

Agricultural and Rural Development in the 21st Century: *Lessons from the past and policies for the future*

Background Paper

1. Overall emerging global scenario for food and agriculture.

Looking back over the past decades, progress in hunger reduction has been nothing short of remarkable. The proportion of people in developing countries living with average daily food intakes of less than 2200 kcal fell from 57 percent in the early 1960s to just 10 percent by the end of the century. To date, growth of global agricultural production has been more than sufficient to meet the growth of effective demand for food coming from expanding populations and rising incomes. The declining trend in world commodity prices attests to this assertion.

It is encouraging to observe that growth in food production during the last three decades is higher in developing countries than the world average, both in aggregate and in per caput terms. And, in spite of a near doubling of their population during this period, average per caput food consumption in developing countries increased 30 percent. A large number of countries have shown that success is possible. More than 30 developing countries, with a total population exceeding 2.2 billion people, have reduced their population of undernourished by 25 per cent.

Most of the improvement in undernourishment figures over the past three decades has been concentrated in Asia, which reduced the proportion of undernourished by 25 percent. In sub-Saharan Africa, the proportion of undernourished has been very limited while the number of undernourished has risen from 91.9 million in 1969-71 to 204 million in 2000-2002. Latin America and the Caribbean experienced a significant decrease in both proportion and absolute numbers of undernourished in the 1970s, but has made little progress since. In Near East and North Africa the proportion of undernourishment fell significantly in the 1970s but by 2000-2002 it was slightly above the level of two decades earlier, after having actually increased over the 1990s, although still at relatively low levels.

Rising food supplies and lower prices does not mean that everyone has access to enough food. The abundance of food suggested by world-wide figures and trends masks the fact that hundreds of millions of people do not have enough food to eat. The most recent estimates indicate that 852 million people worldwide were undernourished in 2000-2002, comprising 815 million in developing countries, 28 million in the countries in transition and 9 million in the industrialized countries.

Ten years are left to achieve the first Millennium Development Goal --eradicating extreme poverty and hunger. Progress is assessed against the target of halving the proportion of people suffering from hunger and those living in extreme poverty and between 1990 and 2015. At the present pace of progress, the hunger reduction goal will be achieved in 2150.

The MDG 1 poverty reduction goal to halve the proportion of poverty between 1990 and 2015 is on track based on the World Bank poverty projections (less than US\$1 per day). At the global level, poverty has declined both in absolute numbers (if only marginally) and in relative

terms. The East Asia region met its poverty reduction target by 2001, 14 years ahead of the timetable. In China and East Asia, GDP per capita more than tripled and the proportion of people in extreme poverty fell from 56 per cent to 17 per cent over the past two decades. South Asia, too, made considerable progress in percentage terms during the 1990s, and achieving the goal of halving US\$1/day poverty is feasible.

The poverty reduction goals seem much more challenging in the other regions. In sub-Saharan Africa poverty has in fact increased between 1990 and 1999. The available projections suggest that for sub-Saharan Africa the MDG poverty goal may be beyond reach. Very little progress will be achieved unless performance is significantly enhanced in the near future, and the absolute number of poor may in fact rise considerably. Should this scenario materialize, close to half the world's poor will live in sub-Saharan Africa in 2015.

Latin America and the Near East/North Africa have made only marginal progress (in relative terms) during the 1990s. If the forecasts are accurate they should at least come within reach of the poverty reduction target. The transition countries in Eastern Europe and Central Asia present a different picture. A big surge in poverty occurred in the region after 1990 (the base year for the target). Most of these countries were then on the brink of a recession after the collapse of the centrally planned regimes and the beginning of the transition towards market economies.

At present, the poverty projections imply that: (i) the goal of halving by 2015 the proportion of people living in poverty from that prevailing in 1990 may be achieved – the proportion falls from 29.0 percent in 1990 to 12.3 percent in 2015; (ii) the absolute numbers in poverty may not be halved, as they decline from 1.27 billion in 1990 to 0.75 billion in 2015; (iii) much of the decline results from prospective developments in East Asia and South Asia; (iv) in contrast, sub-Saharan Africa's absolute numbers in poverty kept increasing in the 1990s and are projected to continue to do so until 2015.

The reduction of hunger and the attainment of many other Millennium Development Goals are inter-related. Levels of child and maternal mortality and low rates of school attendance in developing countries are intimately linked to the prevalence of hunger and under-nourishment. The same applies to environmental sustainability: the overexploitation or misuse of natural resources too often compromises people's food security. To a great extent the achievement of most of the MDGs depends critically on progress in improving nutrition and reducing hunger.

