

## The Transformation of the São Francisco Valley (Brazil) by Changing Development Policy and Export-oriented Fruit Production

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### Abstract

Better techniques of transport and logistics, globalization tendencies and increasing consumer demand for tropical fruit lead to market diversification in industrialized countries and open new export opportunities for non-traditional agricultural products from developing countries, where this tendency also depends on local conditions, knowledge transfer and changing policies. This paper presents the dynamic development processes related to expanding irrigation and export-oriented fruit growing in the traditionally poverty stricken semi-arid interior of the Brazilian Northeast. Recent development initiatives pretend to change the region's perspectives from chronic crisis to booming export economy.

Keywords: Irrigated fruit growing, NE-Brazil.

### 1. Introduction

The trend towards trade liberalization in a globalized market favors non-traditional agricultural exports which contribute to enhance development perspectives. Improved logistics and transport facilities offer new chances for export diversification (Strunden, 1995). Experiences show different forms of activities and degrees of success, and in some areas remarkable changes occurred. In the São Francisco valley in the Northeast of Brazil transformation processes related to expanding fruit production and changing regional development policies are really striking and a promising object of current scientific research. Irrigation and fruit production in the Northeast have shown a highly dynamic expansion during this decade, especially in the São Francisco valley. Important changes of the political and economic frameworks have led to an increasing public and private interest in export-oriented fruit growing. In an area with little tradition in irrigation, the drastic transformation depends on considerable public investment in infrastructure and on the transfer of knowledge and technological and organizational innovations. After a long period of direct intervention and the realization of numerous irrigation projects, recent reorientation of governmental action promotes private initiatives and market orientation. Ambitious development programs for irrigation and tropical fruit growing in the Northeast claim to attract private investment and convert Brazil into the world's most important fruit exporter. Market liberalization is combined with the demand for sustainability of development. How this is done and which processes take place in the modern transformation of the São Francisco valley, will be topics of this paper.

### 2. Development problems in the Northeast of Brazil

Brazil is a country of continental dimensions with a great variety of climates, landscapes and land use possibilities, and the Northeast shows the greatest regional diversity. Here the history

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of Portuguese colonization began, leading to early settlement and important tropical agriculture, mainly concentrated on the coastal areas. The following centuries brought a shift of the political and economic center of the country to the Southeast, leaving behind a problematic Northeast with persisting colonial structures and relatively high population density that contrasts with sparsely occupied neighboring regions in the interior of the continent, where emigrants escaping the severe drought periods of the Northeast are looking for better living conditions. The interior areas of the Northeast, called Sertão, are known as the driest part of Brazil, with 350-600 mm annual rainfall concentrated to the January to April season, but characterized especially by its strong irregularity. Due to the climatic risks of rain-fed agriculture, extensive cattle husbandry has long been the main land use system in large areas of the fragile ecosystem of the Caatinga. Unreliable rainfall, but also historical and structural reasons hindered the evolution of sustainable land use systems.

Although the climatic disadvantages are generally blamed for development problems of the Northeast, the inherited socioeconomic structures, that remain almost untouched by agrarian reform, play a fundamental role. The reasons for chronic poverty and emigration are more complex and not new (Krüger, 1978). Unequal access to land tenure, capital and knowledge leaves an increasing number of smallholders without a sufficient subsistence base, causing a growing pool of landless labor, social conflicts and emigration directed to the overcrowded mega-cities of the Southeast and towards the Amazonian settlement frontiers, provoking additional problems in both regions. The Gini-index of land concentration is one of the highest in the world. The policies of conservative agricultural modernization, of import substitution by capital intensive industrialization, mainly concentrated in the Southeast, and the failed attempts of rainforest colonization contributed to the severe debt crisis, but did not improve living conditions of the majority of people in the Northeast, where socioeconomic indicators still demonstrate the regional disparities in Brazil. Poverty and striking inequalities of access to land remain a source of present and future conflicts and development problems in Brazil with serious social and environmental implications (Dünckmann, 1998), and especially in the Northeast.

Table 1: Socioeconomic indicators in 1995/96

<b>Indicators:</b>	<b>Brazil</b>	<b>Northeast</b>
GNP per capita (in reais)	4760	2579
Participation primary sector in GNP (%)	12	12
Persons in primary sector (%)	26	43
Persons in secondary sector (%)	20	12
Persons in tertiary sector (%)	54	45
Rural population(%)	21	37
Urban population (%)	79	63
Annual growth rate of population (%)	0,92	1,51
Fertility rate (%)	2,4	3,2
Illiteracy rate (%)	15,6	30,5
Life expectancy (years)	66,5	61,5

Source: IBGE, Instituto Brasileiro de Geografia e Estatística.

