# Appendix 2

A Regional Perspective for Agricultural Growth :
Agricultural Development Paths



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# A REGIONAL PERSPECTIVE FOR AGRICULTURAL GROWTH: AGRICULTURAL DEVELOPMENT PATHS

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## Structural Change, 1950-1990

The abrupt changes observed in Latin America since the 1950's in terms of growth, urbanization and modernization were accompanied by a marked trend to diminish the reliance of the economic activity on the primary sector, spurred by important developments in industry and services. The strategies of import substitution and self-sufficiency of the 1960's, supplemented by export promotion in the 1970's were based on a model of industrialization at the expense of the agricultural sector (Krueger et al., Garcia and Montes).

Agriculture went from contributing 21% to the GDP and 54% to employment in the 1950's, to the current levels of 11% and 26%, respectively. Currently, the agricultural labor force in the developing world represents 63% of total labor force (2.5 times higher than that for Latin America). This reduction was absorbed almost equally by industry and services. At first glance, it is easy to conclude that agriculture has lost importance in the Latin American scene. Yet, a closer look reveals that agroindustry has been the main component of the growth in manufactures, which in turn is the most dynamic industrial activity. Furthermore, agriculture has expanded its linkages with other industries (metalurgic, chemical, construction, etc.) as well as with the services sector. What we have today is a more complex agriculture, intricately related with the rest of the economy. These backward and forward linkages make agriculture a unique sector for reactivation of the economic engine and constitute the basis for pointing at agriculture as the most plausible source of development (Mellor, 1989).

## Agriculture in the 1980's

The economic performance of Latin America in the 1980's was quite dismal, to the point that the decade has been labeled the "lost decade". Structural problems related to the high debt situation, permanent fiscal deficits, hyperinflation, unemployment, and the outburst of parallel and informal economies, led to decapitalization and recession in the region (Table 1). Per capita real income decreased at the rate of 1% per year, as GDP growth was much smaller than the 2.1% annual growth rate of population. However, in almost every country, agriculture outperformed the rest of the economy; this was mostly due to the fixities present in the sector that make it, to some extent, a recession-proof sector. But it is also due to a change in the general policy framework that was partially induced by the inability to pursue the policies of the past that were highly demanding terms of subsidies and fiscal contributions. The model of the 1970's based on discrimination of agriculture was severily questioned and a lessening of discriminatory policies with ad-hoc compensations directed towards selected commodities has been detected in most countries (Knutsen, 1988).

## Poverty

By 1989, per capita income was 12% lower than in 1980 (CEPAL, 1990). Toghether with the loss in acquisitive power, there was a worsening of the terms of trade (Piñeiro, 1988). The value of agricultural production grew at an annual rate of 2.0% in 1979-86 at the time that food imports decreased at an annual -5.3% in the same period. It is easy to infer that there was a loss in nutrient intake, as compared with the previous decades. This is particularly notorious in the Andean countries and in the Southern Cone (Table 2). In Central America and the Caribbean, important increases in food aid were observed during the 1980's, that contributed to maintain previous levels of nutrient intake at times of economic upheaval.