Even as developing countries try to solve the age old problems of poverty and food insecurity they are faced with new set of policy challenges that emerge from rapid urbanisation and globalization and the consequent changes in diets and lifestyles. Emerging food supply systems, along with the movement of populations out of rural areas, are leading to the structural transformation of farming systems. Continued population growth as well as rapidly rising incomes are placing unprecedented pressure on environmental resources at the local and global levels. These emerging trends are highlighted in Box 1 and discussed in section 3 of this note. The policy agenda for food and agriculture in the 21st century needs to address the emerging challenges even as it pursues the unfinished business of the last century.

Box 1. Facts and Trends in the Emerging World Food Economy

Slowdown in population growth: The growth rate of 1.35% per annum in the second half of the 1990s is expected to decline to 1.1% in 2010-15 and to 0.5% by 2045-50 (UN Habitat, 2001).

Income growth and reductions in poverty^a: Per caput income growth in developing countries will increase from 2.4% per annum between 2001 and 2005 to 3.5% between 2006 and 2015. The incidence of poverty will be reduced from 23.2 % in 1999 to 13.3 % in 2015.

Average food intake will increase but hunger will remain high: Daily per capita calorific intake in developing countries will increase from an average of 2681 kcal in 1997/9 to 2850 in 2015. Under 'business as usual', undernourishment will decline from 20% in 1992 to 11% in 2015, but reductions in absolute numbers of undernourished people will be modest – from 776 million in 1990/92 to 610 million in 2015, far from meeting the WFS target.

Slower rate of agricultural production growth: Growth of demand for agricultural products, and therefore of production, will slow down as a result of slower population growth and reduced scope for consumption increases in places where food consumption is already high. For developing countries, production growth will decline from an average of 3.9% p.a. in 1989-99 to 2.0% between 1997-9 and 2015 (FAO, 2002a).

Changes in product composition: Between 1997 and 2015, wheat and rice production in developing countries will grow modestly (by 28 and 21% respectively). However, significant increases are expected in coarse grains (45%), vegetable oils and oilseeds (61%), beef and veal (47 %), mutton and lamb (51%), pig meat (41%), poultry meat (88%), milk and dairy production (58%) (FAO, 2002a).

Production growth based mostly on yield growth: Yield improvements will account for about 70% of production growth, land expansion for 20% and increased cropping intensity for the rest. Nevertheless FAO projections show that the arable area in developing countries will increase by almost 13% (120 million ha) and water withdrawals for irrigation by 14% by 2030. One in five developing countries will face water shortages (FAO 2002a).

Towards larger farm sizes: As the opportunity cost of family labour rises, small family farm operations for subsistence production become increasingly unprofitable. Landless tenant farmers will gradually find their way to the urban industrial sector. Small landowners will likewise find it more profitable to sell or lease their holdings rather than to cultivate them.

Growing agricultural trade deficits: Agricultural trade surpluses in developing countries are shrinking and, by 2030, will have become a deficit of about US\$31 billion, with a rapid rise in imports of cereals and livestock products and a decline in surpluses in vegetable oils and sugar.

Urbanisation: Virtually all of the world's anticipated population growth between 2000 and 2030 will be concentrated in urban areas (UN Habitat, 2001). At the present rate of urbanisation, urban population will equal rural population as early as 2007 and will exceed it from that point on.

Diet transitions: The pace of dietary change, both qualitative and quantitative, accelerates as countries become richer and populations become increasingly urbanised, with a shift in diet structure towards a higher energy density diet in developing countries and a dramatic increase in the contribution to food calories from livestock products (meat, milk and eggs), vegetable oils, and, to a lesser extent, sugar. Average developing country per capita meat consumption has increased from 11kg per year in the mid-1970s to around 26 kg in 2003, and oil crop products from 5.3 kg to 9.9 kg. Increases in saturated fat intake from animal sources, a greater role for added sugar in foods, reduced intakes of complex carbohydrates and fibre, and reduced fruit and vegetables intakes are discussed by Popkin (this volume).

Market structures: Agrifood systems are evolving from an industry dominated by family-based farms, small-scale, relatively independent firms to one of larger firms that are more tightly aligned across the production and distribution value chain. Food retailing is increasingly more customer responsive, more service focussed, and more global in ownership; in parallel the input supply and product processing sectors are becoming more consolidated, more concentrated, and more integrated. Tangible evidence of this is in the rise of supermarkets and changing patterns of food procurement in urban areas in many parts of the world, especially in Latin America (see Reardon and Berdegue, 2002a).

