4.1 Role of Agriculture in Economic Development

Agriculture as a science or an art of raising crops and livestock has been practiced only about 12,000 years ago when the human beings started to grow their food rather than merely collecting wild plants and hunting wild life. Although the plants and animals on which the global food security system depends have remained largely unchanged. The land use and farming techniques have undergone rapid changes to keep pace with the demand of the increasing population for food and other non-food agricultural commodities. In addition, and in economic perspective, a great importance has been attached to agriculture in the creation and growth of wealth of nations by the economic theories throughout their evolution since the sixteenth century. According to the physiocrats doctrine of seventeenth/eighteenth century like Duesnay (1694-1774) agriculture is the only one reproductive occupation by virtue of the fact that it offers more returns to the producers than their investment of capital. The classical and neo-classical economic theories gave similar importance to agriculture. Mathus (1789) in his theory of population (1789) links strongly agriculture and population growth in terms of food production and material welfare. Mathus pointed out that the power of population to grow is greater than the power of the earth. Lewis (1954) in his theory of dual economy recognizes two fundamental resources flows from agriculture into the national economies of most developing countries. Agriculture supplies cheap labour force of zero or low marginal productivity as well as surplus food to non-agricultural sector, mainly the industrial sector. Other connections are that agriculture is a major source of demand for industrial products and agricultural exports serve as a source of vital foreign exchange for development.

Shultz (1956), Coal and Hoover argued that efforts to increase food supply in agriculture sector should receive the highest priority allied with this, Kuzents (1959)
and Willian Nicholas (1963) argued that achieving and sustaining reliable agricultural surplus and a market rise in productivity per worker in agriculture is a pre-condition for industrial revolution in any part of the world. In contrast Adam Smith (1776), Higgins (1956) and Libenstein (1957) tended to undermine the importance of agricultural surplus in the advancement of earlier economies of today’s developed countries. This stem from their belief that marginal productivity of capital is lower in agriculture and the propensity to serve is lessened. Moreover, the terms of trade are against agriculture and consequently might affect the balance of payment.

As per UN projection (1999), the global population is expected to reach 8 billion by 2030 from the present 6 billion level that is an increase of around 2 billion people. To feed this additional population, food production has to be augmented by further improving the existing production technologies by having environment – friendly green revolution.

The natural and human resources are the main resource-base for most developing countries – Arable land, rainfall, surface and underground water account much. Also the prevailing relatively rich agro-climatic and bio-diversity enrich agricultural production environmental. Despite these potentialities, agricultural production and productivity is low compared with world wide average.

### 4.2 Factors Challenging the World’s Food Prospects

Several set of factors will condition the world’s food prospects in the New Millennium. Starting at the environmental end of the spectrum towards the more social end. According to Tim Dyson (1196)\(^{37}\) the major factors include global atmospheric changes, land degradation, water resources, biotechnology and research and the prevailing institutional structures namely research extension, farmers and consumers and WTO. All of these factors overlap and interrelate and they can be considered in the following.

Global Warming

Green houses warming and atmospheric ozone depletion could have implications for future food production. The first phenomenon that is the global warming is potentially much more important. According to the Intergovernmental Panel on Climate Change (IPCC) the average world surface air temperature has risen between about 0.3 and 0.6 degree Celsius during the last 100 years. There are strong grounds to believe that at least part of this warming is due to human induced release of Green House Gases (GHG). Among these gases carbon dioxide (CO) is by far the most important. Next in importance come the Choloro Fluoro Carbon Gases (CFCs) which are also the principal agents of ozone depletion. Overall, agricultural activities may account for about one sixth of total human induced global warming. But there is uncertainty as to the extent of any future warming and also about its likely nature- its timing and regional impacts and its consequences for agriculture. Global warming could also threaten some of the world's crop land in river Deltas and coastal areas as the sea level rises due to the combined effect of the thermal expansion of the oceans and melting glaciers. As a result significant parts of the Bangladesh, Egypt, Thailand, China and Indonesia could eventually face this prospects, together with various complications such as increasing saltwater intrusion into fresh water supplies according to party (1990) Downing (1992). The implications of any global warming for the conditions affecting world agriculture are largely a matter of informed guesswork. Yet there is some consensus between the different climate simulation models that the temperature rises involved in global warming will be greater in the winter months perhaps lengthening the growing periods for some crops and that world rainfall will generally increase and temperature rises would be greater at higher attitude benefiting food production in Northern areas of Europe, Asia and North America. On the other hand, higher temperatures could lead to reductions in soil moisture and soil fertility increasing to the risks of erosion. Such process could reduce potential cereal yields in northern mid-latitudes. With regard to the consequences of global warming for