### **3. Recent changes in development policy**

The semiarid areas of Northeast Brazil traditionally are considered one of the most problematic regions of Latin America, where decades of successive development programs and the creation of a special governmental agency for the development of the Northeast (SUDENE) did not achieve to overcome the situation of poverty, poor living conditions and emigration. Most analysts argue that the Brazilian development model for the Northeast has not only failed its objectives but even aggravated economic and social polarization (Rönick, 1986). Regional policies favored the great cities and coastal areas, neglecting the semiarid interior of the Northeast, where public measures were mainly a reaction to the effects of frequent drought periods without integration into a coherent development strategy (Cavalcante, 1997). Every drought crisis was followed by the proclamation of new programs in the areas declared as the “drought polygon”. Energy production became the primary way to make use of the great water resources of the São Francisco river, but also the potential for irrigated agriculture was increasingly recognized. Efforts in infrastructure, sugar cane production for the ambitious Brazilian alcohol program and export crops brought better results than in food crops. Basic food supply remains a severe problem for an important part of the population of the Northeast (Rheker, 1989), dramatically demonstrated during the great drought of 1998. The modernization of large landholdings makes pressure on ecosystems, marginal land, increasing landless labor and unemployment rate even worse.

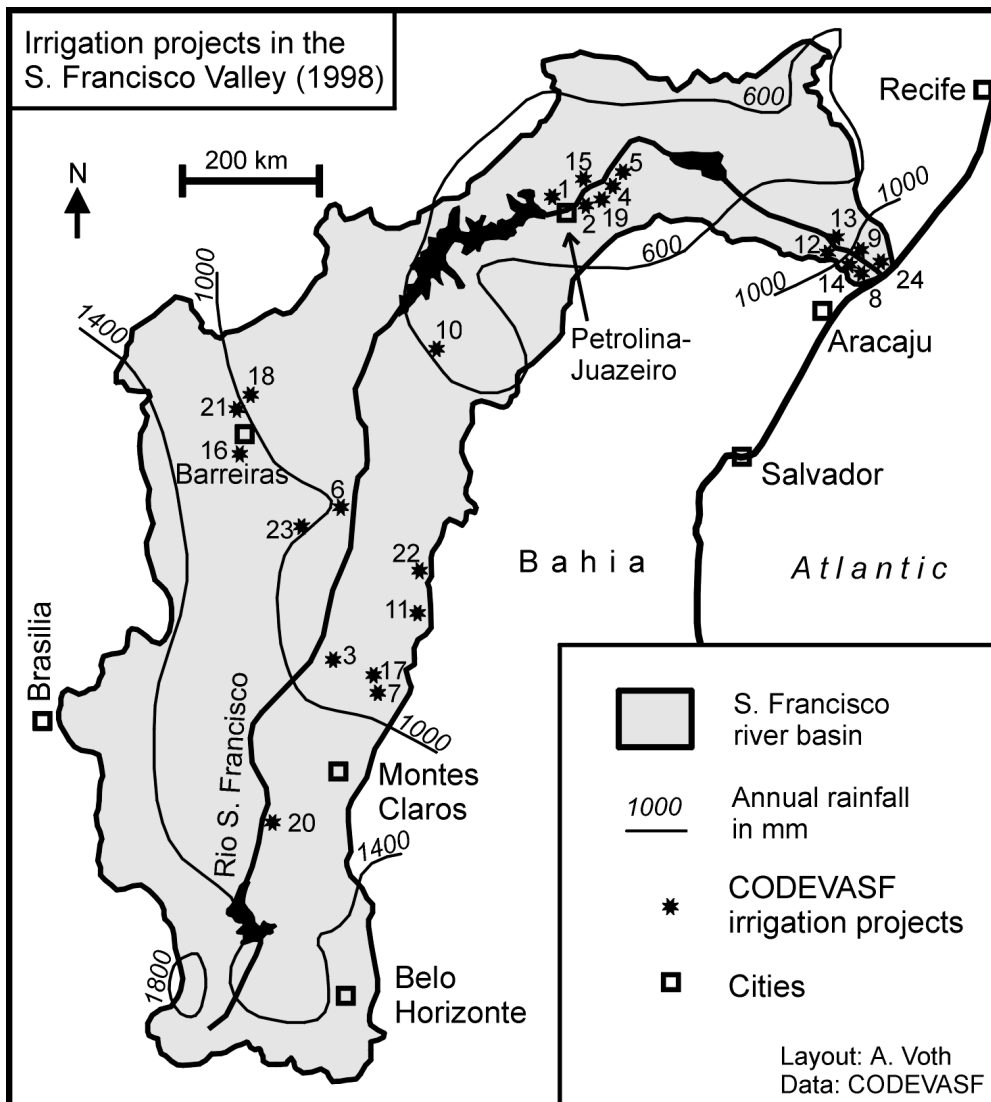
The São Francisco Valley is gaining in importance in recent development plans that seek to overcome the lack of continuity characterizing former plans. After a sequence of hydraulic actions like the construction of the gigantic Sobradinho dam, finished in 1978 forming a lake of more than 4000 km<sup>2</sup>, the great perennial river of the Sertão is placed into the center of new strategies to make use of important water resources that still remain underexploited, presenting a more integrated concept for a sustainable development of the entire river basin and the semi-arid Northeast (CODEVASF, 1996). The interest in irrigated agriculture increases and is integrated into a concept of multiple use of water, trying to obtain a better coordination with existing and recently created programs and spending special attention to transport infrastructure, professional education, better conditions and opportunities for investors, and more hydraulic works to ensure sufficient water supply for all users at a long term, and thus the sustainability of the development projects. Stimulating economic growth by better access to water resources and avoiding water use conflicts between different sectors, the new policy pretends to convert the São Francisco river into a development axis that connects different growth poles and links the valley to the dynamic Southeast of Brazil, giving back to the Rio São Francisco his historical role as the “River of National Unity”. However, the recent financial crisis of the country raises doubts about the coherent realization of the pretended interventions. Although public investment in infrastructure and incentives to economic enterprises are still the basis of development policy, there is a shift towards a greater participation of private initiatives and capital, seeking a less direct state intervention. Offering good infrastructure and investment facilities, the market is expected to induce development.

