</b>	33	40	51	12	15	19
Latin America and the Caribbean	57	71	78	30	34	34
Sub-Saharan Africa	41	42	41	9	10	9
Near East and North Africa	50	65	70	18	22	20
East and Southeast Asia	25	33	51	10	14	24
South Asia	29	32	41	8	8	11
<b>Economic groups of developing countries</b>						
Least-developed	31	31	32	9	9	8
Low-income food-deficit	29	35	46	10	12	18
Low-income	28	34	45	9	12	18
Middle-income	46	58	68	20	23	24
World	55	61	69	28	30	32

Source: FAO, 1996a

As in the case of DES, per caput protein and fat supplies in the world as a whole increased steadily in the two decades from 1969-71. The same pattern of steady increases is also observed for the broad groupings of developed and

developing countries. However, variations in this pattern begin to emerge as soon as the analysis is disaggregated into smaller groupings. In the developing regions, changes in per caput protein supplies seem to have followed four broad patterns. In sub-Saharan Africa per caput protein supply declined in each of the two decades, which parallels the decrease in that region's per caput energy supply. In Latin America and the Caribbean and the near East and North Africa positive gains were made in the 1970s but this momentum was lost in the 1980s. In East and Southeast Asia increases occurred in both decades. Finally, in South Asia the supplies remained constant in the 1970s and then increased in the 1980s.

The patterns of change in per caput fat supply are similar to those of protein supply but with the following differences: first, in sub-Saharan Africa, per caput fat supply remained constant over the two decades instead of declining in absolute terms as did the per caput protein supply; second, the acceleration in the growth of per caput fat supply in Asia occurred in the 1980s, not only in East and South east Asia (as in the case of protein) but also in South Asia.

Considering the dietary energy, protein and fat contents of aggregate food supplies, and on the basis of the experience of the two decades from 1969-71 to 1990-92, it is possible to distinguish three regional groupings in the developing world:

- (i) Sub-Saharan Africa, which experienced absolute declines in per caput energy and protein supplies but a constant per caput fat supply.
- (ii) Latin America and the Caribbean and the near East and North Africa, where strong growth in the 1970s turned into either much slower growth or complete stagnation in the 1980s with respect to per caput dietary, protein and fat supplies.
- (iii) East, Southeast and South Asia, where steady or accelerated increases in per caput dietary energy, protein and fat supplies occurred in the 1980s.

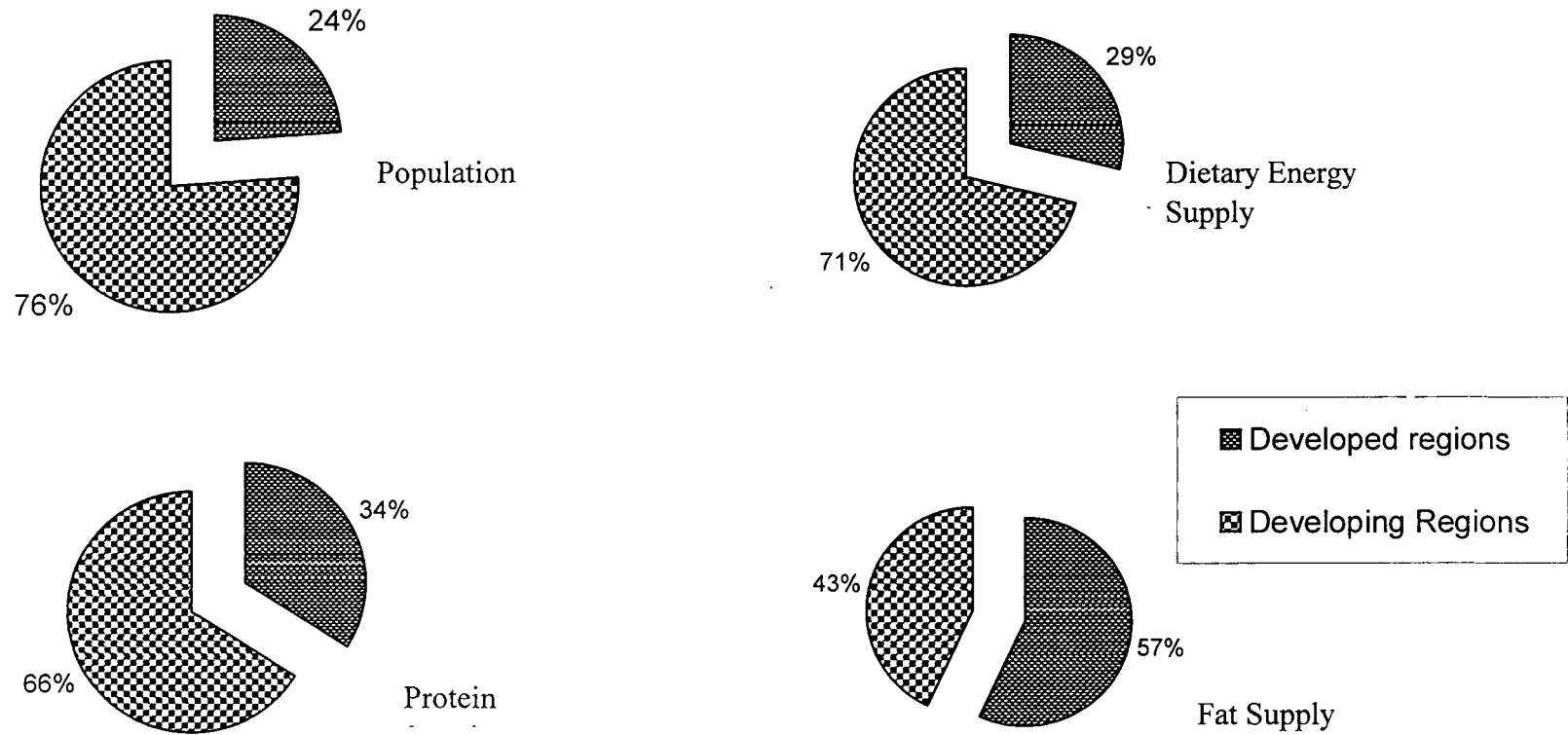
## **Distribution of Food in the World**

As a result of various changes in the availability of food in different parts of the world, the distribution of food among regions and countries as well as the disparities between different parts of the world are changing over time. During 1990-92 the developing regions, which contained 76 percent of the world's population, had access to 71 percent of the world's DES, 66 percent of its protein supply and 57 percent of its fat supply (Fig. 4.1).

The disparity between the two parts of the world is obviously much sharper with respect to protein and fat supplies than with respect to energy for the simple reason that protein – rich and fatty foods are normally more expensive than basic energy-rich foods. Nevertheless, the difference in per caput DES is still quite large. As can be seen from Table 4.3, per caput DES in the developed world was 3350 Kcal in 1990-92 compared with 2520 Kcal in the developing countries, i.e., the average person in the developed world consumed one-third more calories than the average person in the developing world.

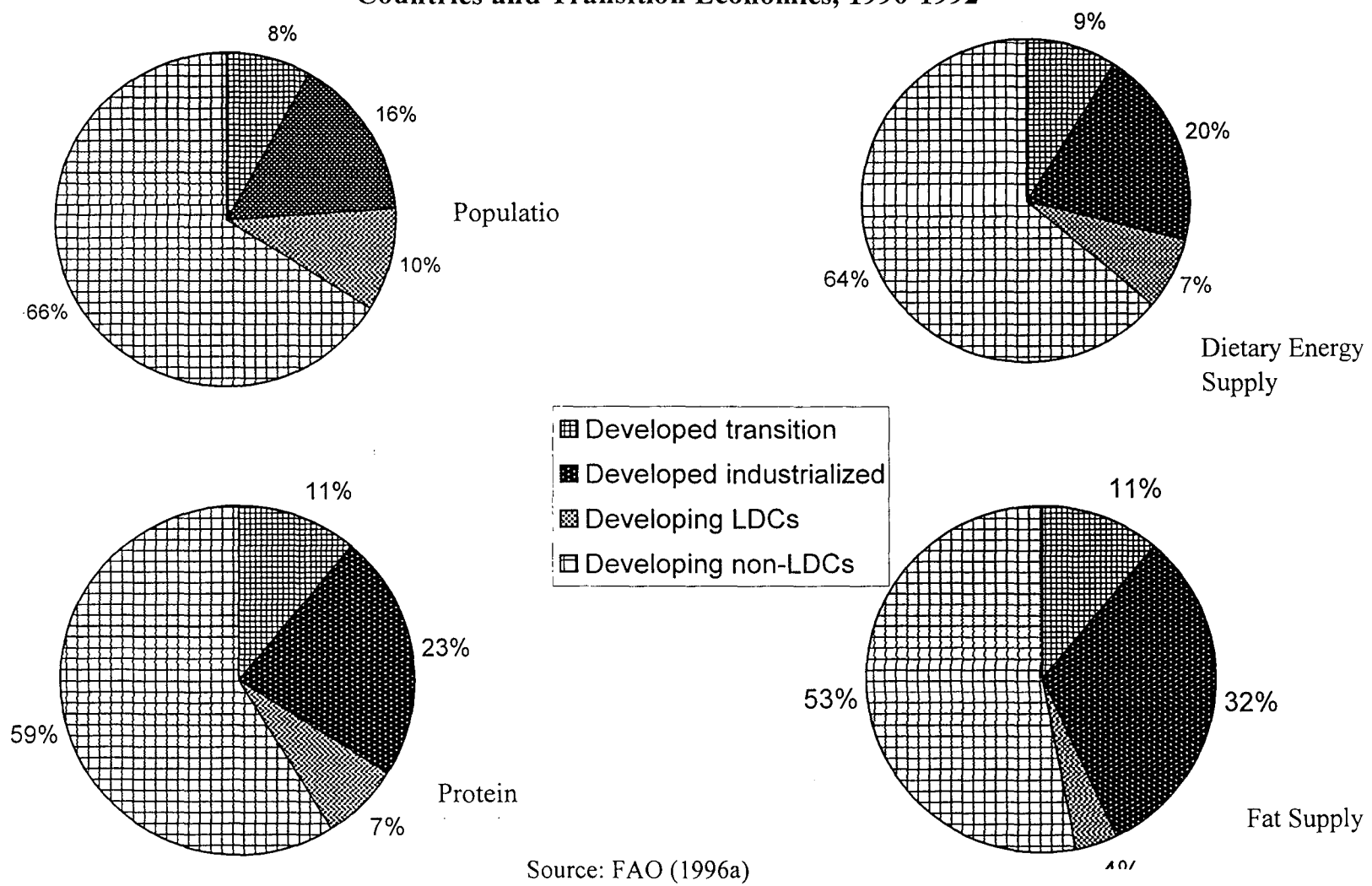
Since considerable disparities exist within both the developed and developing regions, the data can be disaggregated further so as to present a clearer picture of the distribution of per caput DES. The developed regions were divided into industrialized countries and the transition economies (i.e. the former USSR and the East-European countries), while the developing regions were classified as the LDCs and others. The distribution of food and population for 1990-92 in these four regions is shown in figure 4.2. The industrialized countries 'share of the world's DES was far in excess of its population share, while the opposite was true for the LDCs. The remaining two groups' shares of DES and population were fairly close to each other. The disparity in per caput DES between the richest and poorest parts of the world becomes much more pronounced at this lower level of aggregation. Whereas the average person in the developed regions in a whole consumed one-third more calories than his or

**Fig. 4.1**  
**Distribution of Population and Food Supply in Developed and Developing Regions, 1990-92**



Source: FAO (1996a)

**Fig. 4.2**  
**Distribution of Population and Food Supply in LDCs, Non-LDCs, Industrialized**  
**Countries and Transition Economies, 1990-1992**



Source: FAO (1996a)

her counterpart in the developing regions in 1990-92, the average person in the industrialized countries consumed two-thirds more calories than his or her counterpart in the LDCs. If account were to be taken of disparities in available food supplies among individuals within countries, undoubtedly the most privileged would be found to be consuming a multiple of the amount of calories consumed by the poor.

The LDCs lagged way behind even in comparison with the more privileged parts of the developing world. Thus, for example, the average person in the so-called middle-income countries of the developing world consumed just over one-third more calories than the average person in the LDCs (Table 4.3). As a result of widely different changes in the availability of food in the world, the gap between the richest and poorest countries has become wider over time (Fig. 4.3 and Table 4.8). Widening gaps are observed both between the developed and developing regions and within the developing world itself.

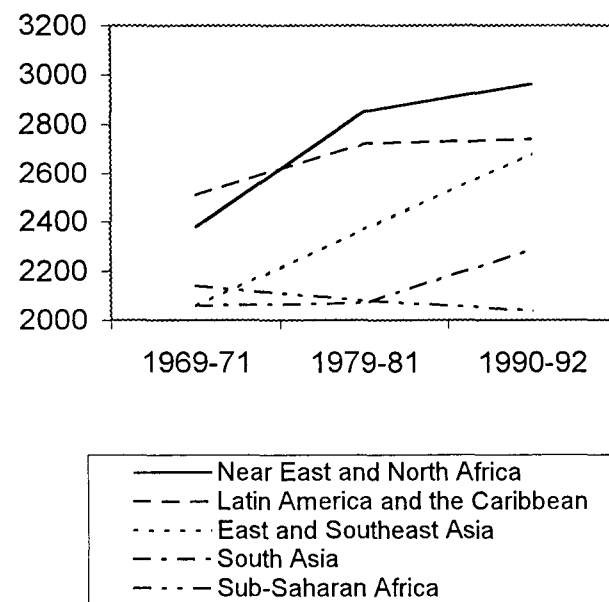
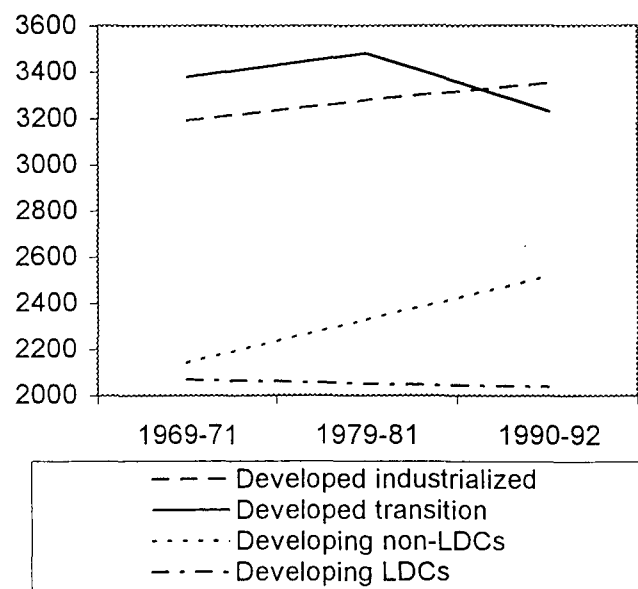
**Table 4.8**  
**Per caput DES in Developed and Developing Regions**

Developed region	Kcal/caput/day		
	1969-71	1979-81	1990-92
Developed industrialized	3190	3280	3350
Developed transition	3380	3480	3230
Developing non-LDCs	2140	2330	2520
Developing LDCs	2070	2050	2040

#### **Developing Regions**

Near East and North Africa	2380	2850	2960
Latin America and the Caribbean	2510	2720	2740
East and Southeast Asia	2060	2370	2680
South Asia	2060	2070	2290
Sub-Saharan Africa	2140	2080	2040

**Fig. 4.3**  
**Per Caput DES in Developed and Developing Regions**



Source: FAO (1996a)



### **Changes in Food Composition**

In the world as a whole, the relative contribution of vegetable and animal products to total energy supplies remained remarkably stable throughout the 1970s and 1980s. The share of vegetable products, for example, stabilized at about 84 percent (Table 4.9). The same pattern is also observed for the developed countries, where the share of vegetable products stabilized at about 71 percent, although in the developing countries there was a slight decline in the share of vegetable products and a corresponding increase in the share of animal products, from nearly 8 percent in 1969-71 to more than 10 percent in 1990-92. There are, however, variations within each of these broad regions. In the developed regions, the share of animal products increased slightly in the transition economies, from approximately 24 to 28 percent. In the developing regions, the increased share of animal products was most evident in East and Southeast Asia, followed by South Asia and Latin America and Caribbean countries, whereas a similar increase did not occur in sub-Saharan Africa or countries of the near East and North Africa. An increasing share of animal products in total DES is observed in both low-income and low-income food-deficit countries, but not in the LDCs.