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38 Downing and Party, 1991, Summary and expansion of the IPPC Assessment of the potential impact on world agriculture.
agriculture in the world's developing regions which generally lie in the mid and lower latitude, there is little agreement as to low levels and patterns of rainfall in these latitudes may be affected. It is possible that average annual rainfall in arid and semi-arid areas like the African Sahel could increase. But if this increase were to happen in just a few concentrated rainstorms, then there could be greater frequency of flooding and little change in the risk of seasonal drought. The most serious consequence for global agriculture could be a greater risk of drought (Party 1990).

There is the key issue of how well agriculture may adapt to any climate change. Here, three preliminary points must be made. First, adaptation will be easier in the face of gradual change. Second, adaptation will inevitably involve costs. Provided the change is gradual the costs are likely to be only a small components of the total global agricultural cost structure. Third, poor populations will generally find it harder to cope with any adaptation costs. Tentative indications suggest that population at mid and lower latitudes may experience net negative effects from global warming and over the long term the adverse consequences for some developing countries may be significant. Because, eventually, climate change could be so pervasive in its agricultural implications affecting every thing under the sun eg. Soil, rainfall, storm, pests, weeds, livestock. Ultimately adaptation are likely to occur across the whole spectrum of farming activities.

In summary, the effect of global warming on world agriculture is uncertain and immensely complicated issue, but it is likely to be gradual and the adverse consequences for food production can be felt by the farmers of the developing regions. Secondly, the increased risk of drought is indeed the most likely serious agricultural consequence of global climate change.

Ozone Depletion
The Depletion of the ozone shield has been clearly in mid and high latitudes and its implications relate chiefly to the world's more developed regions. The thinning of the ozone shield increase the ultra violet – B (UV-B) radiation which reaches the earth's surface and it might eventually affect agricultural production in Northern Zone and
Europe, Asia and North America as UV-B radiation affects the growth of particular crops like Soya beans. It is argued that atmospheric ozone depletion is much less significant than those of global warming. In general, changes in temperature, precipitation and climatic extremes will pace added stress on agricultural resources while eroding the quality of agricultural land.

Land Degradation
The importance of land in economic theory is long and profound. Some of the greatest thinkers in this discipline have been concerned with the role of land in the creation of economic wealth. David Ricardo, Thomas Mathus, Karl Marx figure prominently. These thinkers capture the essential aspects of land as an economic asset. Ricardo on differential land quality; Mathus on the overall scarcity of land and its products and Marx on the economic and political advantages emerging from control over land. The earliest purpose of land was to provide food and necessary materials for human survival. As populations increased and as human aggregations became larger and more concentrated land came to be seen in terms of ideas of belonging and possession. Agriculture, the essential materialistic idea of land became of necessity. General scarcity conditions continue to influence the distance at which agriculture could be carried on with respect to settled communities.

During the past five decades world population increased from 2.5 billion to 6 billion and a quarter of world's top soil was depleted. At the current population level, overuse and misuse of resources due to population explosion and human unstable demand for something extra has led to: habitat deterioration, fragmentation and loss resource over exploitation of soil, water and air pollution, global warming, forests destruction and exotic species invasion.

In general, the natural resources endowment in most developing countries has been shrinking due to the intensive land use systems for cultivation and grazing the support the increasing number of population. The intensive land use systems shortened the rotation for the regeneration of the vegetation cover. The intensive land use systems removed the vegetation cover and because of improper use of machinery and other
cultural practices soil erosion, soil crust and hard pan have developed and resulted in the loss of fertile soil, run-off and floods, in arid and semi-arid areas which cover one third of the earth land surface and these forms of land degradation led to desertification. Land degradation is a major cause of the increasing impact of floods, drought and desertification on human population and environment. FAO's publication (1994) indicates that about 70% of dry lands and one sixth of the world population have been currently affected by land degradation and it is most pronounced in the semi-arid and drought prone zones of Africa, Asia and South America. On the occasion of World Food Day in 1994 of 'Water for Life' it was reported that in many parts of the world, rain fed crops land is in poor shape. Increasing human and livestock populations have led to land degradation through soil erosion, overgrazing, bush fires, deforestation and the expansion of arable farming into unsuitable marginal land in arid and semi-arid areas, which cover one third of earth's land surface. Land degradation is of two types physical and chemical. Physical degradation is due to the formation and soil crust and hard pan while the chemical degradation is due to sanitation and alkalinization.