Table 1. Socioeconomic indicators of the decade of the 1980s

| | Developing countries | Total Latin America | Africa | Asia | World | South America | | Central America | Caribbean |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Temperate | Tropical | | |
| Urban population (%): | | | | | | | | | |
| 1979/81 | 28.9 | 66.4 | 25.2 | 23.9 | 39.6 | 82.3 | 66.9 | 60.3 | 53.1 |
| 1984/86 | 31.0 | 69.0 | 28.0 | 25.5 | 41.0 | 84.3 | 70.3 | 63.2 | 56.5 |
| Growth rate (%) | 1.4 | 1.1 | 2.1 | 1.3 | 0.7 | 0.5 | 1.3 | 0.9 | 1.2 |
| Population density/arable land (persons/ha): | | | | | | | | | |
| 1979/81 | 4.6 | 2.6 | 3.0 | 5.0 | 3.3 | 1.3 | 2.6 | 3.3 | 6.4 |
| 1984/86 | 5.0 | 2.7 | 3.4 | 6.3 | 3.5 | 1.4 | 2.7 | 3.7 | 6.7 |
| Growth rate (%) | 1.7 | 1.4 | 2.5 | 1.7 | 1.5 | 0.9 | 1.1 | 2.5 | 1.1 |
| Per capita income (US$): | | | | | | | | | |
| 1979/81 | 707 | 2,073 | 705 | 499 | 2,499 | 2,509 | 1,916 | 2,291 | 1,821 |
| 1984/86 | 723 | 1,951 | 614 | 550 | 2,567 | 2,190 | 1,832 | 2,132 | 1,844 |
| Growth rate (%) | 0.5 | -1.2 | -2.8 | 1.9 | 0.5 | -2.7 | -0.9 | -1.4 | -0.3 |
| Value of agricultural production (Billion US$): | | | | | | | | | |
| 1979/81 | 428.6 | 95.4 | 50.5 | 291.1 | 927.0 | 21.1 | 49.2 | 19.4 | 5.7 |
| 1984/86 | 513.0 | 105.2 | 57.2 | 360.5 | 1,049.0 | 22.6 | 56.6 | 20.9 | 6.1 |
| Growth rate (%) | 3.7 | 2.0 | 2.5 | 4.4 | 2.5 | 1.4 | 2.5 | 1.5 | 1.5 |
| Food imports (Million US$): | | | | | | | | | |
| 1979/81 | 49,012 | 10,361 | 10,883 | 25,815 | 160,164 | 925 | 4,576 | 2,757 | 2,104 |
| 1984/86 | 44,917 | 7,872 | 10,618 | 24,340 | 152,477 | 344 | 3,285 | 2,204 | 2,039 |
| Growth rate (%) | -1.7 | -5.3 | -0.5 | -1.2 | -1.0 | -17.9 | -6.4 | -4.4 | -0.6 |
| Food aid in cereals (000 mt): | | | | | | | | | |
| 1979/81 | 8,562 | 672 | 4,325 | 3,527 | 8,990 | 23 | 209 | 119 | 241 |
| 1984/86 | ..,.26 | 1,574 | 6,440 | 3,665 | 11,835 | 13 | 472 | 611 | 479 |
| Growth rate (%) | 6.5 | 18.6 | 8.3 | 0.8 | 5.7 | 11.0 | 17.7 | 25.1 | 14.7 |

Source: FAO/TAC Secretariat: Evolving trends in World Agriculture. Washington, D.C. September, 1988

Table 2. Growth rates of per capita caloric intake in Latin America (percentage)

| Country | 1960-70 | 1970-80 | 1980-87 |
|---|---|---|---|
| Brazil | 0.7 | 0.6 | 0.1 |
| Mexico | 0.6 | 1.2 | 0.8 |
| Central America | 0.8 | 0.5 | 0.6 |
| Caribbean (ex-Cuba) | 0.7 | 0.5 | 0.6 |
| Andean Countries | 0.3 | 0.8 | -0.1 |
| Southern Cone | 0.6 | -0.2 | -0.4 |
| Latin America | 0.6 | 0.6 | 0.2 |

Source: FAO (1987) and (1988)

FAO predicts that, unless the pattern of income distribution changes, 8% of the population would remain seriously undernourished in the year 2000 (below the 1.4 Basic Methabolic Rate threshold) compared with 9.5% for 1983-85. In absolute terms, the number of seriously undernourished would increase from 37 to 43 million (FAO, Potential for Agricultural and Rural Development in LAC, Annex 1, p.59).