**Table 4.9**  
**Share of Major Food Groups in Total DES by Region and Economic Group, 1969-71**  
**and 1990-92 (Percentage)**

Food group	World		Developed countries		Developing countries					
	1969-71	1990-92	1969-71	1990-92	1969-71	1990-92				
<b>Vegetable products</b>	84.4	84.3	71.7	70.9	92.3	89.7				
Cereals	50.1	51.2	32.6	30.4	60.9	59.6				
Sugar	9.1	8.8	13.2	12.8	6.6	7.2				
Vegetable oils and fats	5.7	8.2	8.2	11.1	4.1	7.0				
Roots and tubers	7.5	5.0	5.0	3.8	9.0	5.4				
Vegetables and fruits	4.2	4.3	4.5	4.9	4.5	4.8				
Pulses and nuts	4.8	4.0	2.3	2.3	2.3	4.7				
Alcoholic beverages	2.7	2.4	5.3	4.9	5.3	1.3				
Stimulants and spices	0.4	0.4	0.4	0.6	0.4	0.4				
<b>Animal products</b>	15.6	15.7	28.3	29.1	7.7	10.3				
Meat and offal	6.4	7.4	11.1	12.8	3.5	5.2				
Milk	4.8	4.3	8.9	8.6	2.2	2.6				
Animal oils and fats	2.7	2.0	5.4	4.4	1.0	1.1				
Eggs	0.8	0.9	1.5	1.8	0.3	0.7				
Fish	0.9	1.0	1.4	1.3	0.6	0.7				
Food group	Developed countries				Developing countries					
	Industrialized		Transition economies		Least developed		Low income food-deficit		Low-income	
	1969-71	1990-92	1969-71	1990-92	1969-71	1990-92	1969-71	1990-92	1969-71	1990-92
<b>Vegetable products</b>	69.6	70.2	75.6	72.4	93.4	94.0	93.7	90.8	93.9	90.7
Cereals	27.5	26.2	42.3	39.7	60.8	62.4	63.2	62.6	64.5	63.8
Sugar	13.9	13.1	11.8	12.3	4.3	3.5	5.5	6.1	5.0	5.6
Vegetable oils and fats	10.0	13.1	4.9	6.6	3.9	5.2	3.8	6.2	3.6	5.9
Roots and tubers	4.1	3.4	6.8	4.8	11.5	11.6	10.1	6.0	9.9	6.0
Vegetables and fruits	5.3	5.6	3.1	3.4	4.2	4.0	3.5	3.6	3.2	3.4
Pulses and nuts	2.6	2.8	1.7	1.1	6.7	5.7	6.5	4.8	6.5	4.6
Alcoholic beverages	5.5	5.3	4.9	4.2	1.4	1.1	0.9	1.1	0.9	1.1
Stimulants and spices	0.6	0.7	0.2	0.3	0.6	0.4	0.4	0.4	0.4	0.4
<b>Animal products</b>	30.4	29.8	24.4	27.6	6.6	6.0	6.3	9.2	6.1	9.3
Meat and offal	12.7	13.8	7.9	10.7	2.8	2.4	2.9	4.9	2.9	5.0
Milk	8.8	8.8	9.2	8.1	2.3	2.3	1.8	2.2	1.7	2.2
Animal oils and fats	5.5	3.9	5.2	5.3	0.7	0.5	0.8	1.0	0.8	1.0
Eggs	1.8	1.5	1.1	1.6	0.2	0.2	0.3	0.6	0.3	0.6
Fish	1.6	1.8	1.1	1.8	0.7	0.6	0.5	0.6	0.5	0.5
Food group	Developing countries									
	Latin America and Caribbean		Sub-Saharan Africa		Near East and North Africa		East and Southeast Asia		South Asia	
	1969-71	1990-92	1969-71	1990-92	1969-71	1990-92	1969-71	1990-92	1969-71	1990-92
<b>Vegetable products</b>	83.5	82.6	93.3	93.4	89.6	90.4	93.8	89.1	94.4	92.6
Cereals	39.4	38.4	43.7	44.7	61.1	56.9	67.7	66.5	67.0	64.5
Sugar	15.5	16.3	3.4	4.1	8.5	9.3	2.6	3.8	9.6	9.5
Vegetable oils and fats	6.0	11.1	6.4	8.0	7.3	10.6	2.4	5.1	4.3	6.8
Roots and tubers	7.2	4.1	21.7	21.0	1.3	2.2	12.2	5.1	1.8	1.6
Vegetables and fruits	6.0	5.2	6.0	5.6	7.1	7.0	2.8	3.3	2.8	3.0
Pulses and nuts	6.7	4.8	9.0	7.2	3.7	4.0	4.8	3.4	8.2	6.3
Alcoholic beverages	2.4	2.5	2.2	2.1	0.2	0.2	1.2	1.7	0.1	0.3
Stimulants and spices	0.3	0.3	0.8	0.6	0.4	0.4	0.1	0.2	0.6	0.6
<b>Animal products</b>	16.5	17.4	6.7	6.6	10.4	9.6	6.2	10.9	5.6	7.4
Meat and offal	8.1	8.4	3.0	2.9	3.2	3.3	4.0	7.7	0.9	1.1
Milk	5.2	5.4	2.3	2.4	4.2	3.9	0.3	0.5	3.2	4.5
Animal oils and fats	2.1	2.0	0.6	0.5	2.0	1.5	0.6	0.7	1.0	1.4
Eggs	0.6	1.0	0.2	0.2	0.3	0.6	0.5	1.0	0.1	0.2
Fish	0.5	0.5	0.6	0.7	0.2	0.3	0.8	1.0	0.3	0.3

The situation regarding the sources of aggregate protein supplies is slightly different from that of aggregate energy supplies. The share of animal products in total protein supplies rose in both the developed and developing countries (Table 4.10). The same pattern is observed in both parts of the developed world – the industrialized countries and the transition economies – and also in all sub groups of the developing world, with the sole exception of sub-Saharan Africa where a rising share in the 1970s was completely offset by a decline in the 1980s. The most significant increase was observed in east and Southeast Asia, where the share of animal products in protein supplies increased from 15 percent in 1969-71 to 24 percent in 1990-92, whereas in the developing countries as a whole the share rose from about 19 to 24 percent.

The situation regarding the sources of fat supply is different again (Table 4.11). The share of animal products in total fat supplies has been falling both in developed countries and in the world as a whole but rising in the developing countries. While the share of animal products declined from nearly 64 to 58 percent in the developed countries, it increased slightly from 36 to 38 percent in the developing countries. However, this increase was confined almost entirely to East and Southeast Asia and to a lesser extent, to South Asia; elsewhere in the developing world the share of animal products in total fat supplies actually declined over the two decades from 1969-71. These changes suggest that some regions are diversifying their diets more than others. The nature and extent of such diversification can be gauged from Table 4.12 which shows the share in total energy supplies of whatever happens to be the major food groups in a country. The lower the share, the more diversified a country's diet is assumed to be. Using this criterion, it is obvious that the diets of the developed world are much more diversified than those of the developing world but there are two interesting points to note. First, even in the developed regions there are countries (such as South Africa and Albania) in which the extent of diversification is no greater than the average of the developing world while, on the other hand, the diversification level achieved in Latin America is close to that of the transition economies. Second, in all developing regions except sub-Saharan Africa, the extent of diversification is increasing overtime, especially in the countries of the two groups, East and South East Asia and the near East and North Africa.

**Table 4.10**  
**Share of Major Food Groups in Total Protein by Region and Economic Group,**  
**1969-71 and 1990-92**

Food group	World		Developed countries		Developing countries					
	1969-71	1990-92	1969-71	1990-92	1969-71	1990-92				
<b>Vegetable products</b>	66.3	64.5	46.4	42.3	81.1	75.8				
Cereals	46.3	47.2	32.2	29.0	56.8	56.2				
Pulses and nuts	10.0	8.3	4.1	3.9	14.3	10.5				
Vegetable and fruits	4.5	4.8	4.3	4.5	4.7	5.0				
Roots and tubers	4.0	2.7	4.0	2.9	4.0	2.5				
Vegetables and fruits	4.2	4.3	4.5	4.9	4.5	4.8				
<b>Animal products</b>	33.7	35.5	53.6	57.7	18.9	24.2				
Meat and offal	15.6	17.2	24.9	28.3	8.8	11.6				
Milk	10.4	9.6	17.4	16.6	5.2	6.0				
Fish	5.2	5.9	7.0	8.6	3.9	4.5				
Eggs	2.4	2.8	4.1	4.1	1.1	2.1				
Animal oils and fats	0.1	0.1	0.1	0.1	0.0	0.0				
Food group	Developed countries				Developing countries					
	Industrialized		Transition economies		Least developed		Low income food-deficit		Low-income	
	1969-71	1990-92	1969-71	1990-92	1969-71	1990-92	1969-71	1990-92	1969-71	1990-92
<b>Vegetable products</b>	41.4	39.0	56.0	49.3	80.9	82.3	84.6	78.9	85.5	79.5
Cereals	26.4	24.2	43.4	39.2	56.4	60.0	59.2	59.3	60.1	60.5
Pulses and nuts	4.6	4.8	3.2	1.9	14.9	13.2	15.2	10.8	15.3	10.2
Vegetable oils and fats	5.0	5.0	3.2	3.4	3.7	3.4	4.7	4.9	4.6	5.0
Roots and tubers	3.2	2.6	5.4	3.6	4.1	4.3	4.4	2.7	4.4	2.7
Other veg. products	2.3	2.5	0.8	1.1	1.7	1.3	1.2	1.1	1.1	1.1
<b>Animal products</b>	58.6	61.0	44.0	50.7	19.1	17.7	15.4	21.1	14.5	20.5
Meat and offal	28.4	30.5	18.2	23.5	9.2	8.3	6.8	9.9	6.6	9.8
Milk	17.6	17.5	17.0	14.7	4.8	5.0	4.2	5.1	4.0	5.1
Fish	7.6	8.8	5.9	8.2	4.5	3.9	3.5	4.1	3.2	3.6
Eggs	4.8	4.0	2.8	4.1	0.5	0.5	0.8	1.9	0.8	1.9
Animal oils and fats	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0
Food group	Developing countries									
	Latin America and Caribbean		Sub-Saharan Africa		Near East and North Africa		East and Southeast Asia		South Asia	
	1969-71	1990-92	1969-71	1990-92	1969-71	1990-92	1969-71	1990-92	1969-71	1990-92
<b>Vegetable products</b>	61.9	57.1	79.6	79.2	78.7	77.4	84.5	75.8	86.7	82.6
Cereals	37.6	38.1	45.7	48.2	63.6	60.8	60.6	59.1	63.1	62.3
Pulses and nuts	14.6	10.8	19.0	16.8	7.1	7.6	12.9	8.2	17.1	13.2
Vegetable and fruits	4.1	3.9	4.6	4.4	6.0	6.4	5.1	5.5	3.9	4.3
Roots and tubers	3.8	2.6	8.3	7.9	1.0	1.6	5.6	2.4	0.8	1.1
Other veg. products	1.9	1.7	2.1	1.9	1.1	1.2	0.4	0.6	1.9	1.7
<b>Animal products</b>	38.1	42.9	20.4	20.8	21.3	22.6	15.5	24.2	13.3	17.4
Meat and offal	21.8	24.2	10.7	10.4	8.9	10.0	7.5	13.2	3.4	4.0
Milk	11.4	12.2	4.8	5.2	10.2	8.9	0.8	1.3	7.4	10.4
Fish	2.9	3.3	4.3	4.4	1.3	1.9	5.7	6.6	2.1	2.3
Eggs	1.9	3.1	0.6	0.8	0.8	1.7	1.5	3.1	0.3	0.7
Animal oils and fats	0.1	0.1	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0

**Table 4.11**  
**Share of Major Food Groups in Total Fat by Region and Economic Group, 1969-71**  
**and 1990-92**

Food group	World		Developed countries		Developing countries					
	1969-71	1990-92	1969-71	1990-92	1969-71	1990-92				
<b>Vegetable products</b>	48.0	53.3	36.3	41.7	63.7	62.0				
Vegetable oils and fats	28.7	36.6	27.6	33.3	30.2	39.1				
Cereals	9.7	8.3	3.8	3.3	17.7	12.2				
Pulses and nuts	6.8	6.1	3.1	3.3	11.8	8.2				
Other vegetable products	2.7	2.3	1.8	1.9	3.9	2.6				
<b>Animal products</b>	52.0	46.7	63.7	58.3	36.3	38.0				
Meat and offal	22.8	23.9	25.9	26.7	18.6	21.8				
Milk	11.9	9.7	15.0	13.6	7.7	6.8				
Animal oils and fats	13.4	9.0	18.0	13.1	7.2	6.0				
Eggs	2.5	2.6	3.2	2.9	1.5	2.3				
Fish	1.4	1.5	1.6	2.0	1.2	1.1				
Food group	Developed countries				Developing countries					
	Industrialized		Transition economies		Least developed		Low income food-deficit		Low-income	
	1969-71	1990-92	1969-71	1990-92	1969-71	1990-92	1969-71	1990-92	1969-71	1990-92
<b>Vegetable products</b>	38.4	45.1	30.7	32.2	70.8	74.6	67.5	62.3	67.0	60.6
Vegetable oils and fats	30.1	36.4	20.9	24.1	29.5	38.1	29.8	36.9	29.3	35.6
Cereals	2.9	2.7	6.3	5.0	22.2	21.3	20.2	13.6	21.0	14.2
Pulses and nuts	3.5	3.9	1.8	1.5	15.1	11.7	13.2	9.2	12.4	8.1
Other veg. products	1.9	2.1	1.7	1.5	4.0	3.5	4.3	2.7	4.3	2.7
<b>Animal products</b>	61.6	54.9	69.3	67.8	29.2	25.4	32.5	37.7	33.0	39.4
Meat and offal	26.9	26.8	23.0	26.7	13.1	11.3	16.8	22.4	17.4	23.8
Milk	13.1	12.8	20.2	15.7	8.7	8.2	6.8	6.3	6.9	6.5
Animal oils and fats	16.6	10.9	21.9	19.3	5.0	3.8	6.4	5.7	6.4	5.9
Egg	3.4	2.7	2.8	3.6	0.8	0.8	1.3	2.3	1.3	2.3
Fish	1.6	1.8	1.5	2.5	1.6	1.3	1.1	1.0	1.0	0.9
Food group	Developing countries									
	Latin America and Caribbean		Sub-Saharan Africa		Near East and North Africa		East and Southeast Asia		South Asia	
	1969-71	1990-92	1969-71	1990-92	1969-71	1990-92	1969-71	1990-92	1969-71	1990-92
<b>Vegetable products</b>	48.2	56.5	78.0	78.7	64.0	71.5	59.6	52.2	73.6	72.2
Vegetable oils and fats	29.8	44.0	37.4	45.1	39.4	50.6	22.2	30.4	34.2	43.4
Cereals	9.2	7.1	19.0	17.0	15.6	12.3	19.1	11.0	22.5	15.9
Pulses and nuts	6.4	3.4	17.2	12.6	6.3	6.0	13.3	8.4	13.6	10.2
Other veg. products	2.8	2.0	4.4	4.0	2.7	2.6	5.1	2.4	3.3	2.6
<b>Animal products</b>	51.8	43.5	22.0	21.3	36.0	28.5	40.4	47.8	26.4	27.8
Meat and offal	27.1	22.6	10.5	9.9	11.5	10.2	29.1	36.8	4.5	4.0
Milk	11.8	10.0	6.4	6.5	12.3	8.8	1.4	1.4	12.4	13.7
Animal oils and fats	10.3	7.9	3.5	2.9	10.9	7.2	5.2	4.3	8.3	8.6
Eggs	1.8	2.3	0.6	0.7	1.0	1.8	2.7	3.6	0.4	0.9
Fish	0.7	0.7	1.1	1.2	0.4	0.6	2.0	1.7	0.8	0.6