Notes: a) These figures are for developing countries as a whole. It should be acknowledged that reductions in the incidence of poverty will be geographically uneven with the greatest progress being made in East Asia and the least progress in sub-Saharan Africa (FAO, 2002c).

2. Lessons learnt from past performance in poverty and hunger reduction

Agricultural growth plays a critical role in enhancing food security and reducing poverty in developing countries.

There is ample evidence that combating hunger and extreme poverty requires a renewed and expanded commitment to agriculture and rural development in developing countries. Overall, some 70 percent of the poor in developing countries live in rural areas and derive their livelihoods from agriculture directly or indirectly. This dependence on agriculture is greater in those countries where hunger is most prevalent. No sustainable reduction in poverty is possible without improving rural livelihoods. Economic growth originating in agriculture can have a particularly strong impact in reducing poverty and hunger. Increasing employment and incomes in agriculture stimulates demand for non-agricultural goods and services, providing a boost to non-farm rural incomes as well. The corollary to this is that additional demand for agricultural products must come from outside of the rural communities and the communities must be able to meet the expectations of these external markets.

Hunger reduction is a prerequisite for fast development and poverty reduction

Poverty is a cause of hunger, but it is equally true that hungry people will always be poor. Hungry people cannot take full advantage of a pro-poor development strategy because hunger negatively affects health, labour productivity and investment choices, perpetuating poverty. Poverty reduction is faster when carefully targeted programmes, such as food for work, provide immediate hunger relief. As another example, school meal programmes lead to long-term inter-generational gains in poverty reduction.

Technology can make a difference but under the right conditions

Improved technology, especially for small-scale farmers, has hastened poverty reduction through increased crop yields and higher incomes. The decline in food prices, in real terms, has benefited poor consumers, including the rural poor. However, poor farmer access to technology has been hampered by gaps in infrastructure, seed and input markets, extension systems, and very often their ability to afford these inputs. Market, institutional and policy failures have exacerbated the problem. A great deal needs to be done to alleviate small farmers' constraints to technology access and profitable use. Technologies that build on and complement local knowledge tend to be particularly effective in meeting the needs of poor farmers in marginal environments.

Trade can lead to substantial reductions in hunger and poverty

Trade offers opportunities for the poor and food insecure by acting as a catalyst for change and by promoting conditions in which the food insecure are able to raise their incomes and live longer, healthier, and more productive lives. Trade can also have adverse effects, especially in the short run as productive sectors and labour markets adjust. Opening national agricultural markets to international competition – especially from subsidized competitors – before basic market institutions and infrastructure are in place can undermine the agricultural sector with long term negative consequences for poverty and food security. Some households may lose, even in the long run. To minimize the adverse effects and to take better advantage

of emerging opportunities, such as those arising from agriculture diversification to bioenergy and other non-food products, governments need to understand better how trade policy fits into the national strategy to promote poverty reduction and food security. Expanding the benefits of trade for the poor requires a range of other factors, including market infrastructure, institutions and domestic policy reforms.

Public investment fails to reflect the importance of agriculture.

Public investment in infrastructure, agricultural research, education and extension is essential in stimulating private investment, agricultural production and resource conservation. But actual public expenditures for agriculture and rural development in the developing world do not reflect the importance of the sector to their national economies and the livelihood of their populations. In fact, government expenditures on agriculture come closest to matching the economic importance of the sector in those countries where hunger is least prevalent. For the group of countries where undernourishment is most widespread, the share of government spending devoted to agriculture falls far short of matching the sector's importance in the economy. The trends are also discouraging, throughout the 1990s public investments targeted towards agriculture have been declining in countries where the prevalence of undernourishment is highest. Private investment, including farmers' own investment, tends to follow the trends set by the state. Rural communities have typically not benefited from privatization of infrastructure in the way that urban dwellers have and there is little, if any, evidence of the effective use of public private partnerships to provide new rural infrastructure.

Development assistance does not target the neediest countries.