Another characteristic of the 1980's was the reduction in health and education expenditures with respect to the levels of the 1970's. In all, poverty levels are worse than before, particularly in the urban sectors. While 37% of the poor were found in that sector in 1970, by the end of the 1980's 57% were in the cities. Extreme poverty continues to be mostly found in the rural sector, but the proportion of them found in the urban sector went from 31% in 1970 to 45% in the late 1980's.

## The Resource Endowment

Latin America is a new continent characterized by a relatively low labor endowment amidst abundant land. The ratio of persons per hectare of cultivated land is 2.7, compared with 3.4 in Africa and 6.3 in Asia.

Frontier expansion was an important source of production growth in the 1960's and 1970's; the resource constraints of the 1980's called for more intensification (higher yields) as the source for more output (Table 3).

Table 3. Evolution of yields of selected crops in Latin America

| | Annual Growth Rates | | |
|---|---|---|---|
| Crops | 1966-70 | 1970-80 | 1980-88 |
| Corn | ns | 1.9 | ns |
| Rice | ns | 0.9 | 2.6 |
| Wheat | ns | ns | 3.5 |
| Sorghum | ns | 3.3 | ns |
| Soybeans | ns | 2.1 | ns |

ns: not significant

Source: Own calculations based on FAO data

However, an analysis by regions reveals wide disparities in the labor to land endowment. While South American countries exhibit a low ratio of population to hectares of cultivated land (below 2.5), Central America's ratio. 3.7. is higher than the one for Africa and the Caribbean countries (with 6.7) have a value higher than that of Asia.

Modernization of agriculture has been a must steming from a stagnant rural labor force and the pressures for a more efficient agriculture. FAO statistics show that, in order to maintain food production at constant per capita levels during the 1980's, cereal production grew by 26%, fertilizer use increased by 40% and the number of tractors increased by 82%. This trend should continue as rural population for the year 2000 is projected to remain at 125 million, while urban population will grow by 50% (from 275 to 400 million) and the agricultural

frontier expansion reaches a halt. Together with the trend to increase use of modern inputs, there is a trend to specialize (dictated by the fixities of machinery and the need to achieve economies of scale) and to integrate operations both vertically (capturing marketing margins like in grain-feed-poultry operations) and horizontally, in cooperatives and producer associations.

While periurban farming (urban workers in agriculture) has increased, the reverse trend also is present: a higher percentaje of the rural population works in non-agricultural tasks in the 1980's than in 1970 (Table 4). Therefore, the pressure to search for labor-saving technologies and enhancement of labor productivity is an important force in technology design.

The region was a net importer of capital in the 1970's (particularly at and after the oil crisis) but in the 1980's it became a net exporter, as capital inflow plunged due to lack of confidence from foreign investors and lenders and the outflow exploded due to onerous debt service payments.

## Changes in Diets

Urbanization, higher incomes and new technologies contributed to change the patterns of consumption in Latin America. On the rise were rice and wheat, vegetable oils and poultry products, while locally grown roots and tubers, pulses and beef were losers. Concurrently, there was a trend towards more elaborate foods, with a higher component of processing and value-added. Such a trend responds to the need of having a lower transport cost per unit of value of product. Perishable and low value products, like many roots and tubers, [illegible] their share in favor of easier to store, more elaborate and convenient foods. Agroindustry, originally quite dependent on imported foodstuffs, moved closer to production regions and away from the ports, and diversified itself, strenghtening the linkages of industry with agriculture.