**Table 4.12**  
**Extent of Diversification of National Diets by Region, 1969-71 to 1990-92**

Region/economic group	Share of the main food group' in DES		
	Average of countries in region	Most diversified country	Least diversified country
	Percentage		
Industrialized countries			
1969-71	27.9	18.8 (United States)	52.8 (South Africa)
1990-92	25.8	16.9 (Netherlands)	53.7 (South Africa)
Transition economies			
1969-71	46.1	32.5 (Czechoslovakia)	63.9 (Albania)
1990-92	40.8	28.8 (Hungary)	61.6 (Albania)
Latin America and the Caribbean			
1969-71	41.3	25.1 (Dominican Rep.)	63.0 (Guatemala)
1990-92	40.5	24.0 (Paraguay)	60.0 (Guatemala)
Sub-Saharan Africa			
1969-71	50.8	23.8 (Uganda)	81.4 (Lesotho)
1990-92	50.2	25.9 (Gabon)	77.8 (Lesotho)
Near East and North Africa			
1969-71	58.4	43.4 (Kuwait)	80.5 (Afghanistan)
1990-92	53.1	33.7 (United Arab Emirates)	76.3 (Afghanistan)
East and Southeast Asia			
1969-71	66.6	45.7 (Mongolia)	84.1 (Cambodia)
1990-92	60.7	33.5 (Hong Kong)	84.7 (Cambodia)
South Asia			
1969-71	69.4	55.5 (Sri Lanka)	81.0 (Nepal)
1990-92	67.7	55.8 (Pakistan)	83.8 (Bangladesh)

Source: FAO, 1996a

**Table 4.13**  
**Share of Main Cereals and Roots in Total DES by Region, 1969-71 and 1990-92**

Region/economic group	Share in total DES				
	Rice	Wheat	Maize	Sorghum and millet	Cassava
	Percentage				
World					
1969-71	20.3	17.5	5.4	4.4	1.7
1990-92	22.0	19.5	6.1	2.6	1.6
Industrialized countries					
1969-71	5.1	18.5	2.0	0.1	0.0
1990-92	4.4	17.3	3.2	0.1	0.0
Transition economies					
1969-71	1.1	32.7	1.4	0.6	0.0
1990-92	1.3	32.9	1.2	0.2	0.0
Latin America and the Caribbean					
1969-71	9.0	13.9	15.7	0.3	4.2
1990-92	9.4	13.2	15.3	0.1	2.2
Sub-Saharan Africa					
1969-71	4.8	3.6	13.5	19.2	14.3
1990-92	7.8	5.4	14.7	14.6	14.9
Near East and North Africa					
1969-71	6.2	41.7	6.1	2.6	0.0
1990-92	6.2	42.8	4.7	0.8	0.0
East and Southeast Asia					
1969-71	43.9	9.8	6.8	4.6	1.1
1990-92	40.8	17.1	6.8	0.9	0.9
South Asia					
1969-71	35.4	16.8	3.4	10.5	0.0
1990-92	33.7	21.0	2.8	6.6	0.5

Source: FAO, 1996a

Another aspect of food composition pertains to the relative importance of major staple cereals and roots in the world. As can be seen from Table 4.13,

rice continues to be the major cereal in the world, followed closely by wheat. The share of rice actually increased somewhat between 1969-71 and 1990-92, but this was mainly because the population share of the rice-eating parts of the world increased during this time. In the major rice eating areas, i.e. East, Southeast and South Asia, the share of rice in total energy supplies actually declined over the two decades while that of wheat increased. The share of maize in the total world DES increased from 5.4 to 6.1 percent between 1969-71 and 1990-92. The increase in the percentage was significant in the industrialized countries and in sub-Saharan Africa. However, there was a decline in the near East and North Africa as well as in South Asia. In Latin America and the Caribbean, where maize is the most significant staple food, its share in the DES remained essentially unchanged, as it also did in the transition economies and in East and Southeast Asia. Among the minor cereals, the share of sorghum and millet declined at the world level, mainly because of their declining importance in the populous parts of Asia. Cassava, on the other hand, maintained its standing in sub-Saharan Africa, although it is losing its already reduced importance in Latin America.

## **FOOD AND AGRICULTURE IN NATIONAL AND INTERNATIONAL SETTINGS**

### **Poverty and Agriculture**

Undernourishment is not merely a symptom of poverty but also one of its causes. Poverty is not simply a lack of income or consumption but includes deprivation in health, education, nutrition, safety, legal and political rights, and many other areas. All these dimensions of deprivation interact with and reinforce each other.

Over the past decade, poverty and the related issue inequality have moved to the top of the international development agenda. At various summits from the early 1990s onwards, world leaders have proclaimed their commitment to poverty reduction and adopted a series of related targets. These



cover a wide range, from infant and child mortality to school enrolment, from gender equality to maternal mortality, from access to health and reproductive health services to the adoption of national strategies for sustainable development. The UN Millennium Declaration, adopted in September 2000, consolidated most of these targets. The following targets are to be achieved by 2015, against a base year of 1990:<sup>18</sup>

- Halve the proportion of the world's people whose income is less than US\$1a day.
- Halve the proportion of people who suffer from hunger.
- Halve the proportion of people without access to safe drinking water.
- Ensure full primary schooling for all children.
- Ensure equal access to all levels of education for boys and girls.
- Reduce under-five child mortality by two-thirds.
- Reduce maternal mortality by three-quarters.
- Halt and begin to reverse the spread of HIV/AIDS, malaria and other major diseases.

At the beginning of the twenty-first century, over 1.1 billion people are living in extreme poverty, subsisting on less than US\$1a day. Significant, but uneven, progress is being made towards meeting the 2015 target of halving the proportion of people living in poverty in developing countries. This proportion fell from 32 percent in 1990 to 25 percent in 1999. However, because of population growth, the reduction in numbers was less dramatic, from 1269 million to 1134 million. The regional picture was highly diverse. In East Asia, poverty fell very steeply during the 1990s. In South Asia, although the proportion of poor fell, the total number remained almost constant. In sub-Saharan Africa, the proportion remained virtually unchanged, while the number rose steeply.

The development community today shares the same broad recipe for poverty reduction. The recipe involves fostering pro-poor economic growth and favouring poor peoples access to all the services and other factors that support poverty eradication and define an acceptable standard of living : markets, credit and income-producing assets, basic education, health and sanitation services, safe water, transport and communications infrastructure, and so on.

Growth in the agricultural sector has a crucial role to play in reducing poverty. Agricultural growth spreads its benefits widely. Growth in the incomes of farmers and farm labourers creates increased demand for basic non-farm products and services in rural areas. For the poor, the rural non-farm sector offers a relatively easy escape route from poverty. Rural non-farm enterprise often requires little capital or training to set up and so offers many of the rural poor opportunities to find work and raise their incomes. Non-farm activities provide 44 percent of rural jobs in Asia and 25 percent in Latin America. In rural India they provide 60 percent of the income of the poorest 20 percent of the rural population. But the rural non-farm sector cannot grow independently : agriculture must grow first, to generate the increased demand for non-farm products. What economic policies at national level foster agricultural growth in developing countries? During the 1950s and 1960s it was widely believed that only industrial growth could deliver economic development. As a result, industry was protected while agriculture was heavily taxed or afforded low priority. By the end of the 1970s, there was increasing emphasis on the structural reform of economics. It was hoped that privatization, the liberalization of internal and external trade, lower taxes and reduced government intervention would produce higher economic growth and reduce the bias against agriculture. These measures have been widely adopted. However, there is little evidence to show that they have done much to increase growth, either in gross domestic product (GDP) as a whole or in agricultural GDP. This suggests that, badly needed though they were, these measures are not enough in themselves and need to be supplemented with other policies.<sup>19</sup>

## **International trade and globalization**

Freer trade is highly priced as a route to peace and prosperity. In developing countries, particularly in the least developed economies, freer trade in agriculture can raise incomes greatly, be an important source of foreign exchange and act as a catalyst for overall development. For most countries, food imports are already an important source of supplies and will continue to contribute to food security.

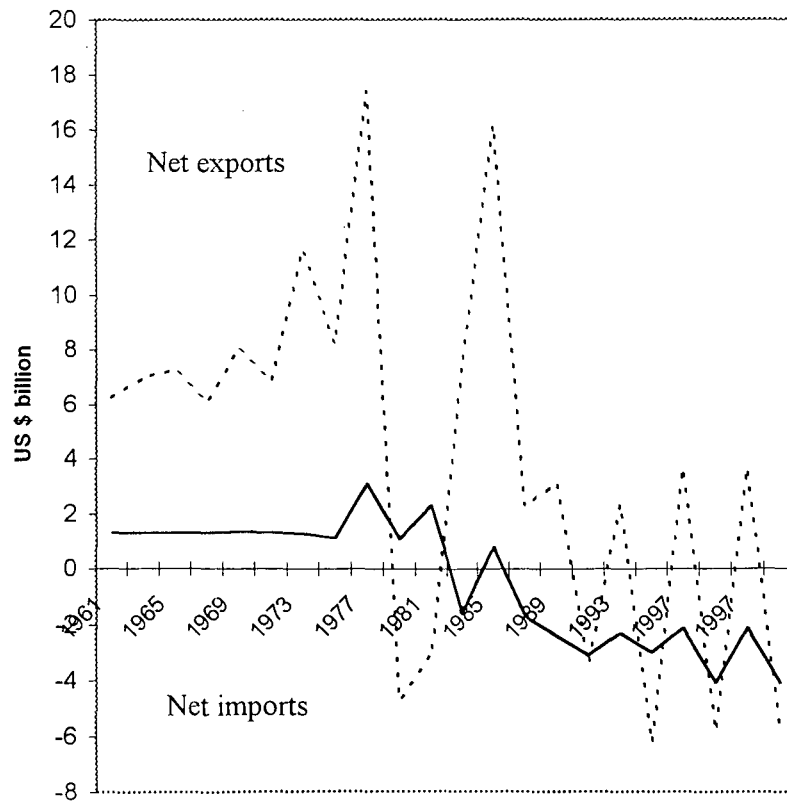
### ***Rising agricultural trade deficits in developing countries***

- The trade patterns of developing countries have changed rapidly over the past 40 years (Table 4.14 and Fig. 4.4): Agricultural exports have grown modestly compared to those of manufactured goods, resulting in a dramatic decline in the share of agricultural exports in total traded merchandise, from about 50 percent in the early 1960s to about 6 percent by the year 2000.
- The overall agricultural trade surplus of these countries has virtually disappeared. In the future they might indeed as a group, end up as net importers of agricultural commodities, especially of temperate - zone commodities.
- The least developed countries (LDCs), also as a group, became net importers of agricultural products as early as the mid-1980s. Their agricultural trade deficit has been widening rapidly and could quadruple by 2030.

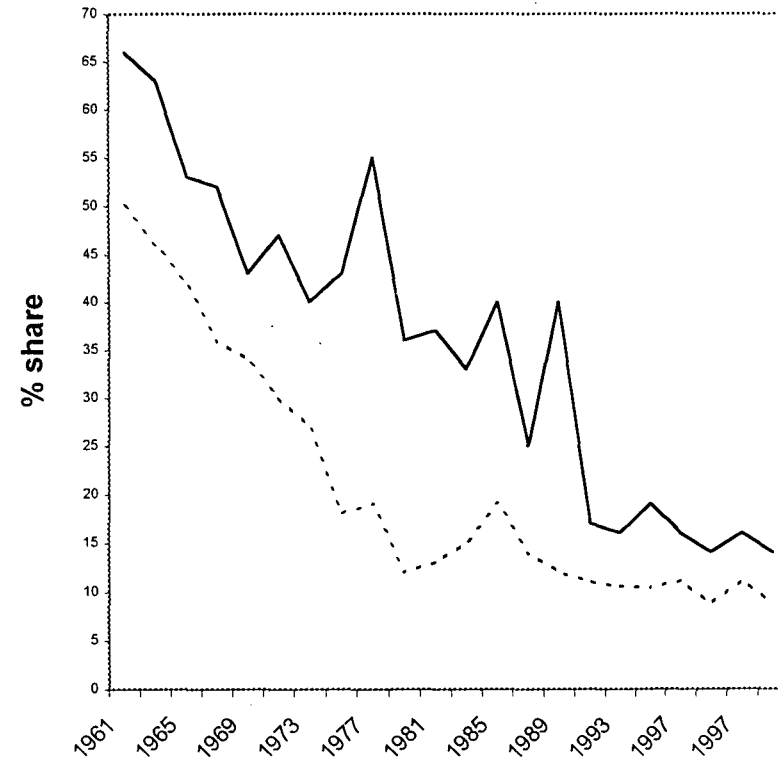
Both policy and market factors are driving these changes. On the policy side, barriers to trade and support for domestic production in the developed (mainly the OECD) countries have held back the growth of agricultural exports from the developing world. These trade distortions impose high costs and create widespread inefficiencies. In the countries that use them, they exact higher prices and taxes from consumers and taxpayers. For other countries,

**Fig. 4.4**  
**Agricultural trade balance and share of agricultural exports in merchandise trade, 1960 to 2000**

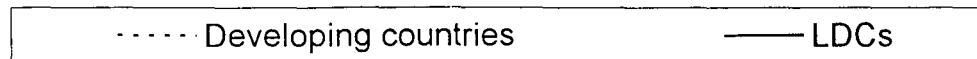
The surplus of developing countries has been shrinking...



... as also has the share of agricultural exports in total merchandise trade



Source: FAO (2000)



they limit access to export markets and introduce unfair competition in domestic markets. They hold world commodity prices down and so hold back the development of agriculture, especially in developing countries where less government support is available. On the market side, growth in agricultural exports from developing countries has been held back by sluggish and largely saturated demand in developed markets, in particular for tropical products such as coffee, cocoa and tea.

**Table 4.14**  
**Agricultural trade balance and share of agricultural exports in merchandise trade, 1960 to 2000**

Year	Surplus / Deficit in US \$ billion		Year	% Share	
	Developing countries	LDCs		Developing countries	LDCs
1961	6.25	1.30	1961	50	66
1963	7.00	1.31	1963	46	63
1965	7.25	1.30	1965	42	53
1967	6.10	1.31	1967	36	52
1969	8.00	1.35	1969	34	43
1971	6.85	1.34	1971	30	47
1973	11.60	1.29	1973	27	40
1975	8.20	1.12	1975	18	43
1977	17.40	3.10	1977	19	55
1979	-4.70	1.10	1979	12	36
1981	-3.10	2.30	1981	13	37
1983	7.40	-1.60	1983	15	33
1985	16.10	0.80	1985	19	40
1987	2.30	-1.70	1987	14	25
1989	3.10	-2.40	1989	12	40
1991	-3.40	-3.10	1991	11	17
1993	2.30	-2.30	1993	10.5	16
1995	-6.20	-3.00	1995	10.4	19
1997	3.60	-2.10	1997	11.1	16
1999	-5.80	-4.10	1999	8.8	14

### ***Ambitions Goals, Modest Achievements***

The benefits of trade reform experienced by many outward - oriented economies have created the momentum to continue reducing the barriers to trade. Many developing countries had already liberalized aspects of their agricultural trade since the 1980s under structural adjustment reforms. These reforms, and the full range of policies that affect agricultural trade, were subjected to systematic multilateral controls for the first time by the Uruguay Round's (1994) Agreement on Agriculture (AoA). The Agreement was hailed as a watershed, yet so far the results have been modest and often disappointing. Many studies<sup>20</sup> have found that, for most agricultural commodities, the AoA's impact on prices and levels of trade has been negligible, as has its impact on many developing economies. Producer support of all types remains high in developed countries : in 2000 it totalled US \$ 245 billion in the OECD countries. This figure rises to US \$ 327 billion if more general transfers to agriculture are included.

### ***Tariffs continue to curb trade***

Under the AoA non-tariff barriers such as quotas were to be replaced by equivalent tariffs. In addition, developed countries agreed to reduce all their tariffs by an average of 36 percent, over a period of six years, with a minimum of 15 percent for any one trade item. Developing countries agreed to reduce tariffs by 24 percent over a ten-year period. The least developed countries were not required to make any reductions. The reductions made since 1994 have complied with these goals, but it is not clear that market access has improved significantly. Developed country tariffs have been cut by an average of 37 percent, but the deepest cuts have been mainly for unprocessed tropical crops that already had low tariffs. Commodities also produced in developed countries, and processed products, benefited much less. For example, maximum allowable tariffs agreed by the European Union (EU) under the AoA

were 86 percent on beef and 215 percent on frozen beef whereas they are only 6 percent on pineapples but 25 percent on processed pineapples.