The most important evaluation of land degradation for the world as a whole is the Global Assessment of Soil Degradation (GLASOD) project which was sponsored by the United Nations (1992). It estimates that over the period of 1950-1990 about 17 per cent of the world's entire vegetated areas lost some of its soil productivity. According to GLASOD study there are three main types of human induced causes of land degradation and all closely related to food production. The first is overgrazing by animals, which is specially widespread and problematic in dry regions like the African Sahel and Australia. The second is deforestation, the third cause contains of various harmful agricultural practices like insufficient rotation periods, faulty irrigation methods and drainage. The maps based on GLASOD research high light ten major world areas where degradation is judged to be serious concern. These parts are : (i) large parts of United States, Mid-West; (ii) much of Central America and the Caribbean; (iii) the Andean foot hills and several parts of Brazil; (iv) Virtually all of Madagascar; (v) most of Turkey; (vi) much of Sahel); (vii) extending from Senegal to
Ethiopia; (viii) much of South Africa; (ix) huge parts of the former Soviet Union, most of India and Pakistan and (x) Much of Eastern and Northern China.

Water Resources
When FAO launched its special programme for food security in 1994 it was well aware that the limited access to water was often a major constraint to increasing food production. It is estimated that the world contains about 1400 million \( \text{km}^2 \) of water of which 35 million \( \text{km}^2 \) (2.5%) are fresh water. The annual rainfall over lands amount to 119000 \( \text{km}^2 \) of which 74000 \( \text{km}^2 \) evaporate and the remaining 54000 \( \text{km}^2 \) flow into water reservoirs, streams or infiltrate into the ground to replenish the aquifers. This 54000 \( \text{km}^2 \) represents what is conventionally called water resources from which 9000 to 14000 \( \text{km}^2 \) are all that economically available for human use. Currently, 3600 \( \text{km}^2 \) of fresh water are withdrawn for human use. In all region except Europe and North America agriculture is by far the biggest user of water accounting for about 69 percent of all withdrawals (2128 \( \text{km}^2 \)) with domestic use 10 % and industry using 21%. Up to 90% of water used for domestic purposes is returned to rivers and aquifers as waste water.

Many experts argue that the world’s renewable water supply is fixed and can not be increased and consequently the per capita water resources dwindle in direct relations to population growth and the rising aspiration. Optimistic publications shows that over the next 30 years and effective irrigated area can be increased by 34 % and this increase needs only 14 % more water. There are two explanations to this notion: first, changing food habits of people in some developing countries will help to increase water efficiency such as replacement of wheat by rice which is a very water intensive crop using about twice much water per capita as wheat. Secondly, the efficiency within which irrigation water is used can be increased over the 30 years from an average 38 % to about 40%.

FAO analysis of 93% selected developing countries shows their water abstractors for agriculture was about 2128 \( \text{km}^2 \) a year. If irrigation efficiency can be increased by 42% only 2420 \( \text{km}^2 \) of water will need to be abstract in 2030 to irrigate a net
harvested area more than one third larger than it is today. This 4% increase in water efficiency can be achieved through modern irrigation techniques and better management of irrigation water by users.

Overuse of water resource indicates that the use exceeds renewable supply rates. On the other hand, misuse of water occurs when clean water is abstracted and returned to water system in an unusable state in form of brackish and sewage water which can be treated to be used again for irrigation. This process is often associated with the risks to human, animal and plant health as well as with social implications.

Irrigated agriculture has been an extremely important source of food production. Globally, rain fed agriculture is practiced on 83% of cultivated land and supplies more than 60% of world's food. Irrigated agriculture is practiced on only 17% (250 million hectare) of cultivated land but supplies 40% of world's food. Inevitably, such an intensive use of water for agriculture can strain resources. Countries could be defined as water stressed if they extract more than 20% of their renewable water resources. By this definition 36 of 159 countries were already water stressed in 1998. Many countries are already using more water than their renewable supply and in water deficit situation which is created mainly by exploiting ground water faster than its replenishment.