Development assistance is critical for very poor countries with limited ability to mobilize domestic private and public savings for investment. It is particularly critical for agriculture, which is largely bypassed by foreign private investors. And yet official development assistance to agriculture, broadly defined, declined by an alarming 24 percent between 1990–92 and 1999–2001 in real terms. The countries with the highest prevalence of undernourishment were the hardest hit. In those countries, External Assistance to Agriculture (EAA) declined by 49 percent in real terms. Many of these countries are badly starved of investable resources. International assistance to them, starting with a lasting solution of the debt problem, would be a tangible sign that the commitments to reach the World Food Summit and the Millennium Development goals are being honoured. The recent decisions by major donors to increase ODA and to cancel debts of the poorest nations are very encouraging in this regard. The Council of the European Union has set an ODI/GNI ratio of 0.56 percent by 2010 rising to 0.70 percent by 2015. Moreover the recent agreement reached by the G8 cancels all debts owed to them by 18 countries without a reduction in the overall funds available to those or other countries. These are important steps towards implementing the Monterrey consensus which will also require a greater share of commitments going to agriculture and rural areas.

Peace and Stability are sine quo non conditions for growth and poverty reduction.

Protracted conflicts and civil crises disrupt food production and undermine food security as they drive people from their homes, strike at the foundations of their livelihoods and erode the social fabric of families, communities and countries. Conversely, food insecurity may lead to or exacerbate conflict, particularly when compounded by other shocks and stresses. The interface between food insecurity and conflict has critical implications for food security and

conflict prevention programs alike. Assessing and addressing the risk factors common to food insecurity and conflict, can serve as a mechanism both for preventing conflict and reducing hunger. A growing body of experience confirms the importance of strengthening the resilience of societies and food systems before crises erupt and of factoring resilience into responses to protracted crises. Relief and rehabilitation efforts are far more effective if they build on the foundation of resilience rather than relying exclusively on injections of external inputs, technology and institutions.

3. Challenges for the future

Challenges raised by urbanisation and dietary transition

With virtually all of the world's population growth between 2000 and 2030 expected in urban areas, provisioning the expanding urban markets is a major challenge for agriculture and food marketing systems in the years to come. Rapidly rising urban food demand induces an increasingly commercial orientation of production systems, while inefficiencies in the marketing and transport infrastructure will either provide incentives for the location of production in peri-urban areas or encourage lower cost imports.

The pace of dietary change, both qualitative and quantitative, accelerates as countries become richer and populations become increasingly urbanised. Urbanisation is accompanied by changes in habitual food consumption patterns and dramatic lifestyle changes which include a marked reduction in levels of physical activity. In developing countries which are urbanising, quantitative changes in dietary intake have been accompanied by qualitative changes in the diet. Changes include shifts from cereal and calorie based diets to energy dense diets with high animal protein and fat content as well as increased consumption of sugars and sugar based products. A number of structural factors also contribute to the differences in urban diets: the organisation of food markets and the opportunity cost of the time of the main food preparers in the household both point to the consumption of a higher share of processed and pre-prepared foods, including street foods. There is evidence that smaller and poorer households also rely on street foods for their diets. This is, in part, because the purchase of street foods releases time for income-earning activities.

The determinants and nature of food security are different in an urban as compared to a rural context. Compared to their rural counterparts, the urban poor rely almost exclusively on market purchases of food, and depend on wage income or self-employment in the informal sector. Transportation and housing constitute essential (inelastic) components of the expenditure basket of the urban poor. The sheer number of the urban poor makes targeting more difficult. However, concentration and better transport and communications systems facilitate the delivery of social services (such as nutrition education, nutritional programmes and health services) and the operation of safety-nets and other targeted programmes.

Food safety issues related to street foods, and hygiene issues related to the transport and small-scale processing of food, are some of the issues which urban food security policy must address. With respect to agriculture, competition for land for urban dwellings, industry and infrastructure and for urban and peri-urban agriculture will intensify. Finally, there is a need to monitor these transitions. Monitoring diets, for example, needs to focus not only on undernourishment, but increasingly on obesity, diabetes and other diseases that result from increased proportions of sugar and animal fats in people's diets.

Challenges resulting from transformation of food markets

Food markets in developing countries are undergoing profound changes that are fuelled by economic development, increase in per caput incomes, changing technology and urbanisation. Higher incomes and increasing numbers of women in the labour force mean greater demand for high-value commodities, processed products and pre-prepared foods. Urbanisation increases the scope for economies of scale in food marketing and distribution, while reductions in transactions costs increase the size of the market for distributors and retailers. The result is an impressive increase in the volume of food marketing handled by supermarkets, but also substantial organisational and institutional changes throughout the food marketing chain.