### ***Domestic support remains high***

Government support for agriculture can also distort trade, by allowing domestic producers to sell at lower prices than would otherwise be economically viable. The AoA also covered domestic support. Several types of support, such as research, infrastructure and environmental programmes, were exempted. Developing countries could also exclude measures of a developmental nature such as agriculture and rural development programmes. The AoA required developed countries to make a 20 percent reduction in their support for agriculture, developing countries a 13.3 percent cut and least developed countries none. These cuts were to be made with reference to a 1986-88 base, over a period of six years for developed countries and ten years for developing countries.

In reality many countries have faced much less pressure to reduce support for, and protection of, their agricultural sector. This is mainly due to the fact that the commitments to liberalize were based on historically high levels of support and protection. These so-called “bound” levels remained high enough to maintain much of the protection previously enjoyed, even after the cuts had been implemented. Indeed, total support to agriculture in the rich OECD countries was actually higher in 1998-2000 than before the AoA.

### ***Export subsidies are still substantial***

The AoA brought direct subsidies for agricultural exports into an international trade agreement for the first time. Indirect subsidies, such as export credit guarantees and food aid, were also covered. Developed countries agreed to reduce their expenditure on subsidies by 36 percent and developing countries by 24 percent. Reductions in the volume of subsidized exports were also negotiated, with reductions for each commodity of 21 percent required for developed and 14 percent for developing countries. Least developed countries

undertook no commitments to reduce their subsidies. The EU accounts for the bulk of direct export subsidies, in 1998 it spent US \$ 5.8 billion, more than 90 percent of all such subsidies covered by the AoA.

***More Liberalization would mainly benefit developed countries***

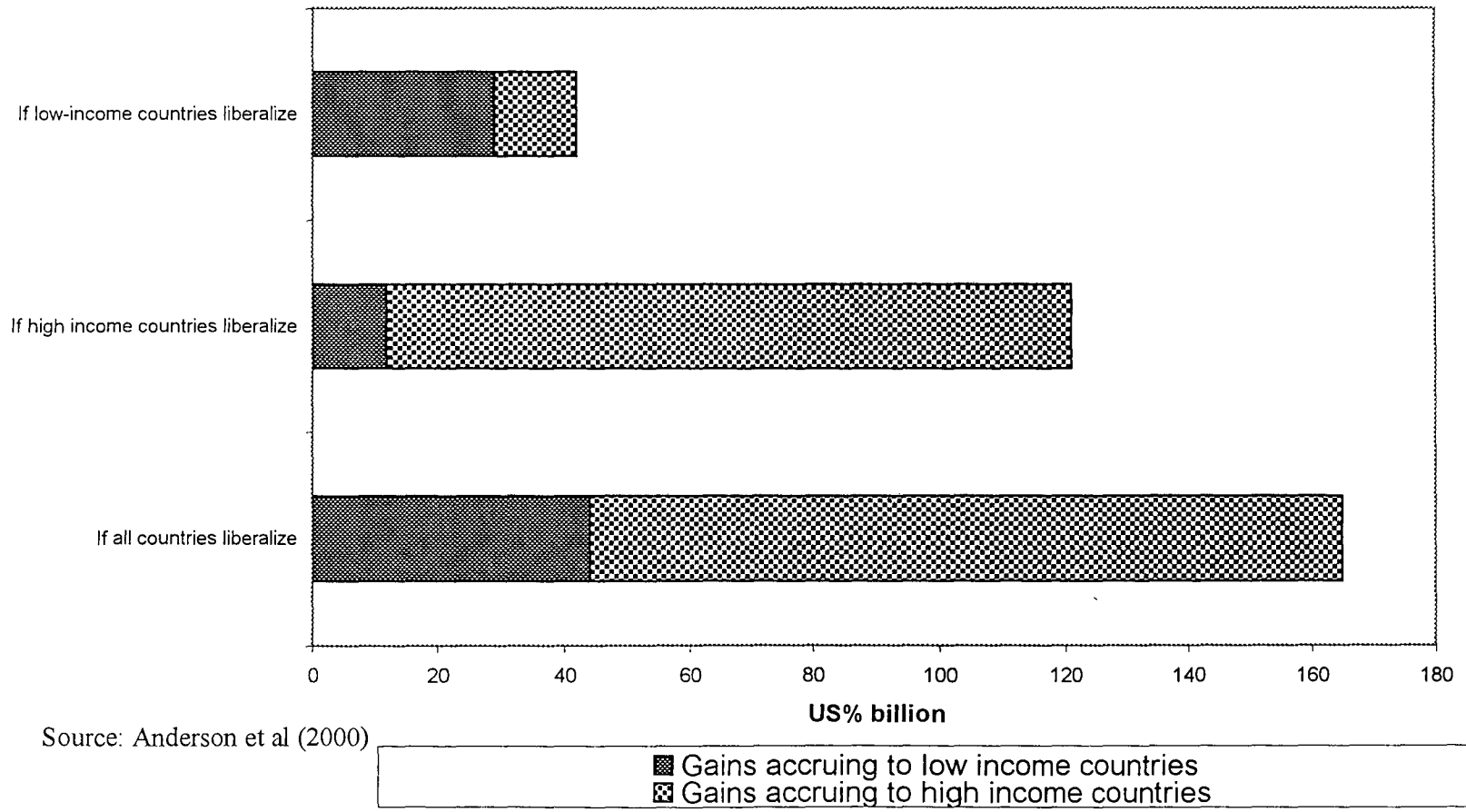
According to most studies, complete liberalization of agricultural trade could produce valuable overall welfare gains, but some groups would win while others would lose. The benefits would go mainly to consumers and tax payers in industrial countries, where agriculture is most protected, and to developing country agricultural exporters. In contrast, urban and landless rural consumers in developing countries might end up paying higher prices for some foodstuffs, especially cereals, milk, meat and sugar. Specific measures would be needed to help such loser groups. The results of studies on the impact of agricultural trade liberalization vary according to the assumptions they make. For example, a recent study found that complete liberalization would boost global incomes by US \$ 165 billion a year. The largest benefits would arise from reforms in developed countries, but the lion's share of these, amounting to some US \$ 121 billion would also remain in these countries. Developing countries stand to gain significantly (by, US \$ 31 billion) only if they also liberalize their own trade (Table 4.15 and Fig. 4.5).

Why do developing countries stand to gain so much less from trade liberalization than developed countries? One reason is that many developing countries have become net importers of agricultural products, and modest increases in world prices are unlikely to turn them into net exporters. In the importing developing countries, consumers stand to lose more from freer trade than domestic producers are likely to gain. The finding that gains for producers in developing countries would often be small reflects a number of factors:

- Many studies show that a cut in OECD subsidies would merely bring about an exchange of market shares between OECD countries. This is because OECD trade distortions are concentrated on temperate zone



**Fig. 4.5**  
**Potential Annual Welfare Gains from Agricultural Trade Liberalization**



commodities - products for which, in the majority of developing countries, the production potential is limited more by agro-ecological conditions than by policy distortions abroad.

- Where developing countries have a comparative advantage - in such commodities as coffee, cocoa, tea, spice and tropical fruits - developed countries import tariffs have already been reduced and the effects of further liberalization are likely to be small.
- Higher and more stable international prices are not always transmitted to farmers in developing countries. Inadequate infrastructure and inefficient marketing systems insulate many of them from world markets.
- Farmers in developing countries may not gain as long as domestic policies largely offset the price incentives from international markets. Most developing countries heavily taxed their agriculture throughout the 1970s and 1980s; many, including India, China and Pakistan, continued to do so during the 1990s.

**Table 4.15**

**Potential annual welfare gains from agricultural trade liberalization**

	Gains accruing to low income countries	Gains accruing to high income countries	Total
If all countries liberalize	44	121	165
If high income countries liberalize	12	109	121
If low-income countries liberalize	29	13	42

*How can trade liberalization benefit developing countries ?*

What measures and strategies would ensure that the poorest and most vulnerable countries and population groups receive an equitable share of the benefits of trade liberalization? The aim should be to:

- Eliminate direct and indirect export subsidies.
- Rationalize and simplify access to OECD markets. Specifically, rationalize and simplify trade preferences, assist countries whose preferences have been eroded through multilateral liberalization, and deepen existing preferences for very poor countries.
- Reduce OECD tariffs and consumer taxes on processed agricultural products, with special preferences for products from developing countries.
- Eliminate tariff escalation for tropical commodities, in the developed as well as the developing countries. Tariffs are rising even faster in the former than in the latter group. The purchasing power of China's or India's rapidly growing middle class could turn these countries into major importers of some tropical agricultural products over the next 30 years.
- Create or expand safety nets and food distribution schemes, to ensure that low-income consumers are not penalized by rises in the prices of food imports.

If developing countries are to benefit from free trade, their farmers will need to become more responsive to the rising and more stable international prices that should result from such trade. A massive mobilization of resources is needed to improve agricultural productivity at home and thus competitiveness abroad. The most important measures are increased credits for rural areas, and more investment in all aspects of support for agricultural production and processing, including rural infrastructure (irrigation,

transportation, storage and marketing), research, education and training, and standard setting and quality control.

Substantial gains would also result from other policy reforms. In developing countries, removing taxes on agricultural exports and tariffs on non-agricultural imports (machinery, fertilizers and pesticides) would improve the terms of agricultural trade and help farmers compete on international markets. In developed countries, removing trade barriers in labour intensive manufacturing could bring benefits for farmers in developing countries. Non-agricultural exports now account for more than 90 percent of the total exports from developing countries, and more than 80 percent in the case of least developed countries. Deeper and broader preferential access to the markets for manufactured goods in some developed countries could make an important contribution to food security in the least developed countries providing them with the means to finance their huge and rapidly increasing food import needs in the future.

***Does Globalization disadvantage the poorest countries?***

Globalization is a modern word for a process that has been going on for centuries. New technologies in the fields of transport and communications, from advances in sailing and navigation to the steamship and the telegraph have often reduced the cost of shifting goods around the world in the past, leading to increased economic integration. Recently, such technologies have included roll on roll-off container systems and the internet, while lower trade barriers have further eased the movement of goods and capital. Globalization has brought lower prices to consumers, and investment and employment to newly industrializing countries. But it has also raised widespread public concern over the fate of the poorer developing countries, which are alleged to have been left further and further behind as the rest of the world advances.

There is strong evidence that countries can be disadvantaged in the global market place by their geographical endowments. Lack of infrastructure

can make it hard to get perishable products to markets, increasing marketing costs and so deterring investment. As new investment heads for better endowed areas, those countries and regions with physical and infrastructural handicaps may be bypassed, falling further and further behind and finding themselves trapped in a vicious circle of disadvantage. Most poor countries are located in the tropics, where the higher incidence of crop and livestock diseases and pests and excessive or inadequate rainfall are further factors compromising their ability to participate in global agricultural markets. Distance from the sea and a lack of navigable waterways can constitute additional disadvantages. Outside Europe, average incomes in landlocked countries are only a third of those in countries with a seaboard.

Sub-Saharan Africa, located mainly in the tropics and with a high proportion of problematic soils, suffers multiple handicaps in the global market place. Only 21 percent of this region's population live within 100 km of the coast or of a navigable river, against 89 percent in high income countries. The proportion of the population that is landlocked is seven times higher than in rich countries. Landlocked countries in Africa have average freight costs almost three times higher than in high income countries. In contrast, regions of the United States, Western Europe and temperate-zone East Asia within 100 km of a coastline account for a mere 3 percent of the world's inhabited land area. Yet they house 13 percent of the world's population and produce at least 32 percent of the world's GDP.

Combining data on population and income levels provides a revealing picture of the distribution or density of incomes over different countries and regions. It underscores the importance of infrastructure and /or geographical location, showing that:

- Nearly all landlocked countries in the world are poor, except for a few in Western and Central Europe which are deeply integrated into the

regional European market and connected by multiple low-cost trade routes.

- Coastal regions, and regions linked to coasts by navigable waterways, are strongly favoured relation to the hinterlands.
- Sub-Saharan Africa stands out as the region that is most disadvantaged in terms of unfavorable agro-ecological conditions as well as inadequate transport and communications infrastructure.

***Does globalization concentrate too much power in the hands of multinationals?***

Globalization is often charged with shifting power away from national governments to multinational enterprises (MNEs). MNEs have been accused of abusing market power, exploiting farmers and labourers around the world, and exerting pressure on governments to reduce environmental and labour standards. Today MNEs in food and agriculture operate across many country borders. They are more and more vertically integrated, covering the whole sequence of operations from producing and marketing seeds, through purchasing the crop, to food processing and distribution. When they control large parts of the supply chain, these large corporations can exert monopoly selling or buying power, thereby putting pressure on farmers and retailers. Through production contracts or joint ownership in land or livestock operations, they can tie farmers into buying the company's inputs and selling their produce only to the company. Farmers may also lose entrepreneurial capacity and become more or less dependent workers on their own farms. It is also true that MNEs can and do more operations from country to country in search of lower costs, including wage rates, and of lower labour and environmental standards.

### *Benefits of globalization*

However, if the often heard demands for global parity in wages and environmental standards were met, this would remove a major competitive advantage of poorer countries and could halt the flow of investment towards them, seriously prejudicing their further development. Countries that excluded MNEs would be excluding the best available channels for getting their products to the global market place. MNEs usually upgrade local skills, methods, standards and technologies as they expand in a country. For example, in the late 1980s, in China's Heilongjiang province, the multinational Nestle built rural roads, organized milk collection points and trained dairy farmers in basic animal health and hygiene. MNEs also force local firms to upgrade in order to remain competitive. Recent research shows that the greater the degree of openness of a national industry to foreign competitors, the greater its productivity. Indeed, the presence of foreign firms may be the single greatest stimulus to improving productivity available in many developing country settings.

The claim is often made that globalization makes the world's poor poorer, but there is no evidence for this. Countries may, however, become poorer in a relative sense as they fail to benefit from globalization. Recent research conducted for the World Bank suggests that openness to international trade boosts economic growth. Developing countries with policies that favour openness increased their rate of GDP growth from 1 percent in the 1960s to 3 percent in the 1970s, 4 percent in the 1980s and 5 percent in the 1990s. In contrast, much of the rest of the developing world, containing about 2 billion people, is becoming increasingly marginalized. The aggregate growth rate of these countries was actually negative in the 1990s.

Overall, the benefits of continuing globalization are likely to outweigh the risks and costs. Negative impacts can be mitigated by appropriate policies. A combination of measures including openness, investments in infrastructure,

the promotion of economic integration and limits on market concentration and control, could make globalization work for the benefits for the poor.

### **Food Aid**

The World Food Programme (WFP) has launched a new approach to the provision of its assistance. The two essential ingredients of this Enabling Development initiative are closer targeting of specific geographic areas and the underpinning of food aid with rural development activities.

WFP assistance has traditionally been directed to support the development policies of recipient governments or areas judged to be vulnerable to food shortages on the basis of their climate and geography. Typically, food was distributed to regions subject to drought or flooding. Recently, however, a more sophisticated understanding of the causes of inadequate nutrition as well as new tools together and analyze data have enabled food-related assistance to be channeled more accurately to the people who most need it. New ways of marking at the local level allow beneficiaries to assume ownership of food assistance activities, thereby helping to ensure that the gains achieved are sustained.

### ***The New Approach***

The new approach recognizes that diverse factors combine to produce different kinds of food insecurity. Recent studies have shown how poverty, illiteracy, malnutrition and environmental degradation can be direct causes, as well as direct effects, of food insecurity. Moreover, although people in areas prone to drought or flooding may be vulnerable to food shortages, as shown in conventional analyses, they have sometimes developed successful strategies for coping with these current threats and so do not necessarily suffer from food insecurity. On the other hand, some disadvantaged members of a community may suffer chronic food insecurity, even in regions where a favourable climate and good soils ensure that these are usually food surpluses.



To achieve food security, three conditions must be satisfied: food must be available in sufficient quantities, taking into account domestic production, commercial and food aid imports and national stocks; house-hold livelihoods must be adequate to provide people with access to food supplies; and the supplies available must satisfy the specific dietary and health needs of all members of the community.

Vulnerability analysis and mapping (VAM) tools can translate these insights into sound plans and effective action<sup>21</sup>. As part of WFP's strategy to focus its Enabling Development initiative on the most food insecure areas and people, the VAM Unit, with support from the Canadian Impact Grant Facility, has identified the best practices available for vulnerability analysis. Instead of concentrating on crop failures and other disasters, the new methods can help to identify:

- Who is food-insecure or vulnerable to food insecurity;
- Why those people are food-insecure or likely to become so;
- where the food-insecure and vulnerable people live.