Therefore, maintaining or increasing the productivity of both rain fed and irrigated agriculture represents one of the challenges to agriculture in the new millennium which need to be addressed in policy - technical and institutional terms.
Table 6: Estimated global water withdrawal (km\(^2\) per year, m\(^3\) per capita and as a percentage of total withdrawal)

<table>
<thead>
<tr>
<th></th>
<th>1950</th>
<th>1995</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Agriculture</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Withdrawal</td>
<td>1100</td>
<td>2500</td>
</tr>
<tr>
<td>Per capita</td>
<td>437</td>
<td>436</td>
</tr>
<tr>
<td>Percentage of total</td>
<td>79</td>
<td>69</td>
</tr>
<tr>
<td><strong>Industries</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Withdrawal</td>
<td>200</td>
<td>750</td>
</tr>
<tr>
<td>Per capita</td>
<td>79</td>
<td>131</td>
</tr>
<tr>
<td>Percentage of total</td>
<td>14</td>
<td>21</td>
</tr>
<tr>
<td><strong>Municipalities</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Withdrawal</td>
<td>100</td>
<td>350</td>
</tr>
<tr>
<td>Per capita</td>
<td>40</td>
<td>61</td>
</tr>
<tr>
<td>Percentage of total</td>
<td>7</td>
<td>10</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Withdrawal</td>
<td>1400</td>
<td>3600</td>
</tr>
<tr>
<td>Per capita</td>
<td>556</td>
<td>628</td>
</tr>
<tr>
<td>Percentage of total</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>

FAO publication 1994

At present and despite the greatly improved knowledge of weather systems farmers are more exposed to climate extremes than ever before for many reasons. Population densities have increased hence marginal land is increasingly used to grow crops, leading to potential soil erosion and flash floods. Deforestation has denuded steep land of its protection vegetation cover; powerful machinery has made it possible to strip land of its vegetation through tillage operation; economic pressures on farmers to increase productivity through high input farming have led to unstable and unsustainable farming practices. Therefore, it would be impossible to maximize agricultural production from limited water resources, degraded land and national disaster unless the factors that so accentuated can be corrected. Studies showed that there were 3.2 times more major natural catastrophes notably floods, storms and earthquakes in the 1990s and in 1960s and their economic damage increased 8.6 times. The increase in frequency and seriousness of floods and mudslides has been most striking.
Optimizing Agricultural Production

There are multitudes of factors that significantly affect the growth of agriculture, both in the developed and developing countries. The specialized emerging problems that affect the developed countries in Asia like Japan, Taiwan, R.O. Korea: are (a) the small farm size of 1-2 ha, (b) aging and the declining number of farming community, (c) the declining returns from the farming sector, and (d) the cheaper imports.

In developing countries, however, the problems are of different nature. In Sub-Saharan Africa, about 1.3 billion, that is one fifth of world population, live on less than 1 US Dollar per day. By 2030, an additional 3 billion people will have to be fed. This requires a 75 per cent increase in current food production of cereals which stands at approximately 2 billion tonnes annually (Ref.) taking year 2000 as a base year. Thus, the situation clearly indicates the need of timely action for maximizing food production on national, regional, and global levels to meet human needs under growing adverse conditions like the declining per capita arable land, climatic changes, land degradation, scarcity of water resources and imperfect commodity and labour markets. Strategies for increasing agricultural production in developing countries can be executed at both production and post-harvest levels including avoidance of wastages at storage points and distribution through both technological and institutional transformation. The proper use of new bio-chemical and mechanical technologies can be relied on. The use of high yielding and disease resistance varieties, best agronomical practices and irrigation account for the major increase in agricultural production that can be anticipated. What is worth considering is the use of environmental friendly technologies to avoid the side effects of these technologies on soils, food security and food safety.

Increase in agricultural production calls for investment in human resource development of farmers and their empowerment which could make deep inroads into agricultural production as an important institutional transformation.

Similarly, the concept of viewing food production as agro-business enterprise similar to other industrial enterprises, should be encouraged, supported and promoted to
absorb surplus production, add value to agricultural production, deals with the seasonality of agricultural production. In addition, the support and promotion of agro-business will create employment opportunities for rural people and significantly reduce rural-urban migration which threatens the performance of agricultural production.