Such changes include the setting of private grades and standards for food quality and safety, and the adoption of contracts between buyers and sellers at various points along the food marketing chain¹. Sub-contracting for products of specified quality and traits is likely to proliferate as a form of interaction between retail food chains, processors and producers. If regions where supermarket retailing is more developed (for example, Latin America) are a precursor of what will follow elsewhere, then vertically integrated or co-ordinated food chains will progressively dominate the food marketing chain in urban areas.

However, concentration of food trade in the hands of a few retailers and large market intermediaries threatens the existence of small traders and small business, central 'spot' food markets and neighbourhood stores. On the production side, these trends may mean the gradual disappearance of those smallholders who are unable to meet the private standards on health and safety set by large retailers and wholesale buyers as well as neighbourhood stores and spot wholesale markets.

Challenges emerging from changing patterns of trade in food

In general, the emergence and strengthening of international trade agreements have resulted in a reduction of national control over flows of goods and services between countries. The inclusion of agriculture in the multilateral trade negotiations has led to governments relinquishing more and more control over their domestic policies. The challenge facing the members of the WTO is to manage and further adjust the new rules-based agricultural trading system in a way which is conducive to achieving greater efficiency, transparency and fairness with equal opportunities for all in international agricultural trade. In this regard, the Doha development agenda recognises explicitly the food security and rural development needs of developing countries by granting them special and differential treatment.

Developing countries are increasingly net importers of food and many have negative net agricultural trade balances. A trend that is likely to continue (even if OECD countries eliminate their agricultural protection and support policies). The net imports of the main commodities in which the developing countries as a group are deficient (mainly cereals and livestock products) will continue their rapid rise. At the same time, the net trade surplus in traditional agricultural exports (tropical beverages, bananas, sugar and vegetable oils and oilseeds) is expected to rise less rapidly or to decline.

¹ See Reardon and Berdegú (2002b) and Reardon et al. (2002, 2003) for a more comprehensive coverage of the issues related to the proliferation of supermarkets.

Increased developing country imports of cereals and livestock products are due to increased demand combined with the low competitiveness of their domestic agriculture, though the relative weight of these factors varies across countries. Low competitiveness is often the result of inappropriate policies and of insufficient resource mobilisation for the enhanced competitiveness of poor rural communities, the sustainable use of natural resources and for adequate provision of market infrastructure and research.

Protection remains high in many countries, with the highest protection being applied by developed and higher-income developing countries. Tariff peaks and tariff escalation create severe distortions that systematically work against the efforts of producers and agro-industries in developing countries to enter the rapidly growing markets for processed products. While countries comply with their AoA commitments, many have adopted domestic support measures that are exempt from reduction disciplines. The degree to which these support measures are in fact decoupled from production incentives continues to be debated, but the evidence suggests that they are not entirely production-neutral. Further effective disciplines may therefore be needed to ensure that domestic supports are minimally trade distorting.

Due to the differences between countries with regard to competitiveness and trade positions, some developing country exporters would benefit from the liberalization of OECD agricultural policies, others would lose as their food import costs rise. However, the greatest benefits for developing countries come from liberalization of agricultural trade among themselves. Modelling studies consistently conclude that between 70 and 85 per cent of the potential benefits for developing countries from trade liberalization is the result of their own domestic policies in agriculture. The primary endowment of the poor is their labour, so domestic policy reforms aimed at improving labour markets are central to hunger reduction. Examples include policies and public investments to help train, educate and provide information that allow labour markets flexibility, information and mobility.

Exports of processed agricultural products are expanding significantly faster than semi-processed and bulk commodities, now accounting for one half of global agricultural trade. Processed goods offer more possibilities for product differentiation and more opportunities for adding value. However, lack of capacity to engage in value added production on the part of primary producers and the presence of tariff escalation in the importing countries both contribute to the loss of potential export revenue. Capacity limitations are particularly felt in markets where access depends on increasingly strict sanitary and phyto-sanitary standards.

The share of agricultural trade among developing countries in total agricultural exports has increased sharply during the past decade, due partly to the emergence of regional trade agreements and partly to the fact that developing countries are the key growth markets for agricultural goods. Income growth, urbanization, and expanding numbers of women in the labour force are creating new opportunities for trade among developing countries especially in processed food.