New country programmes are being designed with more accurate geographic, sectoral and beneficiary targeting. These enable WFP and its partners first to reach the regions and people most in need and then to design and plan activities so as to address the real causes of their food insecurity.

### *Applying the new approach*

A good example of this approach in action is provided by Nepal. WFP was previously involved in two projects in the country: one was in support of a national education programme, and the other entailed the construction and rehabilitation of national rural infrastructure (tracks and trails). When the Nepal country office set out to recast its programme in line with the Enabling Development initiative, a major review of existing projects and a

comprehensive vulnerability analysis were carried out. The result was a new programme with the following objectives<sup>22</sup> :

- concentrate resources on areas with the highest incidence of food-insecure people;
- focus on the most insecure populations (the hungry “poor”) within these areas;
- Carry out activities that address community needs and the root causes of food insecurity.

This line of action means a change in both the areas and the people targeted for assistance. It will shift the focus of WFP activities progressively from the food-producing Terai area of the plains to the western mountains, which have the worst access to food and the most severe food insecurity. Participatory methods will then be used to ensure that the most food insecure commodities, and more specifically households and individuals, will benefit from the employment generated and the assets created by WFP activities (Map, pp. 30, Food insecurity, 2001).

### *Linked activities*

During the five-year programme (2002-2006), WFP will support three distinct but linked types of activity in infrastructure development, education and nutrition. By concentrating these activities in the same geographic areas, it aims to build up physical and human capital in tandem and so achieve the maximum possible impact on food security.

Initially the programme will support a range of self-help activities to improve community infrastructure. These will underpin subsequent education and nutrition activities and promote an enabling environment for other development activities. In the short term, the aim is to alleviate temporary and seasonal food shortages in food-deficit households by creating community based employment. In the longer term, the food security of these households

should be improved through the construction of small roads and trails to improve access to markets and through the creation of community assets that stimulate food production. Such assets could include structures for small-scale irrigation or for the control of flooding and soil erosion. Groups of needy households will build the community infrastructure through food-for-work arrangements and will subsequently own and maintain the structures.

### *Increased effectiveness*

As WFP programmes continue to benefit from the more accurate targeting provided by vulnerability analysis so their effectiveness will be increased. Since the Enabling Development initiative was adopted in May 1999, 80 percent of new programmes have benefited from hunger and vulnerability analyses. All development proposals submitted to WFP's Executive Board now include food-assisted interventions designed to enable development in situations where food insecurity is the major constraint. Food aid alone is now used only where extreme poverty prevents access to food.

### *Pathways to food security*

Poverty is a key determinant of food insecurity. Finding out about the livelihood systems of poor people is an essential first step in identifying the options they have for improving their lot. At the World Food Summit in Rome in 1996, leaders identified three key questions that need to be answered in order to guide action:

- Who are the food-insecure?
- Where are they located?
- Why are they food-insecure?

Vulnerable group profiling is a method developed by FAO to help countries find the answers to these questions. This method is based on the assumption that food-insecure people are found within larger population groups that are exposed to various vulnerability factors, such as low income, insecure

land tenure or a deteriorating natural resource base. Through the identification and characterization of homogenous vulnerable groups, it is possible to determine, within each group, who the food-insecure are, where they are located and why they are food-insecure. It is also possible to identify the options open to different groups for improving their incomes and other aspects of their circumstances that contribute to food security.

### **HIV/AIDS: a crisis like no other**

While the HIV/AIDS epidemic is still essentially perceived and dealt with as a health issue, for millions of households and entire communities and regions devastated by disease and death, access to food has become a major priority. It is currently estimated that some 36 million people worldwide are infected with the human immune deficiency virus (HIV), 95 percent of whom live in developing countries. Tragically, the prevalence of the disease is still increasing. Regionally, the magnitude of the epidemic is greatest in sub-Saharan Africa, where more than 25 million people live with HIV/AIDS.

The disease commonly strikes the most productive members of society, with critical effects on agriculture as well as on all other aspects of economic and social development. Both rich and poor may succumb, but the poor are more vulnerable to its effects. HIV/AIDS prolongs and deepens poverty over time, stripping households of their assets and depleting human and social capital. These characteristics mean that the disease simultaneously undermines both the production of food and economic access to it - dealing a double blow to food security.

### ***The impact on food security and nutrition***

The effects on food security and nutrition are felt:

*At the household level*

Classically, a downward spiral in the welfare of an HIV/AIDS affected household's welfare begins as soon as the first adult falls sick. This results in less ability to carry out work on food production and processing, and increased time and money spent on health care, with further negative effects on food-related activities. Children may be forced to discontinue their schooling because the household needs their help and can no longer afford school fees. When the first adult dies, additional expenditures are incurred for the funeral and the productive capacity of the household is permanently impaired. Socio-cultural practices may further aggravate the household's problems, for example when a surviving wife cannot maintain access to the land of her deceased husband. A driving force behind the spread of AIDS, such forms of gender inequality can lead to a greater degree of deprivation among women in AIDS - affected societies.

In the next stage, the partner of the first adult may become sick, problems intensify and accumulate and the downward spiral accelerates. The household may find itself without cash reserves; often it becomes indebted and is forced to sell livestock and other productive resources. The household slides into destitution. For a poor person infected with HIV/AIDS, malnutrition and disease form a vicious circle. An inadequate diet increases the risk of secondary infections and hastens the progression of HIV/AIDS. This in turn results in a further deterioration of nutritional status. After HIV infection, the onset of AIDS and of secondary infections is delayed in individuals with a good nutritional status.

*At the community level*

There are several ways in which HIV/AIDS affects agriculture and food production at the community level. The first and most obvious is the fall on the labour force. FAO estimates that, in the 25 most affected countries in Africa, 7 million agricultural workers have died of AIDS since 1985 and 16 million more

deaths are likely in the next two decades. The labour force is expected to shrink by 10 to 26 percent in the ten countries with the most serious epidemics.

Commercial farming is just as badly affected as small-scale subsistence based farming, since migrant workers are particularly prone to infection. Crucial labour for weeding and harvesting may become scarce. The morbidity and mortality of employees increase the social and health costs incurred by the business, which may lose skilled and experienced workers. Just as food producers and processors are affected, so also are the institutions that support them. When many households in a community are affected by HIV/AIDS, traditional safety mechanism for the care of orphans, the elderly, the infirm and the very poor are overwhelmed and may well collapse altogether. Agricultural skills disappear because children are unable to observe their parents working. All these problems can inflict lasting damage on the community's ability to produce and buy food.

#### *At the national level*

Household and local impacts build up progressively, so that the life of the entire nation is affected. Key decision-makers and highly skilled professionals at the national level are lost. The increased burden on government health budgets diverts funds away from productive investments, such as agricultural services, inputs and credit. National food supplies decline, leading to a rise in food prices which hits poor people the hardest. The breakdown of commercial enterprises may undermine the country's capacity to export and hence to generate foreign exchange earnings and jobs - with a further impact on access to food among the poor.

#### *Urgent action needed*

HIV/AIDS represents a daunting humanitarian and development challenge. Yet experience from several countries shows that this challenge can be met and that the epidemic can be met.

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## **GLOBAL FOOD SYSTEM - THE EVOLVING SPATIAL PATTERN**

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International conflict over agricultural regulation continues. Paradoxically, the deadlock has been caused by a type of national regulation of agriculture whose days are numbered. Even more paradoxically, Europe, that as a defender of the old ways, has committed itself to more basic domestic reform than the United States. The choice is not between 'regulation' or 'free trade', but between new forms of implicit or explicit regulation<sup>1</sup>.

In and around the tangled web of national politics, European and North American integration, and international economic competition, new protagonists are taking shape. The contest over new rules and relations for food and agriculture also depends on transnational corporations and popular movements not formally present at any negotiations. Agricultural support programmes were put in place roughly half a century ago in response to farm politics. Since then, farms have become suppliers of raw materials within a transnational agro-food sector dominated by some of the largest, most technically dynamic corporations in the world. At the same time, urbanization and the rise of social movements expressing the concerns of consumers, environmentalists, and others, have shifted the focus from farm incomes to other interests.

In the long view, it is clear that the agricultural trade conflicts inside and outside the World Trade Organization (WTO) are the culmination of long term structural and inter-state changes. The rules implicitly governing agro-food relations were established in the years immediately after World War II and

worked stably enough for nearly twenty five years to justify calling them a 'food system'. However, new relations were forged during that time, which by the early 1970s began to undermine the post war system of food regulation.

#### **A. THE GLOBAL FOOD SYSTEM**

The impasse in international economic relations is centred on agriculture because in the agro-food sector there exists the largest gap between national regulation and transnational economic organization. This gap is the legacy of the post-World War II food system, the rule-governed structure of production and consumption of food on a world scale<sup>2</sup>. The food system was created in 1947 when alternative international regulation in the form of the proposal for a World Food Board was rejected.<sup>3</sup> AT the WTO, the only clear positions are those which 'decouple' and 'deregulate' elements of a food system that no longer works. The present alternatives for a new system are not formally proposed. They must be teased out from analyses of the social forces involved in global agrofood restructuring.

The post war food system was governed by implicit rules, which nonetheless regulated property and power within and between nations. The food system, therefore was partly about international relations of food, and partly about the world food economy. Regulation of the food system both underpinned and reflected changing balances of power among States, organized national lobbies, classes - farmers, workers, peasants - and capital. The implicit rules evolved through practical experiences and negotiations among states, ministries, corporations, farm lobbies, consumer lobbies and others, in response to immediate problems of production, distribution and trade. Out of this web of practices emerged a stable pattern of production and power that lasted for two and a half decades.

The rules defining the food system gave priority to national regulation, and authorized both import controls and export subsidies necessary to manage

national farm programmes. These national programmes, particularly at the outset US New Deal commodity programmes, generated chronic surpluses. As these played out, they structured a specific set of international relations in which power - to restructure international trade and production in one state's favour - was wielded in the unusual form of subsidized exports of surplus commodities. In this way agriculture, which was always central to the world economy, was an exceptional international sector. Then, the 'food crisis' of the early 1970s, combined with simultaneous money and oil crisis, initiated a period of instability from which we have not yet recovered. The sense of crisis in the early seventies stemmed from the sudden, unexpected shift from surplus to scarcity, which sent grain prices soaring and threatened food shortages for poor people and most of all, for poor countries. In retrospect it is clear that since the shortages came from a one-time explosion of demand and a temporary drop in production, the basic cause of surpluses was bound to reassert itself. Since major states continued to support agricultural prices by purchasing commodities, within a few years farmers produced more surpluses, and states resumed mercantile trade practices to get rid of them.

With the reappearance of surpluses, most commentators abandoned the idea of crisis and focused on ever shorter time horizons. Old policies designed to deal with surpluses once again seemed appropriate, and problems with those policies were not connected to the long trajectory of international food relations since 1947. However, disappearance of the symptom simply marked survival of the disorder. Like a Kalesdoscope turning, new relations which had emerged within the system became significant enough to alter the pattern. Old practices, especially surplus disposal in foreign markets, could not reconstruct the original relations of power and property. Food aid or other forms of export subsidy, which once underpinned the food regime, came instead to express intense international conflicts.

### **The Surplus System, 1947-72**

Because the United States of America (USA) protected its own domestic markets, other countries were constrained to adopt similar agricultural policies focused on the national market. US trade restrictions, designed to protect domestic farm programmes, encouraged other states to focus on their own national agro-food sectors. States replicated the US regulation of national sectors, but adapted policies to their locations in the food system. For continental Europe, this meant shifting the focus of protective agricultural policies away from tariffs, and redesigning trade protection around domestic support for farm prices. For other parts of the world, adaptation of the US model involved parallel shifts in the forms of state agricultural regulation. Thus, the postwar rules did not liberalize national agricultural policy, but created a new pattern of intensely national regulation.

At the same time, the free movement of investment capital tended to integrate the agro-food sectors of Europe and the US into an Atlantic agro-food economy. This tension framed the new roles of tropical export countries, including former European colonies, in the food system. This integration, moreover, was uneven. It did not include the countries of the socialist bloc, and despite high levels of aid and trade, the capitalist countries of Asia were not integrated into transnational agro-food complexes.

Thus the postwar food system was built on a tension between the replication and the integration reflected on an international scale the problem inherent in US farm programmes - chronic surpluses.

### **US at the Centre**

Paradoxically, the main challenge to present rules comes from the source of those same rules in the early postwar years - the US state. New Deal farm programmes of the 1930s were retained after World War II despite widespread awareness of the problem of surpluses. Mercantile practices had to be used to

dispose of the surpluses and to prevent a flood of imports into the US. As the dominant economic power after World War II, the US insisted on international rules consistent with its own national farm support programmes. These rules eventually allowed the US to create an overwhelming preponderance in world agro-food production and trade, far beyond its historic share.<sup>4</sup>

Yet mercantilist agricultural policy was in conflict with the larger US policy to promote free movement of goods and money internationally.<sup>5</sup> Because of its weight in creating international institutions after World War II, US decisions transferred this tension to the food system as a whole.

The food system was created by a series of decisions between 1945 and 1949, which reflected US determination to protect the import controls and export subsidies which, as we shall see, were a necessary complement to its domestic farm policy. US commitment to mercantile agricultural trade practices led to the sacrifice of multilateral institutions which had wide support among postwar governments, not only for regulating food, but also for the pursuit of the larger US agenda for liberal trade. The World Food Board Proposal, which provided for global supply management and food aid through the FAO, was rejected by the US and Britain at an international conference in Washington, DC in 1947. The Havana Treaty creating an International Trade Organization (ITO) a 1946 initiative by the US Department of State, was never formally submitted to Congress because it contradicted mercantile clauses in US domestic farm laws. Even the GATT, which began as an ad hoc negotiating forum intended to be subsumed under the formal powers of the anticipated ITO, and continued as a feeble substitute in its absence, excluded agriculture from its ban on import controls and export subsidies, at US insistence.<sup>6</sup>

The need for trade controls stemmed from an odd feature of domestic farm programmes, where, instead of direct income support, New Deal price supports tried to raise farm incomes indirectly by setting a minimum price

through state purchases. Government purchase to support prices encouraged farmers to produce as much as possible. Surpluses mounted more persistently with the technological developments involved in the industrialization of agriculture. Industrializations subordinated farms to emerging agro-food corporations, both as buyers of machines, chemicals, and animal feeds, and as sellers of raw materials to food manufacturing industries or livestock operations. Profits in the agro-food sector depended on the larger restructuring of the post war economy towards mass production and mass consumption,<sup>7</sup> especially increased consumption of animal products and high value-added manufactured foods, or what might be called 'durable foods'.

Commodity price support programmes both protected family farms and encouraged their relations with agro-food corporations. There was an important shift; the separation of intensive livestock from cereal production, and with it the growth of the two most important crops of the 'second agricultural revolution', hybrid maize and soy. Capital-intensive manufacture of soy-maize animal feeds allowed corporations to place themselves between increasingly specialized intensive livestock operations, which were their customers, and maize and soy farms, which sold to them. At the same time, mass production of durable foods required standard agricultural raw materials which corporations obtained through contracts with increasingly specialized and standardized farms.

The key to the persistence of the world food system was the innovative US policy of foreign aid, combined with import controls. Domestic agricultural price supports required import controls and export subsidies. Without controls, high domestic support prices would attract imports. Apart from its negative impact on hungry people abroad, especially war-torn Europe, this meant that without import controls, the commodity Credit Corporations, a US government agency, would have to buy ever greater quantities of world supplies to maintain the income of US farmers. Moreover, the more it bought, the greater was the

gap between support prices and residual market prices. Government stocks put a downward pressure on prices by keeping supply high. This created fiscal problems for the state budget, which had to pay support prices plus storage and disposal costs. Since the destruction of surplus agricultural products was politically unacceptable in a hungry nation (and world), commodity price support programmes required a way to dispose of surpluses without lowering prices, that is, outside markets'. These were found through domestic public distribution, such as food stamps and school lunches, and through subsidized exports to other countries in the form of 'aid.

Aid allowed the US to turn the problem of surplus stocks into an opportunity to pursue strategic, welfare, and economic policies. Yet aid did not simply integrate donor and recipient. As a mercantile trade practice, aid encouraged recipients and competitors alike to adopt the national regulation of agriculture and trade. Thus replication was built into the international food economy at the same time. In other words, what is frequently called the 'export of the US model' of both production and consumption<sup>8</sup>, was the outcome of specific practices in the postwar food system. At the same time, these practices also reflected historical experiences, so that the effects were quite distinct in Europe, the emergent third world, and as we shall see later, in Japan. In Europe and third World, new links with the US revolved around trade in wheat, animal feeds, and raw materials for food manufacturing.