Table 4. Latin America, structure of employment in agriculture and rural sectors

| Country | Year | Share of agricultural EAP of urban origin (in %) | Share of rural EAP working in non-agriculture (in %) |
|---|---|---|---|
| Brazil | 1970 | 12.3 | 15.2 |
| | 1980 | 17.7 | 23.4 |
| Pernambuco | 1970 | 13.1 | |
| | 1980 | 16.3 | |
| Sao Paulo | 1970 | 26.6 | |
| | 1980 | 38.0 | |
| Costa Rica | 1963 | 5.4 | 29.1 |
| | 1973 | 6.2 | 41.2 |
| Ecuador | 1962 | 6.5 | 19.3 |
| | 1974 | 6.8 | 26.4 |
| Mexico | 1970 | 23.8 | 23.1 |
| | 1980 | 26.0 | 42.4 |
| Nicaragua | 1963 | 11.0 | 12.8 |
| | 1971 | 11.7 | 20.0 |
| Peru | 1961 | 18.3 | 20.1 |
| | 1972 | 23.7 | 18.8 |

Note: Census definition of urban is as follows: Brazil (unspecified); Costa Rica (administrative centers of cantons); Ecuador (capitals of provinces and cantons); Mexico (center of populario with at least 2.500 inhabitants); Nicaragua (administrative centers of departments and municipios); Peru (populated centers with 100 or more occupied dwellings); Puerto Rico (center of population with at least 2,500 inhabitants and employed persons only).

Sources: FAO, Potentials for agricultural and rural development i Latin America and the Caribbean. Annex II, p.22

## Latin American Agriculture Towards the XXI Century

The current decade of the 1990's is filled with uncertainties, particularly around two variables that can potentially have deep repercusions on the economic performance of the region. These are oil prices and interest rates.

In 1973, the effects of the oil crisis were managed via higher endebtment, a possibility that is not viable now. Substantially higher oil prices will negatively affect the development of marginal areas in oil importing countries even further than already anticipated, as transportation subsidies will become unmanageable. The reverse might be true for oil exporters like Mexico, Venezuela, Ecuador, Colombia and Bolivia. Among oil importers, resurgence of agricultural energy sources (like PROALCOHOL) will regain credibility, shifting resources away from food production. Chemical inputs will become more expensive, imposing more efficient input use, within the context of an integrated crop management approach, substituting chemical use for more sound management.

That scenario of high oil prices, coupled with higher interest rates (themselves linked to higher oil prices and inflation in the developed nations, US deficits, ambitious investment plans for Eastern Europe, etc.) spells more problems for Latin American countries, particularly those with a high debt service and oil imports. Those countries will find it difficult to become more competitive in world markets.

Many of the recent trends point out in the same direction: the urgent need for increased efficiency, to maintain growth rates with lower area pansion, and the need for resource conservation leading to sustainable agricultural systems. In other words, more efficient and sustainable technologies must be put in place. Whether growth will be internally or externally induced is somewhat a futile discussion: increased efficiency is a must for economic aperture, yet the new technologies designed in the context of increasing linkages of agriculture will in turn generate

their own income to ensure that internal growth will also exert an important pull back into agriculture through higher derived and aggregate demands (Mellor, 1989).

## Addressing the Conditions for Sustainability

The theme of the 1950's and 1960's was growth through progress (modernization and adoption of new technologies). In the 1970's awareness markedly shifted into growth with equity, as the battle against poverty was not advancing despite economic growth. By the eighties a new dimension came into play: the Malthusian prediction of the XVIII century had not been fulfilled, but population pressure kept at a harsh pace. By the year 2000, world population will exceed the 6.0 billion mark, about twice as much as of that in 1960. Important growth in the developing world was occurring at the expense of future income: depletion of renewable and nonrenewable resources, degration, pollution, the greenhouse effect, etc., became important concerns.

High population densities and poverty constitute a powerful mix for resource overexploitation and degradation. A basic economic force to increase the concern for sustainability is to place higher values for future incomes than currently done. In other words, to be in a condition of applying low discount rates that do not excessively tax future incomes over present ones. But this will not happen under conditions of poverty: the poor value current income very highly and quite rightly view inmediate resource use as the only alternative to improve their status. Likewise, countries as a whole with short term democratic regimes will value immediate incomes highly, particularly if the debt burden and fiscal deficits run high at a time when terms of trade are deteriorating and market access is reduced.