As agriculture is integrated into the world trading system, there is also an increasing need for regulation of food safety, plant and animal health.. Trade allows the rapid transmission of unsafe foods, animal and plant diseases across borders, so regulations, including legislation, tracability, inspection and risk assessment and communication, have become more important. The application of standards that are not based on sound science can be a barrier to production and trade. When developing country producers strive to meet developed country

standards relating to animal welfare, their products may become uncompetitive, unless major investments in capacity building are being made.

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The share of intra-developing country agricultural exports has increased sharply during the past decade, due partly to the emergence of regional trade agreements and partly to the fact that developing countries are the key growth markets for agricultural goods. Income growth, urbanization, and expanding numbers of women in the labour force are creating new opportunities for intra-developing country trade especially in processed food.

As agriculture is integrated into the world trading system, there is also an increasing need for food safety and related human safety regulation. Trade allows the rapid transmission of unsafe foods, animal and plant diseases across borders, so traceability and other regulations have become more important to ensure food safety. The unequal application of standards can be a barrier to successful production and trade, for example, when developing country producers strive to meet developed country standards relating to animal welfare, their products may become uncompetitive.

Challenges emerging from intensification and resource degradation

First, increases in the opportunity cost of family labour, rising energy costs, together with increasing scarcity of natural resources (land, water, forest resources and biological diversity), underline the need for technologies which enable sustainable intensification, increases in productivity, resistance to pests, and stress tolerance. New biotechnologies (for example, Genetically Modified Organisms – GMOs) could potentially contribute to fulfilling some production needs, including through applications that respond not only to the needs of resource-poor farmers, but also to the need for improving the nutritional content of crops and livestock products.

To date, most biotechnology developments have targeted commercial farmers who can afford them. If the poor are to reap this potential as well, public action is needed to create effective demand for research to meet their needs. For this to occur, it is important that the current controversy and uncertainty over the risks and benefits of new technologies be resolved and that acceptable pathways be created through which small farmers can access these technologies. In this context, developing countries, Africa in particular, urgently need technological breakthroughs on various fronts, for which National Agricultural Research Systems, that currently have limited capacity and resources, need to be better equipped.

Second, an increasing commercial orientation of production systems is expected due, inter alia, to rapidly rising urban food demand, changing consumption patterns, rising interest in energy crops and the increasing integration of domestic and international markets for agricultural products. Some of the resulting changes include: larger operational holdings; reduced reliance on non-traded inputs; increased specialisation of farming systems, and the

need to adopt technologies such as precision agriculture to improve resource use and to form the first link in the data chain for traceability. While the pace of these transformations differs substantially across countries, they are all moving in the same direction.

As economies grow, the returns to intensive production systems that require high levels of family labour are generally lower than those from exclusive reliance on purchased inputs. With the expected rise in operational holding size, the ability of the household to supply adequate quantities of non-traded inputs declines. Power, soil fertility maintenance, and crop care are the primary activities for which non-traded inputs are used in subsistence societies. With the increased opportunity costs, family labour will be used less as a source of power and more as a source of knowledge (technical expertise), management and supervision.

Third, rapidly increasing scales of production are being observed particularly in the livestock sector, trying to supply rapidly growing markets for meat, milk and eggs. Both global analyses and country case studies confirm that advanced technology embodied in breeds and feeds appears to be critical to the success stories for poultry around the world, and the same is likely to become true for hogs over time. Much of this technology appears to be transferable, but only at relatively large-scales of operation, at least for poultry. Thus there is strong reason to believe that technology itself is a prime driver of the displacement of smallholders from the livestock sector. Small-scale producers obtain lower financial profits per unit of output than large-scale producers, other things equal. This suggests that, in the absence of deliberate action, small-scale producers will eventually be put out of business by competition from large-scale producers, especially since the better-off producers will scale up.

Fourth, preserving biodiversity will be a formidable challenge. Higher opportunity costs of labour increase farmer reliance on herbicides for weed control for rice and other staple food crops that are currently managed through weeding by hand. Insecticide and fungicide use for high value-crops, such as vegetables and fruit, is substantially higher than for staples, and improper use can increase the incidence of pesticide-related diseases. Although food will, in general, be cheaper, failure to internalise the environmental costs of the expansion and intensification of agriculture will result in the price of food being lower than its social cost, holding back incentives for further research in yield improvements.

Finally, increases in agricultural production and commercialisation are not frictionless processes. The absorption of the rural poor in the industrial and service sectors has significant costs in terms of learning new skills and family dislocations. Also, where property rights are not clearly established, high-value crop production in upland environments could lead to higher risks of soil erosion and land degradation.