### **Europe and the Atlantic Pivot**

Marshall aid to Europe simultaneously established the basis for Atlantic agro-food relations, and invented the specific mechanisms of foreign aid which were later adapted to the third world. For European agriculture, the tension between national regulation, with attendant surpluses, and liberal trade, was reflected first in Marshall aid and later in the Common Agricultural Policy. The US supported the European protection of wheat and dairy products, even at the

very high level needed to keep out efficiently produced and subsidized US exports. In return, the European community exempted maize and soy from the import controls of the common agricultural policy.<sup>9</sup>

Under the Marshall administration, dumping was secondary to recovery. US legislation required the use of Marshall funds to buy US surplus commodities at specified rates as much as 50 percent below the domestic price; it balanced the contradictory interests of reconstruction and dumping by specifying maximum and minimum quantities to be disposed of in recipient countries. US Marshall administrators, however, minimized agricultural dumping, as they understood it to be.<sup>10</sup> The 40 per cent of Marshall aid that went to food and agriculture in Europe was concentrated upon imports of feedstuffs and fertilizers for agricultural reconstruction. The balance shifted after 1954, when surpluses were redirected to underdeveloped countries in the form of food aid.<sup>11</sup>

However, as soon as agricultural reconstruction showed some success, West European farmers sought US markets for their dairy products. Congress then imposed import quotas on dairy (and a whole range of other) products. This, despite the fact that even with high support prices, imports of dairy products accounted for less than one percent of the US market. The ability of special interests to override US interests in trade relations with Europe can only be understood in the ideological context of the Cold War. Despite protection, the openness to direct investment by US transnational corporations helped to integrate European and US agro-food sectors via industrial inputs and processing. Both in promoting meat intensive diets and in organizing intensive livestock production, agrofood capitals shaped agricultural reconstruction along lines similar to the US. Most important was investment in an intensive livestock sector relying on industrial feedstuffs composed from soy and maize. This linked apparently national agricultures to imported inputs. Beneath the protected surface, therefore, lay the corporate organization of a transnational



agro-food complex centred on the Atlantic economy. It linked North-American, especially the US, to Europe.

The combination of the freedom of capital and the restriction of trade shaped agricultural reconstruction so that it created a new relationship between European and US agro-food sectors. A decade later, the common Agricultural Policy (CAP) of the European Economic Community introduced a similar form of agricultural support to that in the US. To achieve import substitution in the face of chronic US surpluses, however, the level of protection required was very much higher. In return for the US acceptance of EEC restrictions against wheat and dairy imports (the old products in international trade) the EEC did not restrict the new US export, maize and soy. The latter soon came to account for far greater export revenues than those lost with wheat<sup>12</sup>. Both European corporations and subsidiaries of US corporations in Europe contributed to a massive growth of manufactured feedstuffs for intensive livestock production, and a shift from domestic and colonial raw materials, such as flax and cotton meal, to maize and soy imported from the US. Like other industrial sectors, the apparently national livestock industry rested on a chain of inputs which effectively integrated a transnational sector.<sup>13</sup>

Thus European wheat replicated the national US sector, while specialized European livestock farms imported inputs from the US, creating an integrated Atlantic agro-food sector. The price support mechanism for wheat and dairy products eventually replicated the surpluses, and with them the export subsidies to dispose of them. By 1975 the EC had switched from being a net importer to a net exporter of wheat, and by 1985, France's exports (including to other EC members) were larger than those of the US.<sup>14</sup> At the same time, agro-industrial integration allowed European livestock producers to substitute a wide range of feed ingredients for US imports and to diversify trade. Eventually, the CAP closed the circle by introducing support for domestic oilseed production, an import substitution/ replication which eventually brought the US and EC to

the brink of trade war in 1992. Thus, trade restrictions and competitive dumping turned from the founding principle into the enduring friction of the food regime.

### **The Third World**

The Atlantic agro-food economy was the hinge for the reconfiguration of the food relations of Asian, Latin American and African countries. AS third world states sought to develop national economies, their agrarian strategies were shaped by the opportunities and limits of world food markets. These gave little reason to question the dominant ideologies - capitalist and socialist; modernization and dependency - which all encouraged states to down play agriculture except as a contribution to industrial development .For most countries, both the food supply of urban-population and the export revenues for industrial investment were largely sought outside traditional agrarian sectors during the 1950s and 960s.

For the commercial food supply, US wheat surpluses made imports an attractive alternative to the modernization of the domestic food sector. When the US Cost European wheat markets, which had been virtually the only source of import demand until the 1950s, it sought other outlets for its surpluses. It found them in Japan, and above all in the emerging third world. Third world markets were cultivated, despite lack of foreign exchange, through the use of food aid. The main US food aid instrument, public Law 480, adapted the specific mechanisms invented far Marshall aid. However, while Marshall administrators in Europe had resisted the Congressional attempts to dump US wheat because it undermined the main goal of agricultural reconstruction,<sup>15</sup> there was no such counter balance for PL480 aid in third world countries. Consistent imports made many third world countries dependent on cheap world wheat supplies.<sup>16</sup>

Wheat was both a change from most traditional dietary staples and an efficiently produced, often subsidized alternative to the marketed crops of domestic farmers. Despite the Green Revolution, which replicated in the third world the hybrid maize revolution of US agriculture,<sup>17</sup> and integrated national agriculture into world markets for equipment and chemical inputs, the third world as a whole became the main source of import demand on world wheat markets. Import policies created food dependence within two decades in countries which had been mostly self-sufficient in food at the end of the second world war.

On the export side, tropical crops faced the notorious problems of declining terms of trade, even when export states tried to manage world supplies.<sup>18</sup> Two of the most important tropical export crops, sugar and vegetable oils, were increasingly marginalized by industrial substitutes used as sweetness and oils. Although changing US (and other advanced country) diets increased the per capita consumption of sugars and fats, these were increasingly consumed in a new form. Sugars and fats became intermediate ingredients in manufactured foods rather than articles used directly by consumers.

Once industrial processes allowed for technical substitutions, the relative costs of crops could determine which would be used as raw materials for durable foods. The main industrial substitute for cane sugar was high fructose corn syrup, which became economically feasible to use because of US subsidies and surplus stocks of maize. The main substitute for tropical vegetable oils was soya oil, which was a byproduct of soymeal for animal feeds. Beyond that, soya oil was the second largest US food aid item after wheat, and was widely substituted for traditional oils for cooking and for industry, in recipients of US aid from Spain to India. Thus the food system fostered import substitution of tropical oils and sugars in the US and Europe, the Atlantic hinge of the international food regime.

By the early 1970s, then, the global food system had caught the third world in a scissors. One blade was food import dependency. The other blade was declining revenues from traditional exports of tropical crops. If subsidized wheat surpluses were to disappear, maintaining domestic food supplies would depend on finding some other source of hard currency to finance imports.

The food crisis of 1973-74 did create a sudden scarcity. It sent prices soaring and dried up aid. Worst of all for dependent third world importers, the food crisis coincided with the oil crisis. The effects included a complex differentiation of the third world based on the new importance of paying for expensive imports of food and energy. The solution was temporary, elegant, and dangerous. The oil revenues deposited in transnational banks by oil-rich states were lent out extravagantly to states desperately in need of financing food (and oil) imports.

### **New Relations, New Rules, 1972 - Present**

After two decades, the internal tensions within the food system had begun to pose serious problems. The replication of surpluses, combined with the decline of the dollar as the international currency, led to competitive dumping and potential trade wars, particularly between the European Economic Community and the US. This eventually made it unbearably costly for small countries, such as Canada or Sweden, to subsidize surpluses or exports. On top of international conflict, transnational corporations outgrew the national regulatory frameworks in which they were born, and found them to be obstacles to further integration of a potentially global agro-food sector.

However, the crisis was precipitated externally by an event which permanently breached the boundary between the capitalist and socialist parts of the food system. The geopolitical context for both Atlantic integration and the reorientation of third world agro-food relations was Cold War rivalry. The catalyst of crisis in the early 1970s, a crisis from which the regime has yet to

recover, was the massive grain deals between the US and the USSR which accompanied detente. The crisis unfolded through a series of US embargoes in response to feared shortages throughout the seventies, followed by fierce rivalry when surpluses returned in the eighties and nineties.

### **Détente and the Linking of Blocks**

The food relations among the US, Europe, the third world were only one part, though the dominant part of the food regime. They were contained by the Cold War dam which, despite leaks, divided the capitalist and the State socialist economies. With Detente, major trade and financial links breached the cold war dam. It is important to underscore that nearly two decades before the collapse of the socialist bloc and of the Soviet Union, economic ties between blocs had forever altered international food relations.

The Soviet American grain deals of 1972 and 1973 permanently broke the dam separating capitalist and socialist blocs. Despite leakages, this dam had been a wall containing the surpluses which were the pivot of the food system. In the 1972-73 crop year, the Soviet Union bought 30 million metric tons of grains, which amounted to three quarters of all commercially traded grain in the world.<sup>19</sup> The scale of that transaction created a sudden, unprecedented shortage and skyrocketing prices. Even though surpluses returned in a few years because the agricultural commodity programmes which generated them remained in place, the tensions did not disappear, but were intensified by farm debt and state debt, international competition, and the changing balance of power among states.

The sudden scarcity of grains and soybeans precipitated by the Soviet purchases provoked a counter-productive response by the US. First of all, despite forty years of experience, the US Department of agriculture acted as if the chronic surplus problem engendered by commodity price supports had disappeared. With state encouragement, US farmers abandoned conservation

and other practices which had reduced acreage erratically since the New Deal. Hastily treating surpluses as a bad memory, farmers borrowed to finance expansion. In the US, farm debt more than tripled in the 1970s, fueled by high prices and speculation in farmland.

Second, the Nixon Administration introduced a series of embargoes between 1973 and 1975, which prevented internationally cooperative adjustments to the new conditions. The grain deal of 1972 was the economic centerpiece of its major foreign policy initiative, Detente with the Soviet Union. The US government gave the Soviets 75 per cent of allocated CCC export credits, plus additional subsidies which reduced the export price below the domestic price. When the details became public, another scandal resulted in Congressional inquiries into the great Soviet grain robbery.<sup>20</sup> When soybean prices began to climb the following year, consumers and livestock farmers mobilized, and the US embargoed all exports in July 1973. Then in 1974 and 1975, fearful of a repeat of the scandals of 1972, the US embargoed grain to the Soviet Union.<sup>21</sup>

The embargoes were complete failures. They revealed that the US government could not control trade even when, as far soybeans, the US had a virtual monopoly over the supply. State trading agencies and transnational corporations and their subsidiaries were able to use complex transactions and transshipments to organize trade outside the knowledge, much less the control, of the US government or indeed of any state. Within two months of declaring the second embargo, the US negotiated the first of a series of five year contracts with the Soviet Union. This represented the largest single transaction in the world food economy.

This rapid US shift in 1975 implicitly acknowledged the frailty of US food surpluses as a weapon. The US reversed course by shifting the focus to economic policy intended to increase export earnings. The dependence of the

US on agricultural exports was compounded by the fact that a quarter of its maize and about 15 per cent of its wheat was bought by the USSR.<sup>22</sup>

Nonetheless, the Carter administration imposed one last embargo in 1980 in response to the Soviet invasion of Afghanistan. The Soviets bought almost the whole amount of the cancelled contracts on the world market, mostly from Argentina, Canada, and possibly even the US via transshipments from Eastern Europe. Consequently, the US embargo gave windfall profits to the corporate traders which took advantage of the unusual price fluctuations. Thus, even though the Soviet Union and Eastern Europe together accounted for imports valued at only a third of the third world, the US became dependent on Soviet purchase.

Yet within less than a decade the Soviet market, having risen to second largest in the world, effectively collapsed. Over the course of the 1980s, Soviet imports began to be sustained by the same US mercantile trade practices which had been applied earlier to Europe, Japan, and the third world.

Wheat, corn and soybean stocks in the US rose again in the 1980s, although new policies and expectations kept them in private hands. When the surpluses returned, they were harder to dispose of than before the boom. The US had expanded its production and world market share instead of reforming agricultural policy. US farmers carried a debt load which could not be supported when falling prices reduced cash flow and deflated land values, and in the 1980s farm failures became as severe as in the 1930s. Farmers had meanwhile lost many of their urban allies and their unity across commodity groups, making room for agro food corporations to exercise the most effective lobby. When the bubble burst in the 80s, US farmers had lost their monopoly over agricultural exports, and their political weight in US trade policy.

## Japan and the Asian Tigers

Just at the time when the US was becoming dependent on grain and soybean exports, its economic weight was declining relative to the EC and Japan, which were the major markets protected against its products. While the US and Europe were sliding into a subsidy war, relations between Japan and major exporters began to evolve in distinct ways. With the manifest collapse of the socialist bloc market after 1991, those relations revived the older, prewar competition centered on import demand. These economic relations are deeply submissive of the defining principle of the food system, namely power based on state supported exports of surplus commodities.

Japan's national agro-food economy began with Marshall aid. The Allied Occupation carried out a land reform and created a large class of small farmers whose interests lay in maintaining high subsidies for rice. Japan's postwar agro-food reconstruction replicated the US model, adopted to the circumstances of rice production. Rice producers became politically important to successive governments, and the security afforded by domestic rice supplies became a tenet of national ideology. Subsequent US strategic aid to South Korea and Taiwan had similar effects.

Yet replication was not balanced by integration as in Europe. Despite the similar goals and policies of Marshall aid, the economic and political conditions after the war, plus a lack of historical connections, led US corporations to shy away from significant direct investments in Japan of the sort they were undertaking in Europe.<sup>23</sup> Thus compared to Europe, US transnational firms did not create production chains integrating Japan's agro-food sector with that of the US.

In addition to postwar strategic conditions, the distinctively national character of the Japanese agro-food sector stemmed in part from its distinct diet. Although Japan early became a major importer of grains and say, they



played different roles in consumption and therefore in production. Wheat reflected a dietary change, encouraged by numerous trade missions and specific aid projects, such as provision of school meals. Japan became the largest of the new wheat importers after WWII, the rest being countries of the emerging third world. By incorporating wheat into their diets, Japanese consumers benefited from low world prices and helped clear US surpluses from the market. In this sense Japan played the same role as third world countries in restructuring international wheat trade around the US as an export centre.

Japan's relation to international soy markets was also different to that of Europe. Since soy was initially used mainly for human diets, it did not enter the economic and technical chains of the feedstuffs industry. By the time Japan began to import significant quantities of soy for animal feeds, the food system was already changing.

Dependence on US imports was reliable during the stable period of the food system, when US surpluses led to cheap world supplies. However, the US soy embargo of 1973 changed Japanese perceptions radically and permanently. Although the embargo lasted only two months and all contracts were eventually honoured, its effect on the confidence of import states was enduring. In particular, the embargo fatefully impressed the government of Japan with the unreliability of the US as a source of virtually all its soy. Japan began in the early seventies to look for alternative sources of soy supply to the US. Its strategy was to change the nature of surpluses from a problem of disposal, which the US and EC confronted, to an advantage for the buyer. It found a complementary interest among countries of the third world whose national industrial policies created internationally competitive agro-food sectors in the 1960s and after.

### **New Agricultural Countries**

Trade between Japan (and other commercial importers) and successful new agro food exporters in the third world continues to destabilize the Atlantic-centered food system. The new relations began during the early crisis years of the 1970s.

Soviet-American trade brought skyrocketing prices and new export markets in the seventies. These conditions coincided with the new possibilities for public borrowing created by the oil crisis. OPEC states captured a large share of world revenues and deposited them in international banks. The banks in turn pressed these 'petrodollars' on borrowers. Many of the borrowers were third world and socialist states, including some which hoped to invest in export agriculture and to use the earnings to repay the loans. Another set of borrowers, on a scale equivalent to third world debt, was US farmers. Seventies lending of petrodollars fueled both buyers and sellers of an expanding world market.