Therefore, it is imperative to raise income for those at levels of extreme poverty and reduce population pressures before a sustainable development can be envisioned. In that context, there are a number of internal and external actions that must be considered.

At the continental level, there are two external factors that must be influenced to ameliorate current pressures on the resource base: lessening of the debt burden and better market access. Unless these two inmediate sources of income are accessible, it is doubtful that the discount rate can be lower and therefore that a favorable private and social environment will be in place to promote resource conservation in Latin America.

At the internal level, IFPRI lists four strategies that relieve poverty and population densities and that lay the basis for more sustainable growth: (i) land reform programs for land preservation: (ii) public works with an environmental protection component aimed at providing employment during nonpeak farming seasons directly "substitute employment for the environment"; (iii) food programs for the poorest children in the rural areas that will make their families less driven to degrade marginal lands: and (iv) reduction of population growth rates (IFPRI Report Vol. 12 No. 2, 1990).

## Broad Trends for Technology Design

Despite accute dualism and sharp disparities in a highly heterogeneous agricultural sector, some trends emerge towards the next century. We now find an agriculture where there is intense pressure to increase labor and capital productivity, as the model of frontier expansion will be limited by financial constraints. Modernization and more commercially oriented farmers will demand input responsive germplasm, which ideally should also produce acceptable yields at low input levels. The demand for mechanization calls for a broader range of alternatives than currently available. The lack of alternatives is particularly striking when compared with the ample range of small and mid-size machines being used in Asia.

The trend to more elaborate foods with higher value added implies a lessening of the paramount importance that breeders used to give to the physical characteristics of the products based on what was interpreted

as consumer preferences. If the product will be used as raw material for feed or flour production, for example, its size, shape and color looses importance since the relative cost of its nutrients is what really matters for least cost mixtures.

Production systems research in the context of a land use perspective is increasingly in high demand, as the concern for sustainability with higher productivity and improved equity trascends the commodity approach to place issues in the context of better knowledge of agroecologies and their socioeconomic context.

## Agricultural Development Paths

As stated by FAO (1988, p.79) a central question for the design of a development strategy based on agriculture is the choice of development path: either a "New Continent" path based an extensive use of land and the increase of the land/labor ratio as chief means to raise incomes or the "Asian" path based on abundant use of labor in agriculture and the increase of farm incomes by raising land productivity.

The issue is closely linked to the relative factor endowment of countries and regions and the foreseen potentials for technical change.

FAO (1988) has grouped Latin American countries in four groups according to the nature of their development path:

1) **Land using path**. Argentina, Bolivia, Brazil, Chile, Cuba, Dominican Republic, Paraguay, Suriname and Uruguay.

2) **Labor using path**. Ecuador El Salvador, Guatemala, Honduras, Mexico and Nicaragua.

3) **Factor unbiased path**. Colombia, Costa Rica, Haiti, Panama and Venezuela.

4) **Receding path.** Guyana, Jamaica, Peru, Trinidad and Tobago.

This classification is based on the evolution of labor and productivities during the period 1961/63 to 1984/85 (see Figure 1).

The suitability of these development paths for individual countries has been changing over the recent past and can be expected to evolve further as both the national and international socioeconomic frame change.

Major changes affecting the advantage of individual paths are:

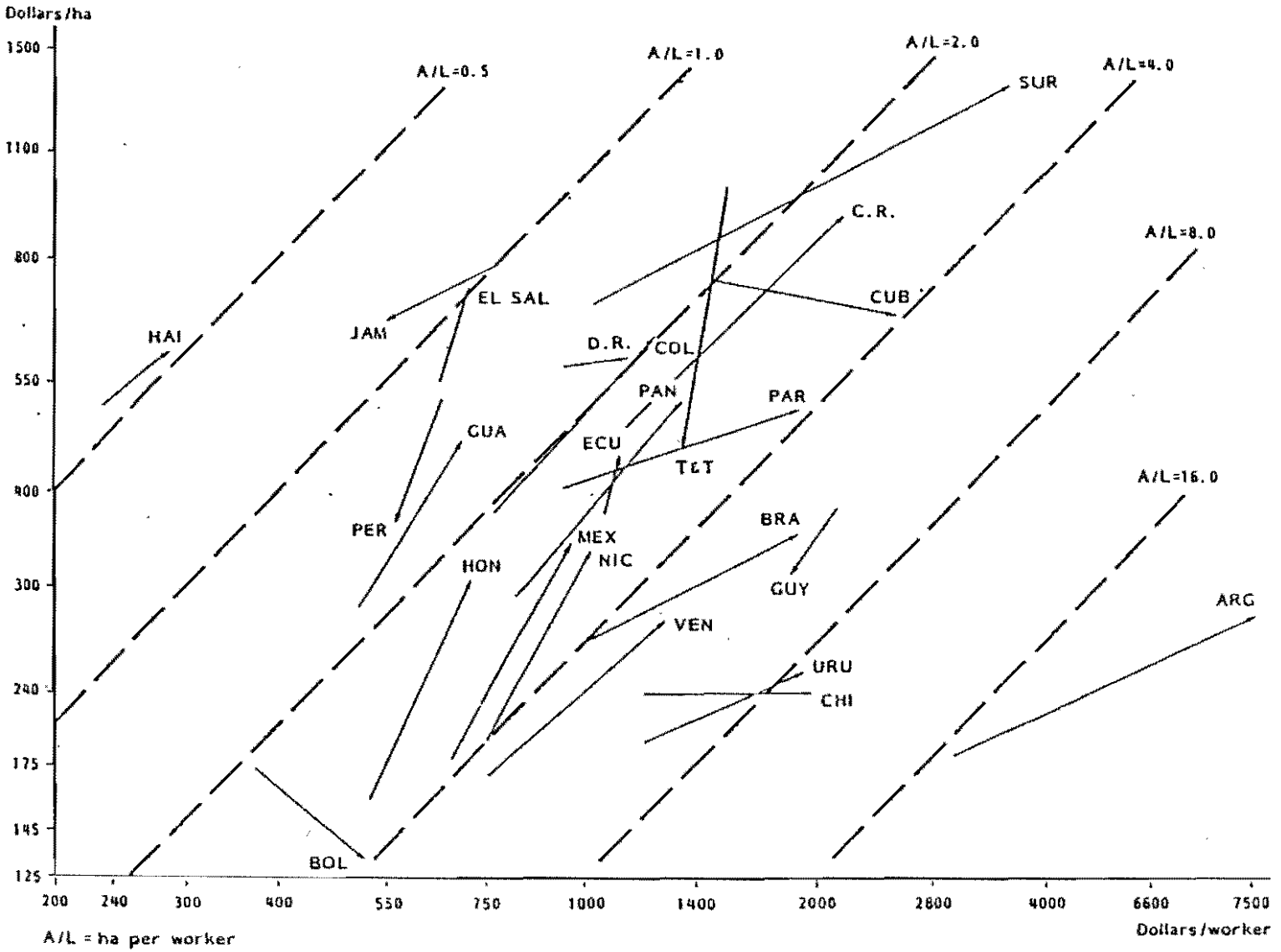
- Rural urban migration making labor more scarce in regions distant of the major markets but more abundant in the periphery of major cities, given the lack of urban employment.

- Growing costs of frontier expansion due to lack of public funding for infrastructure, gradual depletion of the more fertile accessible frontier lands and increasing awareness of the environmental costs involved.

- Increasing energy prices which reduce the competitiveness of frontier expansion and of regions distant from the urban or export markets.