Thus, the increase in agricultural production in the triennium is a real challenge, especially for poor resource-base countries, and for countries of poor infrastructure.

Social Transformation in Agriculture Sector
In most developing countries, the majority of agricultural population is illiterate. For them, the predominant goal of life is salvation which is perceived to be achieved through conformity to the traditionally sanctioned customs and ritual practices performed by local social institutions. According to Ghosh, BN and Ghosh, Rana (1991), social institutions such as caste system, joint family and kinship are significant in the majority of developing countries. These institutions by one way or another have their implications on access to land, land tenure and access to production resources, thereby have restricted the mobility of labour and capital and free land ownership and consequently the efficient allocation of resources for optimum agricultural output. In addition, rural communities place their priority to non-material ends of life, and a general discounting of its material aspects. Consequently, they are of low aspirations and they don't want to work after they have obtained a minimum level of income. Thus, enterprise and aggressive business spirit are looked down upon and the value system is so framed that economic incentives, material rewards are minimised and because of the poor knowledge, resources are not fully utilised, nor the opportunities for agricultural improvement. Moreover, the increasing trend of rural-urban migration of the talent, enterprising and strong elements of rural population added to the weakness of agricultural performance.

Thus, agricultural producers, especially the traditional farmers must encourage ongoing learning and innovation among human resources. The millennium will present greater challenges in the development of agricultural sector. Efforts must be used
towards the use of modem technology to attain high productivity and solve the
problem of labour shortage. There is also a need to create a continuous pool of
knowledgeable farmers and to encourage young generation to take up farming as their
profession. This can be achieved by including an interest in agriculture and providing
vocational guidance at school level. In addition, future agriculture scenarios must be
acknowledged agriculture as an economic and commercialised sector managed by a
pool of knowledgeable young graduate farmers. Beside, knowledgeable farmers,
there is a need to facilitate optimum utilisation of knowledge and research findings
through innovative networks established among researchers, producers and extension
workers. Agricultural producers should use information technology as a motor for
change.

Consumers’ Concerns
Consumers are becoming more aware of food quality and safety issues. The food
safety and security is an issue that concerns consumers as well as food producers
alike. The 1996 World Food Summit declared that ‘food security exists when all
people, all times have physical and economic access to sufficient, safe and nutritious
food for a healthy and active life.’ The whole food chain system from production to
consumption and disposal impacts consumers. Food not only fulfils nutritional needs
but is also an expression of religion and culture. Food safety involves a spectrum of
government policies encompassing agriculture, consumers, health and nutrition and
trade.

The growing awareness among people for a better quality of life, health and
environment is drawing them towards consumption of chemical and pesticide free
foods. Thus, the main food safety agenda covers: (a) chemical intensive food
production, (b) chemical ingredient in the processed and preserved food, and (c)
genetically modified food. In view of these concerns, food safety can be understood in
a broad term as food free from chemical residues or chemical fertilizers, pesticides,
etc; free from ingredients used in its processing and preservation to avoid health
hazards and food contamination. To attain and maintain high food safety standards,
governments and other relevant institutions must have their own food standards and
food safety regulatory programmes, measures and policies to maintain high quality food. Thus, food safety is one of the major agendas on the international agricultural trade negotiations under Sanitary and Phyto-Sanitary (SPS) and other measures. It has in fact become a global issue.

At the international levels, food quality and safety is dealt within the Agreement on Agriculture of WTO under Sanitary and Phyto-Sanitary measures. Limits for SPS measures important for human health are specified by Codex Alimentarius Commission, while to maintain animal and plant health, the role of OIE and IPPC are important.

The Agreement on Agriculture (AoA) under WTO provides a basic framework within which members have the right to introduce and develop Sanitary and Phyto-Sanitary (SPS) measures and that such measures should not unduly inhibit the free flow of international trade. While it is a step in the right direction as it will protect the interest of consumers, standardization of quality measures in developing countries would not be possible in the near future due to technical and financial constraints. Hence, under the guise of SPS, food safety could turn into a non-tariff barrier for the developing countries in accessing marketing of the developed countries. The imposition of SPS standards by some developed countries e.g. rice from Thailand to Mexico or skimmed milk from India to EU are the examples of non-tariff barriers. Similarly adherence to labour standard by the developing countries is also cited as another form of non-tariff barrier. In this regard, restrictions imposed on the imports of carpets and other rural based products from India and cocoa from Ghana deprive these countries from market access of the developed countries.