The differentiation of the third world into oil exporters, successful exporters of manufactured products, and those left behind in poverty (sometimes called the 'fourth world'), began in the early seventies. The new industrial countries, called NICs, were part of a transnational restructuring of industrial production. As we have seen, the technical basis of the American model of agriculture, which was replicated and integrated in different ways in other parts of the world, comprised the subordination of crops and livestock into corporate, often transnational, agro-food complexes and the industrialization of agriculture itself. The successful development of export agriculture was as important as that of manufacturers, and created a comparable set of 'new agricultural countries', or NACs. Some, such as Brazil, are both NICs and NACs. Brazil is the most important NAC. Its export capacity was based on a particularly successful development of the industrial agro-food economy in the 1960s, by means of state guided policies of industrialization

through import substitution. Brazil replicated and modernized the US model of state organized agro-food production. It shifted the focus of domestic policy from agricultural subsidies to agro-industry, which increased the value of commodities and did not create surpluses. Brazilian export policy replaced the US focus on stabilization of domestic farm programmes, with an emphasis on high value added exports.

Within four years of the US soy embargo of 1973, NACs had cut into the previous virtual US export monopoly. By 1977, the US share of world exports of oil seeds and meals, of which soy was the largest, was only 54.6 per cent.<sup>24</sup> Ten years later, the US share of world oil meal exports had fallen to one-sixth. It exported less than Brazil and only slightly more than Argentina. China, Chile, and India had joined the ranks of major oilmeals exporters. When Japan, the Soviet Union, and other import countries looked for alternatives to US supplies, Brazil was especially well poised to concentrate on value added meal rather than unprocessed soybeans. By 1980 Brazilian soybean production was a third as large as that of the US, and its soymeal production half as large; Brazilian exports of soybeans were 10 percent of US exports, but its soymeal exports were virtually equal. Then within a few years, as we saw, Brazilian soymeal exports exceeded those of the US. Thus, Brazil's successful adaptation of the US model, which shifted the focus from agriculture to agro-industry and from the management of surpluses to commercial exports, involved a complex web of international and social transformations. It gave Brazil a competitive advantage in a technically evolving and increasingly open international food economy. Most important for international food relations, the NAC phenomenon revives the intense export competition on world markets that existed prior to the postwar food system, and shifts advantage from exporters to importers.

Liberalization has created an unstable situation in which importers (with strong currencies) benefit and the largest exporter wields the greatest power in

international rule-making. Paradoxically, liberal trade practices now so desperately pursued by the US to manage short term deficits, reinforce the long term shift of advantage to (economically strong) import countries.

### **The End of the Surplus System**

The impasse over agricultural subsidies at the WTO reflects the contradictory foundations of the postwar food system, foundations which are crumbling rapidly. Overt conflict between replication and integration of national agro-food sectors at the end of 1992 was reduced to a few million tons of oilseeds. That it was important enough to jeopardize the comprehensive multilateral agreement to extent corporate power in key areas for future accumulation, such as services and intellectual property rights, testifies to the strength of residual tendencies in the food system.

### **The End of Commodity Programmes**

Recent farm policies are catching up with the structural end of the food system. The separation of farm income supports from production - that is, the end of price supports - is the likely future for North America and Europe. This would undo the key feature replicated in the food system - government generated surpluses. In the US, the farm bill of 1985 accelerated the shift from price to income supports - even as it intensified export subsidies. After 1987 fiscal pressures reduced the level of price supports. Payments to farmers will support their incomes directly, instead of indirectly through the prices of their commodities. Farm income supports may also be tied to management of rural resources and to environmental programmes.

The shift to income supports promise eventually to end the mountains and lakes of surplus agricultural commodities disposed of abroad by government subsidies and credits. It is easy to ignore the remarkable consensus on this way of ending an epoch of agricultural policy because implementation seems glacial.<sup>25</sup> Yet the shift is likely to continue, because it confirms in policy

what has already occurred structurally. Whatever stocks may be intentionally created for stabilization or security, whatever export subsidies and import controls may be retained or introduced, will have - indeed already do have - effects on the global agro-food sector different from those which shaped the food system.

### **The Food System Unhinged**

The two trade hinges of the food regime are coming unstuck. Countries of the third world and more recently of the former socialist bloc, have joined the multilateral trade negotiations at the WTO. This reflected (and reinforces) the unhinging of Atlantic agro-food integration, and of the US - Third world grain trade. The Atlantic hinge is weakening as Western Europe and the US are reinstating trade towards their respective continents. The North American Free Trade Agreement of 1992 and the expansion of the European Community to the European Union, promises to extend 'decoupling' to the continents of North America and Europe. Continental integration is also emerging in Asia, centered on Japanese imports and investment.<sup>26</sup> Whether these turn out to be rivals or partners, they replace the US centre of the food system with multiple centers.

The Atlantic hinge held because of the Cold War divide of Europe. The collapse of the socialist bloc was crucial in breaking the impasse over West European farm policy, by separating reform of the CAP from the conflict with the US. The other hinge was between the US on one side, and the third world (and Japan) on the other. The decline of US economic power parallels the transformation of exports from a source of power into a source of dependence. US exports were a source of economic and strategic power. In many underdeveloped countries, the food system left a legacy of food import dependence, stagnating export revenues, and debt. Later, a few became New Agricultural Countries, whose competitive exports helped to disrupt the food system. Now, in the twilight of the system, the export imperative prevails. For

strong importing economies, such as Japan, this is an advantage. For the third world as a whole, the transformation of their economies into agricultural export platforms intensifies new global international hierarchies between North and South.

The export imperative completely undermines US centrality in the food system. The inevitable trend toward export dependence which was built into US farm and export-and-aid programmes, has come to fruition. The US zeal to force open commercial markets implicitly recognized the failure of concessional sales, long term credits and other forms of 'aid' to create new markets. Surpluses have come to signify weakness rather than power, a burden rather than an opportunity. The need for markets and the need to restructure domestic agriculture have led to contradictory foreign economic policy - aggressive trade practices combined with insistent demands to abolish such practices.

The accession of former third world countries into the WTO and their sudden conversion to free trade signals the subordination of food restructuring to international debt. Promotion of agricultural exports, especially those called "non-traditional" (geared to new niche markets for exotic foods, flowers, and other crops), is an explicit aim of structural adjustment conditions imposed by creditors. They usually intensify social inequalities and conflicts in poor countries.

Debtor countries are caught in a scissors between the export imperative and import restrictions in Northern markets. They are thus forced to support free trade, however, wrenching is the shift from decades of import substitution, controlled flows of goods and money, and state enterprises. Debt repayment, currency reform, and the rest, require access to highly protected food markets in North America, Europe, and Japan. Liberal capitalism is the new, externally imposed form of austerity in the late 20th and early 21st Century. It is opposite

to the austerity chosen by revolutionary third world states of the Cold War era, which took the form of Antarctic socialism. Collectivization regardless of national circumstances was often futile and even disastrous. The same can be said of the creation of agro-food export platforms regardless of national circumstances.

Yet the export imperative, despite the faith in comparative advantage prevailing in expert circles outside Europe, does not create new regime rules. 'Decoupling' and 'tariffication' are the worlds used to dismantle farm policies and trade policies which once worked in tandem to regulate the food system during years when it was stable. But if farm incomes are supported for reasons other than agricultural production - social insurance, keeping a lid on unemployment, environmental protection, promotion of tourism - then what will become of agriculture? Direct payments to farmers can address rural poverty and antimigration, can support rural tourist industries, and perhaps mollify farm organizations, but they intentionally do not regulate agriculture. Likewise, to increase the transparency of trade controls by converting them all to tariffs does not regulate agro-food power or property.

## **B. GLOBALIZATION OF FOOD AND THE INDUSTRIALIZATION OF AGRICULTURE**

'The global food system', 'the international food regime' and 'agro industrial commodity complexes' are key signifiers in the academic discourse of rural development and change at the global and world regional levels. Regulation theory and the 'new' industrial geography inform these signifiers in the discourse termed 'the new political economy of agriculture.'<sup>27</sup> This discourse links the processes of globalization to the production, processing, distribution, marketing and consumption of food. Food systems are linked to forms of capitalist accumulation which are divided into three historical periods

stretching from the 1870s to the 1990s<sup>28</sup> which coincide with regulation theory's regimes of industrial accumulation.

Declining farm subsidies, increasing rates of contract farming and concentrated corporate control of food define the emerging system. This system is characterized by the dominance of transnational to the detriment of state regulation, control and sovereignty. With the exception of the enduring dichotomy of north/south, deterritorialization and a concentration upon a rapidly expanding fresh-fruit and vegetable industry also define this stance.<sup>29</sup> According to this perspective, global forms of regulation will deepen unequal power structures between the north and south.<sup>30</sup> Agro-food restructuring at the global level is marked by '... a complex division of labor, broadly governed by a complementary specialization in high value "nontraditional" exports from the South and Low-value cereals exports from the North (thereby exacerbating Southern food dependency).<sup>31</sup>

The international political economy of agriculture reveals relations of dependency and raises questions concerning food security, access and self sufficiency as food-grains and industrial feed-grains are supplied by the north to the south while coffee, tea, sugar, meat and horticultural products are exported to the north. This approach has been particularly helpful in understanding the world grain industry and the food-grain / feed-grain/ beef nexus.<sup>32</sup> It has also illuminated the role of transnational corporations and capital and commodity flows in shaping the production, movement and consumption of fresh and processed food.<sup>33</sup> The approach also details the ways in which agricultural production, processing and distribution processes have become spatially and temporally fragmented owing to innovations in communications, transport and storage technology.

Recent work in the geography of food and agriculture concerning the dynamics of agrarian change and its spatial implications calls for the broader



inclusion of social theory into conceptual and theoretical frame works.<sup>34</sup> Definitions of the industrialization of agriculture have moved well beyond descriptions of production, processing and distribution to debates about how agriculture mirrors industrial production by using Fordism and post-Fordism as categories to describe agro-industrial change at the global level.<sup>35</sup>

The processes and discourses of globalization are social constructs<sup>36</sup> which are dynamic, uneven and contested. Globalization does not represent the end of territorial distinctions and distinctiveness but an added influence on the local.<sup>37</sup> The current task is to begin methodologically and conceptually to grasp how the global is embedded within localities and how this reconfigures space and place.<sup>38</sup> The 'new' regional geography can play a role in approaching questions of local/global linkages.<sup>39</sup> Regions and their transformations are inextricably bound to social processes. Its emphasis upon social agency and the role of discursive strategies and struggles over resource identity, distribution and control in local arenas provides the necessary framework for explaining development and change on the ground.<sup>40</sup> Human activities shape, and are shaped by, place and history; human identities and activities constitute the economic, political and ideological processes which form and transform regions. In turn, the particular contextual details of place shape human activities. In this view, regional transformation is constituted from, and constitutive of, multiple overlapping processes occurring at varying geographic scales, from the local to the global.<sup>41</sup>

Empirical studies at the local and regional level reveal the importance of social categories such as race, class, ethnicity and gender in understanding how globalize agriculture shapes and is shaped by the social relations of production.<sup>42</sup> Gender difference structures pay rates, defines appropriate tasks and shapes patterns of mobility and immobility which determine structures of local labour markets. In order to grasp patterns of uneven development on the ground, social relations of production and divisions of labour are key elements

pertaining to this concept. These elements exist within all sectors of the food system embracing and extending beyond the farming household to workers in processing, distribution and marketing.<sup>43</sup> Some scholars also indicate the importance of race, gender and ethnic social categories as well as class in the shaping of divisions of labour. The interaction between these social categories and the labour process is a vital component of identity and the construction of place and spatial structures. As we begin to diversify our approaches to globalization and the geography of food, the political ecology,<sup>45</sup> feminist studies<sup>46</sup> and the development studies<sup>47</sup> provides an interdisciplinary set of literatures which place the relations of identity and work experience, society and environment, and development and change in particular places at the centre of the examination of the global food system and the impacts of industrial agriculture.

Considerations of class and class fractions structure farm size, ownership, labour markets and even how rurality is defined in a particular place.<sup>48</sup> This awareness is crucial in initiating dialogues and strategies at the grass roots levels among those resisting the negative effects of globalization. These include falling real incomes, increasing joblessness and layoffs, the elimination of small farms and businesses, deteriorating working conditions, accelerating environment destruction, and the erosion of democracy.<sup>49</sup>

### **C. WORKING IN THE GLOBAL FOOD SYSTEM : POWER AND POLITICS IN LABOUR RELATIONS**

The international division of labour within the structural and systemic conceptualization of global food is categorized by a north/south dualism shaped by capital and commodity flows.<sup>50</sup> These flows define the food chain which stretches from seed manufacture to consumption and involves the cultural construction of food and diets. The north/south division of labour is defined in terms of the south's dependency on the north for basic grains, the rise of

horticultural productions in the south to supply markets in the north as part of structural adjustment conditions and subsequent development strategies. Urban diets in the south change as indigenous staples such as yams and faro give way to the purchase of processed products such as milled rice, flour and processed, value-added imported foods. This shift in consumption marks the westernization of world diets, or shift to grain fed beef and mounting demand for fresh and processed fruit and vegetable products among the middle classes.

In the north, this division of labour is characterized by the location of corporate headquarters and corporate dominance in seed patents and biotechnology research on plant genetics. The north dominates the food-grain and feed-grain trade - especially in wheat, corn and rice. Research and development has provided the means to substitute agricultural crops by synthetic or nonfood crops and the productivist paradigm in agriculture has been diffused throughout the world even though the long-term sustainability of this paradigm is in serious question.<sup>51</sup> This division of labour is also realized by urban, middle-class and wealthy consumer preferences for wheat bread, beef and internationally recognized brand-name processed foods. Contract farming is a crucial form of production which integrates producers to corporations or state agencies through production and pricing contracts in both the north and south.<sup>52</sup>

Initially, the international division of labour in agro-industry tended to emphasize commodities and capital over people in its conceptualization. Struggle, conflict, experience, power and response at the local level were virtually obliterated by the structural conceptualizations of both the division of labour and the food system at the global level. Studies of how labour is disciplined and divided at the levels of worker, management, and owner / operator and farming household within the categories of production, processing and distribution indicate the need for an approach which blends social history and political economy with documentation of the human experiences of, and

responses to, the changes that restructuring engenders. This strategy parallels work in urban industrial geography which also examines the relationship between the political economy of industrial development and the reworking of gender divisions of labour in the informal economy and the international division of labour in industrial production.<sup>53</sup> Feminist theory and methodology have continually stressed the importance of the multiplicity of voices and positionality of subjects and knowledge as critical to deconstructing monolithic representations of women, third-world women and challenging the idea of dependent victims. This strategy is crucial in terms of lending a more local and human dimension to the conceptualizations of the global food system and understanding how the global lies at the least of the local. In addition, significant grassroots activity concerning food availability, food safety and the conditions of agricultural production informs the growing body of literature on the 'new' social movements.<sup>54</sup>

#### **D. FOOD FIRST OR TRADE FIRST**

Agriculture, the foundation of food and national security, was redefined as an issue of trade and commerce alone during the Uruguay Round of GATT with agribusiness MNCs as the determining force in the shift. The WTO Agreement on Agriculture (AoA) in fact does not refer to food and agriculture at all. There is no reference in it to soil or crops, to food or farmers, to sustainability or livelihoods, to food security or fair prices. Core issues of agriculture and food security at the national level have been reduced to non-issues in the global agreement. Food security, rural development, environmental sustainability, survival and sustenance of small farmers have been lumped together as "non-trade" issues, or been redefined as barriers to trade. In the AoA, trade and commerce come first - in other words, corporate profits take precedence over the health of the people, or the survival of rural communities. That is why the relentless implementation of the WTO's trade liberalization rules is pushing farmers to suicide, the poor to hunger and the planet towards an

ecological catastrophe in the form of climate disasters, extinction of species and destruction of water systems.

Assessing the impact of trade liberalization is the obligation in Article 20 of the AoA. The mandatory review required taking into account:

- (a) the experience from implementing WTO rules;
- (b) the effects on world trade in agriculture;
- (c) non-trade concerns (i.e., food security, food safety, livelihood security and rural development) and special and differential treatment to developing country members; and
- (d) other commitments to reform agriculture.

The review started one year before the implementation period of the Uruguay Round, i.e. in 2000.

Para 13 of the Doha Ministerial Declaration, adopted on November 14, 2001, stated that member countries commit themselves to “substantial improvements in market access, reductions of, with a view to phasing out, all forms of export subsidies, and substantial reductions in trade-distorting domestic support. We agree that special and differential treatment for developing countries shall be integral part of all elements of the negotiations and shall be embodied in the schedules of concessions and commitments and as appropriate in the rules and disciplines to be negotiated, so as to be operationally effective and to enable developing countries to effectively take account of their development needs, including food security and rural development. We take note of the non-trade concerns reflected in the negotiating proposals submitted by members and confirm that non-trade concerns will be taken into account in the negotiations as provided for in the AoA.” The modalities are to be established by March 31, 2003.