4. Designing an agenda for action

Agenda 1: The future of rural areas in an urbanizing world

The persistence of hunger in the developing world means that ensuring adequate and nutritious food for the population will remain the principal challenge facing policy makers in many developing countries in the years to come. However, the rapid transformation of diets and the changes in food systems at all levels (production, processing and distribution/retail) pose a number of important additional challenges to food security, nutrition and health policy in the developing countries.

Urbanization is likely to increase the “effective demand” for food safety and quality. In developing countries, the informal sector is often a significant producer, processor, distributor and preparer of food and food products (e.g. street foods). On one hand, there is a need for greater regulation and food safety control. On the other, public systems to ensure food quality and safety suffer from lack of organization and adequate funding. When imposing standards that are difficult and costly to achieve, policy makers need to be wary of the implications for low-income food producers, sellers and consumers.

Questions to be addressed:

How does the structural transformation of food systems, including the rapid emergence of vertically co-ordinated chains, change the analytical task and the nature of food policy?

What is the public sector role in providing incentives and managerial support to small producers adapting to dynamic food chain systems, increasingly dominated by large volume, vertically coordinating supermarkets?

How can the public sector contribute to ensuring that small producers adversely affected by the increased vertical co-ordination of food chains, have viable alternative livelihoods?

How can policy effectively deal with the dual burden of the co-existence of undernourishment and overnourishment within the same society.

Agenda 2: The future of agriculture in a globalizing world

The global economy is becoming increasingly integrated through information systems, investments and trade, and agriculture is part of this trend. For some countries, agricultural trade expansion – sparked by agricultural and trade policy reforms – has contributed to a period of rapid pro-poor economic growth. Indeed, some of the countries that have been most successful in reducing hunger and extreme poverty have relied on trade in agricultural products, either exports or imports or both, as an essential element of their development strategy. Many of the poorest countries however, have not had the same positive experience. Rather, they are becoming more marginalized and vulnerable, depending on imports for a rising share of their food needs without being able to expand and diversify their agricultural or non-agricultural exports. For the least developed countries, the benefits from trade reform will only come with a complementary effort in domestic policy and institutional reform and with substantial investment in physical and human infrastructure.

Questions to be addressed:

Are existing policies, institutions, infrastructure and safety net programmes sufficient to cope with the globalization related risks to vulnerable groups?

What actions must developing countries take to shift their product portfolio to enhance their profitable participation in agricultural trade?

How can developing countries compete with the economic and political clout of the much larger and much richer industrial countries?

Agenda 3: Environmental challenges to agricultural development and food security

Over the past fifty years, humans have changed ecosystems more rapidly and extensively than in any comparable period of time in human history, largely to meet rapidly growing demands for food, fresh water, timber, fiber, and fuel². As a consequence many ecosystem services are being degraded or used unsustainably, including fresh water, capture fisheries, air and water purification, the regulation of regional and local climate, natural hazards, and pests. The Millennium Ecosystem Assessment concludes that the degradation of ecosystem services could grow significantly worse during the first half of this century and is a barrier to achieving the Millennium Development Goals. For example, observed recent changes in climate, especially warmer regional temperatures, have already had significant impacts on biodiversity and ecosystems, especially in dryland environments such as the African Sahel. Degradation of ecosystem services is exacerbating the problems of poverty and food insecurity in the developing world, particularly in the poorest countries.

Global climate change is taking place against a natural environment that is already stressed by resource degradation as a result of various factors including certain forms of agricultural technology and input use. Agricultural activities occupy and influence vast landscapes. Farmers, ranchers, and agro-foresters manage, work and live in watersheds, grasslands, hillsides, coastal plains, forests, and river deltas. These various agro-ecosystems provide a wide range of local, national and global benefits and services in the form of positive externalities and public goods. The precise impacts of climate change on agriculture and food production are difficult to gauge. But two basic messages seem to emerge from the various assessments that have been undertaken so far. For the world as a whole, climate change is unlikely to alter the overall production potential. The benefits of warmer climates for some areas may just be offsetting the problems arising in other areas. In some of the adversely affected areas, however, climate change could jeopardize the livelihoods of millions, particularly where the impacts of climate change are compounded by other factors or where existing poverty and hunger makes it extra difficult to cope with its impacts. Such areas of multiple stress are expected to emerge primarily in the poorest developing countries, but also some of the emerging Asian economies could well be affected.