Moreover and because of increasing incomes of consumers, especially in developed communities, consumers tend to shift to higher value food items like livestock products, dairy meat, fish, fruits and vegetables. Subsequently, this may lead to restructuring of farming towards producing diversified commodities of specific concern to consumers.
World Trade Organization (WTO)

Due to growing economic liberalization and market integration across the world, especially in the wake of WTO and Agreement on Agriculture, there is a new challenge of producing agricultural commodities by each country and region in a cost effective and competitive manner. As economies of scale and genetically modified technology favour developed countries, there is an increasing need for the research scientists of developing countries also to work on developing competitive technologies. But the developing countries do not generally have the capacity to provide similar support to their agriculture.

The WTO Agreement on Agriculture further requires that developing countries should limit their domestic support to agriculture even at lowest than the de minimus level of 10 per cent, while developed countries subsidize their agriculture by more than 350 billion dollar (European Union). Thus, there is no level playing field in international trade of agriculture commodities. In fact, the high level of support to agriculture in developed countries improves their trade competitiveness vis-à-vis developing countries and consequently what the developing countries can gain through international trade may be either nil or negligible. Moreover, in many developing countries, there is not much of commercial orientation in agriculture as it is still subsistence-based. As a result, there is no proper attention paid to quality of products, standardization, grading, packing, value addition, etc. Also the issue of food safety, sanitary and phytosanitary concerns has not been adequately addressed by most of the developing countries. This fact limits their access to global market and very often and even if they exist, such measures are used as barriers by the developed countries, especially in case of processed food.

Moreover, tariffs at the borders of developed countries are still high and tariff escalation continues to be practised. Also, there has been the increasing use of SPS measures to protect domestic products form competition. Unless these issues are properly addressed, farming in developing countries would not be a business proposition and they may fail to benefit from the new opportunities created by Agreement on Agriculture.
Institutions and Marketing

The monopoly and control of technology by the specialized technical institutions is most likely to be the challenges that will face small producers. The major suppliers of technologies for enhancing agricultural productivity (improved seeds, chemicals and fertilizers) are the multinational companies of the developed world which control the supply of agro-based technologies. They are not only controlling the supply of agrotechnologies, but are also threatening the bio-diversity in most developing countries. The bio-diversity in most developing countries provides reliable crops mix, farming systems and livelihood media which all together form and enrich sustainable agricultural production and income generation environment for the traditional small producers of the developing countries. The expressed fears that, the rich bio-diversity will be replaced by the newly generated seeds monopolized by the multinational companies, thus limiting the small farmers’ choices and making them vulnerable to the supply of new technology as well as to the risks associated with the technology regarding its adaptability to the prevailing modes of farming and micro-eco systems in most developing countries and to the possible genetic calamity and epidemics. The best example to the cited is the terminal seeds that germinate only once and those which require an application of a whole package in order to yield the prescribed yield targets, and for which the majority of small producers lack the knowledge, demonstration access and resources. Thus, technology package might threaten the entire system of food security at some points of time.

With regard to the market, there has been a gradual as well as expected full liberalization of international agricultural trade. The key features of liberalization is the move away from subsidies towards greater reliance upon markets and prices. At the international level the claimed benefits of liberalization, with the heavy subsidized food production in North America and Europe, will be restricted and consequently less food will be produced. Also by restricting subsidies in the developed world countries will lower their import restrictions bit by bit and accordingly world food prices will rise and food production in developing countries would benefit and their
own production will expanded. Many developing countries have been forced in the 1980s and 1990s to make the changes rapidly.

But, at the world level, despite greater liberalization is assured in the future rounds of the GATT and WTO, recent history strongly suggests that it will be comparatively protracted and piecemeal process. There are powerful political interests and arguments against any sudden liberalization because food is special commodity and may national governments have serious reservations about relying solely upon international markets for future supplies. Unless the process of liberalization is moderated it will probably lead to widening differentials with regard to future food production, consumption and levels of food security. Between 1980 and 1990 the amount of financial aid provided by developed countries to assist agriculture in the developing world declined from US$ 12 billion to 10 billion. Likewise spending on international agricultural research has stagnated in real terms.