The multiplicative effect of all these trends will lead to a more heterogeneous pattern of development paths within countries at a continental scale. Nevertheless the general pattern for the Latin American tropics will be tilted towards a relatively a labor-using development path. Nevertheless there will be pressure for substantial increases in labor productivity in many regions due to outmigration and aging of the remaining rural populations.

We define the following prototypes of agricultural development paths:




Source: FAO (1988)

**Figure 1. Distribution of LA/C countries by change in crop output per ha and per worker, 1961/63-1984/85 (constant 1980 international dollars, Log scale)**

1. **Intensive peri-urban farming**

This is a highly labor-using development path which will expand close to urban centers. It responds to the fact that rural migrants will not be absorbed by urban employment. Thus rural employment will give them access to urban lifestyle (access to public goods) while being employed in the rural sector. This development path requires either large urban markets for fruits and vegetables, or an export demand (e.g. flower production in the Sabana de Bogota, Chilean fruit for export, etc.). Regions have to have good infrastructure, environmental problems will typically be those of intensively farmed areas: pesticides, depletion of water tables, etc. Access to markets will frequently lead to large enterprises using hired labor extensively or individual farmers organized either in cooperatives or vertically integrated.

Major challenges for this development path include the identification of elastically demanded products, the enhancement of the mobility of production factors, particularly land; and the management of conflicts between the agricultural and other uses of the resources, e.g. water for irrigation or urban consumption, recreational value of intensively farmed land, etc.

2. **Marginal land farming**

This development path refers to farming on less fertile land which is also more distant from the major markets, generally by small to medium sized farms, frequently pushed out of more fertile regions. These systems present serious sustainability problems, low incomes, pressure on fragile resources, erosion, etc. The development path is basically a land using one, related to outmigration of part of the populatic and more extensive land use by the remaining population. This would reduce pressure on resources. Outmigration may only imply local movement to niches with better soils closer to the market which will develop into a development path similar to one with intensive crops in a highly labor using path or to rurally based agroindustries.

3. **Commercial farming on fertile land**

This development path will be relevant for large areas of the continent which presently produce the basic grains for the urban population. We envisage a factor neutral development path which will respond to the overall limits to area expansion and increasing transport costs. At the same time, demand growth and outmigration and aging of the population will imply need to increase labor productivity.

This will imply increased mechanization and trend towards less diversified systems. The challenge will be to increase efficiency in a sustainable manner avoiding the present problems of specialized agricultural systems such as excessive use of agrochemicals, weeds, erosion, etc.

4. **Intensification on environmentally low value land with agricultural potential**

This development path, the intensification of the acid savannas offers the scope for a substantial intensification from presently low levels of productivity. Clearly here the path will imply both increases in land and labor productivities but will have more of a land using nature.

The critical issue for this development path is whether the production will be competitive with increasing energy prices affecting transportation and input costs. This relates to the potential impact of research in developing materials which can efficiently use these environments.

5. **Intensification on environmentally valuable land with low agricultural potential**

This path refers to the exploitation of the humid forest for cropping and livestock. This development path in the past had a markedly land using nature, associated to the free access to this resource. The large negative environmental externalities of this

path have led governments to question its soundness. There is a growing consensus on the need to better understand this ecosystem and the trade-off involved to design more appropriate technology for its use. It is clear that if at all, the appropriate development path should be clearly labor using. It is clear that this will imply the need for very targeted sets of policies and incentives to induce such a labor using development path.

## Conclusions

- Given the structural adjustment the countries of the region are undergoing, substantial changes in the role of agriculture are to be expected.

- Increased mobility of production factors will lead to a clearer differentiation of regions following alternative development paths within countries and regions.

- The external environment: interest rates, energy prices, access to DC markets, will influence the choice of development path much more directly than in the past.

- Environmental issues will increasingly become a key bargaining element between the region and its present or potential trade partners. A better understanding of the interrelationships between the choice of development path, the access to developed countries' product and capital markets, poverty and the environmental issues is urgently needed to facilitate this international bargaining process.

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