However, no progress has been made on the implementation issues or review of the AoA in spite of three years having gone by since the review started and one and half years having passed since the Doha Ministerial. The recently concluded mini-ministerial in Tokyo, convened largely to iron out differences on agriculture issues on the basis of the WTO chairman of agricultural negotiations, Stuart Harbinson's draft, failed to achieve an agreement between countries wanting to export at any cost and countries concerned with domestic food security and rural development issue.

### **The Harbinson Draft**

Stuart Harbinson, the Chairman of WTO's agricultural negotiations working group set up to draft the "modalities", including the numerical targets and formulae, in terms of which countries can frame their liberalization commitments. The report has made far-reaching recommendations.

On agricultural tariffs, it separates commodities into three categories: those with ad valorem tariffs greater than 90 percent, between 15 and 19 percent and below 15 percent. In the case of the developed countries, the report proposes that the single average tariff reduction rate for these groups should be 60, 50 and 40 percent respectively, and the minimum reduction per tariff line should be 45, 35 and 25 percent. Thus, the higher the currently prevailing tariff, the greater would be the proportionate reduction commitment.

The report also proposes that domestic support in the form of Blue Box payments or direct payments under production limiting programmes, liberally resorted to by the European Union, be reduced by 50 percent over five years. Further, aggregate support, including input and price subsidies, are to be reduced by 60 percent over a similar period and export subsidies are to be completely phased through a two-step process: those accounting for 50 percent of budgetary outlays are to go at the end of six years and the rest at the end of nine years.

What the Harbinson report does not do is propose a reduction of Green Box payments, or fixed payments made to farmers independent of their production levels, which were defined during the Uruguay Round process as being non-trade distorting. This has been a demand of some developing countries and critics of the Uruguay Round Agreement on Agriculture. In practice, these payments too affect the level of production and, therefore, the volume of world supplies and world prices. By ignoring these payments, the draft does not fundamentally go against government protection for farmers in developed countries at the expense of “freer” world trade. What it does do is make the case for adopting the United States’ route of migrating from conventional subsidies to Green Box payments in all countries, including those in the EU.<sup>55</sup>

The problem here is that the migration from conventional support, including Blue Box payments, to Green Box payments, is far easier in land-abundant countries or land-surplus countries, such as the US and parts of Latin America, than in land-short countries, such as the EU nations and Japan. In land-abundant countries, implicit or explicit rents are lower and farmers do not have to extend cultivation into far less fertile tracts to maintain a reasonable level of production. Since costs would rise as less fertile land is broken into, such production levels also tend to be justified by unsubsidized market prices of inputs and outputs. As a result, a given Green Box style fixed payment can go a long way in sustaining farm incomes. And the US does provide huge direct support payments, especially to large farms.

In land short countries, however explicit or implicit rents are much higher and costs of cultivation rise much faster as farmers extend cultivation into less fertile, marginal lands. If, in such a situation, subsidies and Blue Box payments are withdrawn and substituted with a fixed direct income payment, the effect on production is likely to be much larger, resulting in employment and income losses for farmers and a substantially increased penetration of

imported agricultural commodities. It is possibly this factor that constrains the process of migration to Green Box payments in the EU and Japan. If, in addition to forcing the pace of such migration, export subsidies are to be done away with, farmers from land-short countries, especially the EU nations, would be deprived of any access to the large market for agricultural exports, thereby increasing their income losses.

The crisis in the WTO on the agriculture negotiations is two fold. The first arises from the fact that countries are pursuing different objectives and serving different interests. Large exporting countries - the US and the Cairns group - want market access for their exports at all costs. Anything denying them market access is a trade barrier that needs dismantling. The least developed countries, the developing countries, Europe and Japan put social, economic and environmental sustainability as higher objectives than trade. For the south, socio-economic sustainability has higher priority; for Europe, environmental sustainability is important. But, in spite of major differences, a large group of countries put "food and agriculture first" not "trade first". This must be the objective of WTO reform.

The developing countries should have freedom in fixing tariffs in agriculture, especially in the face of high Northern subsidies. Trade liberalization cannot set the determining framework for how food is produced and how agriculture is organized. Countries cannot ignore the issues of social, economic and environmental sustainability. WTO's first error is that it has externalized these basic issues in the AoA.

The second source of the crisis arises from the process itself. The WTO as a system excludes and marginalises the concerns of developing countries. After the failure of the Seattle Ministerial, the most frequently used phrase was that the WTO is a "member-driven organization." However, the process since Doha shows the opposite. The issues raised of developing countries have been



conveniently dropped or marginalised. The critical issue of Quantitative Restrictions (QRs) has conveniently been excluded even though it is at the heart of agricultural conflicts. The conflict between the US and the EU is centered on the Europeans' ban on GMOs. The North-South conflict is centered on the high subsidies of \$400 billion in OECD countries, and the dumping resulting from forced removal of QRs. A recently released report from the International Agriculture and Trade Policy Institute has shown that in four major US commodities, the level of dumping has increased since 1995 when the WTO came into force, even though the WTO's proclaimed aim is to "reduce distortions in trade".

Introducing restrictions on imports or raising tariffs is the only safeguard for poor peasants and poor countries in the face of the trade-distorting subsidies and dumping practiced by rich countries. This is what countries such as India, Argentina, Philippines have proposed. Harbinson draft completely ignores these proposals to regulate imports as a self-defence strategy against dumping. Instead, it proposes removing even temporary rights to safeguards.

In the face of rising subsidies and increasing dumping, import restrictions and countervailing duties are a right, a survival necessity. The WTO has robbed countries of this right and now, would like to rob them even of temporary safeguards. Countries should focus on stopping dumping, the basis of the destruction of food security and rural livelihoods in the Third World. Once this crippling tool is removed, countries can start building a global system on citizens' initiatives and national priorities that ensures sustainability, support small farmers, ensures just prices, prevents dumping, protects the countryside and the environment and ensures good, safe, adequate food for all.

#### **E. WHAT NEXT ?**

Emergent tendencies have unfolded quickly since the Uruguay Round began in 1986. These prefigure alternative rules and relations. One is the

project of corporate freedom contained in the WTO rules. The other is less formed: a potential project or projects emerging from the politics of environment, diet, livelihood, and democratic control over economic life. Farmers (who are heterogeneous) must somehow all themselves in the main contest over future regulation: will it be mainly private and corporate, or public and democratic? What international rules would promote each alternative. The answer depends on the ways that emergent agro-food policies are linked either to accumulation imperatives or to demands raised by popular social movements.<sup>56</sup>

### **Private Global Regulation**

At present, agro-food corporations are the major agents attempting to regulate agro-food conditions, that is, to organize stable conditions of production and consumption which allow them to plan investment, sourcing of agricultural raw materials, and marketing.<sup>57</sup> If new rules are put into place of the type envisioned in the present WTO round of talks, their main effect will be to empower transnational capital. This empowerment concerns not only the freedom to trade and invest in agriculture (cattle and potatoes), industry (frozen hamburgers and chips) and services (hot hamburgers and chips). Provisions for intellectual property rights also have serious implications for uses of biotechnologies, for control over genetic resources, and for standards protecting craft and regional foods.

However, transnational agro-food corporations have now outgrown the system that spawned them. In particular, even US based corporations have long had interests of their own, not related to those of the US state or national economy, and certainly not to those of US farmers. A major reason why US embargoes never worked, for instance, was corporate collusion with import countries to evade US trade restrictions. Even before the food crisis, subsidiaries of US corporations were working independently of US national policy.

Within the limits of international rules, corporate integration of a global agro-food sector has proceeded as quickly and thoroughly as changing technologies permit. Meanwhile, as the rules have shifted, so have the commodities central to accumulation. While feedstuffs, the heart of the food system are becoming globalised rather than merely internationalized, the completely new markets in 'exotic fruits and vegetables are global from the outset. Any state can enter, and in the push and shore of new markets, there is room for fly-by-night entrepreneurs and instant transnational corporations, as well as the giants of the postwar agro food system. Rapacious empresensial practices are encouraged by slavish state policies to attract investments and promote exports.

### **Democratic Public Regulation**

Stable rules cannot come from private and competitive organizations, despite the global reach of some corporations. There are two reasons for this. First, the very conditions which allowed for agro-food capitals to become pivots of accumulation have created new social sectors and new social problems. Second, agro-food corporations are actually heterogeneous in their interests.

Classes of producers and consumers have changed radically from the time when transnational agro-food corporations were born. The agro-food sector is now focused on food - industry and services - rather than on agriculture. As farmers have declined in numbers and unity, and workers have lost some of their bargaining power with agro-food corporations, food politics have shifted to urban issues, that is, to food rather than agriculture. Consumers in the food system have been constructed by agro-food corporations to desire first standard foods, and then exotic foods from the entire globe. Yet contradictions have emerged in the sphere of consumption. Poverty limits access to food and demand for the products of the agro-food economy.

A food policy is more adequate to present conditions than the farm policies left behind by the waning food system. It is made possible by the decoupling of farm incomes from agricultural production. The national agricultural policies of the food system not only support prices and generate surpluses, but through credit and insurance criteria, for instance, they also foster large farms, monocultural practices, and the environmentally destructive use of chemicals and heavy machinery. They also encouraged technological and social dependence of farmers on corporate suppliers of packages of chemical inputs and purchasers of contractually (or simply monopoly) specified crops and animals. As national farm policies are to come under increasing pressure, the possibility arises to create a positive food policy.

The social basis for a democratic food policy lies in movements for employment and incomes, for safe and nutritious food, for environmentally sensitive agriculture and for democratic participation. The main social movements concerned with aspects of food focus on poverty, hunger, employment, health, cultural integrity, the environment, rural recreation, and even animal rights. Within this field of issues, agricultural regulation can become part of a comprehensive plan to use the capacities of people and the land to meet the needs of communities for nourishment, cultural expression, and a congenial habitat.<sup>58</sup>

A democratic food policy is quite a different prospect from the implicit policy posited by liberalization of trade and empowerment of transnational corporations. The latter embodies the principles of distance and durability, the subordination of particularities of time and place to accumulation. It moves beyond the global promotion of American diets, such as hamburgers and cola drinks, to the creation of a global diet consisting of an array of manufactured meals and ingredients, called Chinese, Mexican, Middle Eastern or Whatever, in the freezers of supermarkets throughout the world.

Democratic principles, by contrast, emphasize proximity and seasonality - sensitivity to place and time. This means the use and development of technologies and markets to facilitate local enterprises in every possible link of agro food chains. What is increasingly clear is that healthy food and environmentally sound agriculture must be rooted in local economies. These must respond to the capacities and limits of bioregions, including the needs and capacities of the people who dwell there.

Even with national support, the success of regional agro-food systems depends on international institutions. The World Food Board proposal of 1947, which expressed the hopes of a western and hungry world for international cooperation to plan food and agriculture, belongs to the past. But it is important to remember that alternatives did exist and choices were made. Despite the multiplication of the number of states since 1947, virtually all have agreed to multilateral economic negotiations. The consequences are dangerous for livelihoods, especially in the developing countries. There is a need for greater awareness, participation among the developing countries and a necessity to show respect for their rights by the developed countries.

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## **CONCLUSION**

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This study has attempted to look into the geopolitics of world food resources. It is apparent, with even the narrow interpretation of the field adopted here, that there is much still to do. There is no modern text to guide the student and not one has attempted a holistic perspective. As the study has relied on information which was in detail but only covering that aspect. So the major effort had gone into collecting and putting the information in a systematic way so as to fit into the schema of my study.

Food is one of the basic resources of life and its importance can be gauged by the centre stage it occupies on the global arena, be it the production and consumption of it or the trade in it. But its geopolitical importance makes it a subject matter of political geography.

Agriculture is the foundation of food and hence agriculture naturally comes in the study. The outlook for agriculture does not look bright as with falling demand for agricultural products, agricultural trade deficits of developing countries have been worsening. Though the progress in improving nutrition has been significant but with population continuing to grow, average nutrition will improve only slowly and undernourishment will fall only slowly. The crop production scenario does not look bright too as the growth of cereal demand is also slowing down, the traditional export crops marketed by the developing countries are also not showing signs of increased demand and with continuing shifts in cropping pattern from food to non-food crops in developing countries, they will become more dependent on imports and hereby making them more vulnerable.

Land and water resources have served as the basis of any agriculture and hence of food. Though there are enough land resources but much stress on them have depleted them and with increasing population, they are being continuously diverted from agricultural to non-agricultural uses. Same is the case of water and in the coming years water could well become very scarce and hence its use in agriculture would have to be minimized due to its diversion to other uses with increasing population. These could pose a threat to our food security and hence needs to be addressed.

The need is therefore for a shift towards the sustainable utilization of resources and towards sustainable agriculture. The other important need of the hour is to utilize the appropriate technology. Biotechnology can play an important role in increasing the food availability in the world, but the real issue is not just of the availability of food but its accessibility. The importance of this was evident in Sen's (1981) use of the term entitlement to understand why specific groups and individuals suffer from food shortages when there is little or no absolute decline in the amount of food available. This shifted the analytical focus towards understanding distributive mechanisms; that is, what determines how available food is distributed and how politics, economics and ideology influence its distribution. More of an in-depth analysis of these factors would push our study into the arena of economics, and hence I have concentrated on the geographical aspect of food consumption. There has been a transformation of Western diets after industrialization and even since the 1960s it has been changing the world over with an evident shift from a starch rich diet to protein and fat rich diet. As incomes continue to grow the diversity in food continues to grow in fast developing countries but the trend is very slow towards diversification among the poor countries. This is the cause of much concern.

There has been a trend towards globalization and liberalization since the 1970s, but this trend has got an impetus after the coming in of the WTO. The

implications of more liberalization in agriculture are grave for developing countries as their agricultural trade deficits are rising. The developed countries continue to keep tariffs on agricultural products from developing countries high, they provide subsidies to their farmers and due to their high domestic support the prospects for developing countries are not bright and hence even globalization has not benefited them. The issue of food aid is also relevant in the study and this has been used as an important tool in effecting opinion of developing countries. The food security scenario in sub-Saharan Africa and South Asia looks grim due to the persistence of poverty. The emergence of the HIV/AIDS as a serious challenge to the health of the people has also effected the food security and nutrition of the people not just at the household and the community level but even at the national level, the case is severe in sub-Saharan Africa. Urgent action is needed to tackle this menace as it is showing no signs of slowing down.

The importance of food on a global level can be seen when we see that a large gap exists between national regulation and transnational economic organization in the agro-food sector. This, coupled with the efforts made by states to have control over this essential requirement of life, has led to the emergence of a 'global food system' especially after the Second World War. The food system was partly about international relations of food, and partly about the world food economy. The US remained at the centre of the surplus system of 1947-72 and it influenced policy in Europe through the Marshall aid and later through PL 480 of the developing countries by giving food aid. But with the emergence of New Agricultural Surplus countries the use of food as a tool of diplomacy by the US declined.

The Surplus System declined in the 1980s and today surplus has indeed become a weakness rather than a strength. But the food system continues to remain unhinged. There has been a trend towards the globalization of food rather than just agriculture and this had led to the industrialization of

agriculture. There has been a shift in the agricultural cropping patterns and consumption of food, brought about by the globalization of food. This has changed the priority of food from just being a basic need to one related to corporate profits. Excessive liberalization of trade by developing countries is eroding their profits whereas continuing support to their farmers by developed countries is driving the agriculture of developing countries towards the margin. The food security of developing countries is not being addressed in the going round of WTO negotiations and so the future scenario seems to be dark. The agricultural trade of developing countries is declining with the developed countries - which are the available markets - and instead of discussing these real trade issues they are continuing to bring in the non-trade issues like environment, competition, trade facilitation etc., in this way hijacking the real issues.

The need of the hour is for a democratic food policy. To look into the real issues and to address them. The fall in the level of undernourishment continues to be slow and so the need of the hour is to first meet the essential need of every human, which is food to eat. Till every human being sleeps hungry the aim remains unfulfilled. There is plenty on this earth, but the geopolitical significance of food and its use as such has led to this undesirable scene, which can only be removed by respecting the right of every human to live, for which food is a necessity. It is the right of every human and till this is not restored much of the ills from this planet cannot be removed.

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