Because many ecosystem services are not traded in markets, markets fail to provide appropriate signals that might otherwise contribute to the efficient allocation and sustainable use of the services. The Millennium Assessment suggests a wide range of economic and financial instruments for influencing individual behavior with respect to the use of ecosystem services. These include: the elimination of subsidies that promote excessive use of ecosystem services; and the promotion of market based approaches including user fees and payments for environmental and ecosystem services. In addition to market instruments, strengthening institutional and environmental governance mechanisms, including the empowerment of local communities, is absolutely crucial for the effective management of environmental resources.

² This section draws from the Millennium Ecosystem Assessment, Synthesis Report. 2005

Questions to be addressed:

How can the water and other resources be managed more efficiently to enhance food production while conserving the environment?

What is the role for policies, markets and institutions in the management of local and global public goods?

Can environmental service payments, including biofuels and the related carbon emission financing schemes be used as a mechanism for poverty reduction?

How far can biofuels from agriculture contribute to its diversification and to rural development strategies without negatively affecting food security?

Agenda 4: Frontiers of science for agriculture in the 21st century

Harnessing the best of scientific knowledge and technological breakthroughs is crucial as we attempt to “retool” agriculture to face the challenges of an increasingly commercialised and globalised agriculture sector. Modern science and technology can also help provide new impetus for addressing the age-old problems of production variability and food insecurity of rural populations living in marginal production environments. In a similar vein, science & technology both enables and drives the creation of increasingly sophisticated food chains that can deliver fresh and minimally processed food to demanding consumers.

Whilst the real and potential gains from science and technology are apparent, it is also necessary to take into consideration the fact that research and technology development are more and more in the private domain: biotechnology is a prime example.

Biotechnology holds great promise, but may involve new risks. In most countries, the scientific, political, economic or institutional basis is not yet in place to provide adequate safeguards for biotechnology development and application, and to reap all the potential benefits. Clearly the question is not what is technically possible, but where and how life sciences and biotechnology can contribute to meeting the challenges of sustainable agriculture and development in the twenty-first century, based on a science-based evaluation system that would objectively determine, case by case, the benefits and risks of each individual GMO. Similarly, the evolution of food chains has been led by the private sector with obvious benefits in terms of food safety and food price reductions. However, there have been casualties as some farmers and firms have been marginalised. In this case the question becomes one of whether there are technical solutions and business models that can enable engagement of such marginalised groups.

Modern science can also provide opportunities for enhancing input efficiencies and for developing more sustainable production systems. The extent to which farmers in developing countries benefit from such technologies, which are often highly knowledge intensive is a matter of debate. Furthermore, it is doubtful if they are compensated for the environmental good that such changes effect. Also to be discussed is the appropriate role of traditional knowledge and local genetic resources in future food systems.

Questions to be addressed:

What policies and global public goods contribute to the generation and diffusion of future innovations and technological advances?

How can equitable access be assured to any of the technological advances that are taking place today in the private sector?

How can modern science complement farmer knowledge in the management of local resources, including genetic resources?

Agenda 5: Targeting and delivering research for marginal areas and marginalized people

Public investment in infrastructure, agricultural research, education and extension is essential for stimulating private investment, agricultural production and resource conservation. However, the marginal production environments have historically received extremely low levels of public investments even though they are home to a large proportion of the world's poor. The Green Revolution has bypassed these environments and future technological prospects seem to be limited. The marginal environments could benefit from breakthroughs in genomics and genetic engineering coupled with resource conserving technologies such as conservation agriculture, but current investments in biotechnology are not targeted to the problems of these areas. Significant scientific efforts in developing effective resource management techniques would also be crucial for the fragile soils and other resources in these environments. Even if the technologies are available getting them to into the hands of poor farmers in marginal environments continues to be a formidable challenge.

The challenge is complicated by the fact that the ultimate goal must be to increase the income of the farmers. Thus, there is a need to have business models that enable these farmers to access higher value markets so that they can afford improved inputs and that their disposable income increases.

Questions to be addressed:

Can public/private sector partnerships be created such that private sector technologies can be adapted for the problems faced by the poor in marginal production environments?

What mechanisms are available to effectively blend local knowledge and modern science to address the perennial problems of the marginal environments, such as drought?

What priority investments and incentive systems need to be in place for enhancing productivity and incomes in these areas?

Agenda 6: Policy options for the future

This item provides a synthesis of the previous five items and sets out an agenda for the future.