#### **4. The transformation of the São Francisco Valley by irrigation**

Brazil, as a predominately humid country with vast land resources, traditionally did not see a national interest in irrigation and preferred the colonization of sparsely populated interior regions to avoid a necessary agrarian reform. The main objective for investment in dams was the construction of hydroelectric power plants needed for the industrialization of the Southeast and the creation of new industrial growth poles. The economic sense and negative ecological and social consequences of large dam projects in Brazil have been objects of

critical discussion (Kohlhepp, 1998). Also the flooding of inhabited fertile lands in the São Francisco valley caused social injustice and conflicts (Augel, 1978; Boland, 1996), but Sobradinho and other dams on the same river were the only ones that created an important potential for irrigated agriculture. Several public institutions were engaged in water management and irrigation planning, with frequently changing programs and only part of their objectives fulfilled. The agency commissioned to manage irrigation planning in the São Francisco valley is the CODEVASF (Companhia de Desenvolvimento do Vale do São Francisco), founded in 1974 as a successor of former institutions. Experiences and knowledge transfer about water management from other countries supported an increasing use of the water resources of the valley for irrigation. In 1995 the irrigated area in the valley was estimated to reach 260.000 ha, corresponding 71.157 ha to 19 projects of CODEVASF. The recent increase of activities led to an area of 93.448 ha in 24 projects in 1998, of which about one half of the area is used by small and medium farmers and the other by companies (CODEVASF, 1999). In effect, 71.973 ha of all project areas were planted, 59% of them with permanent and 41% with annual crops.

Figure 1: Irrigation projects of the CODEVASF in the São Francisco Valley (1998)



The land use evolution in the projects shows a declining relative importance of annual crops, representing a general shift from food to export crops. Some projects, like those surrounding the agribusiness growth pole of Petrolina-Juazeiro, are in a more advanced stage than others promoted more recently and differ in land use, management effectiveness and composition of different farm types. In the same project area small settlers are often neighboring plantations of large companies. Another concept is the reservation of some lots to farmers with professional agronomic preparation. Planners expected a better diffusion of innovations, knowledge transfer and use of labor force. The dynamic expansion of private plantations also takes place outside the official irrigation projects, but the lack of data and the concentration of CODEVASF on its own projects do not permit their inclusion in a comprehensive, integrated planning of the river basin. The risk of uncontrolled water use and an equilibrated distribution of resources between competing areas of the basin will be an important task for future development policy. The ambitious aims of new irrigation programs make the disposal of sufficient financial means for their realization questionable, so that the objectives of environmental and social sustainability could be the first to remain only on paper, as earlier experiences in Brazil demonstrate. The drying out of the river's sources in the mountains of Minas Gerais by deforestation and new eucalyptus forests (Boland, 1996) constitute another threat to the irrigation plans that has to be taken into account. Therefore the recent shift towards the consideration of the whole river basin as a planning unit should favor sustainability.

The existing areas of irrigation in the Northeast are relatively small compared to future governmental plans that estimate the potential area of irrigation to 1,6 million hectares, of which 640.000 ha are located in the São Francisco basin where the CODEVASF already has projected studies for 387.000 ha in different projects (CODEVASF 1996). In order to avoid water shortages effecting the existing hydroelectric power plants and to permit a future extension of irrigation in the Northern Sertão even outside the São Francisco basin, recent plans propose water transfers to the river from neighboring basins located to the Southwest, which receive higher rainfall. This proposal raises new expectations in states like Rio Grande do Norte or Ceará, where investments in irrigation and tropical fruit growing already began and their governments are looking for new investors to "irrigate the development", as new folders propagate. Examples of water transfer in other parts of the world, like California, Spain or Israel, are always referred to in order to justify large water transfer projects to adequate areas of the Northeast declared as a "new Eldorado for the national agroindustry", that the government tries to turn into "the Brazilian California". The enormous scale of the irrigation and fruit production programs remember of the gigantic dimensions of former development programs in Brazil, although new aspects of sustainability have been introduced in recent proposals. In fact, consolidating agribusiness poles like Petrolina-Juazeiro succeeded to attract not only specialist professionals and investors from all over Brazil and other countries who contributed their knowledge and capital, but also small farmers and labor force from the surrounding Sertão, a migration reflected in a population growth above the national and regional average. Like former development programs for the Northeast, also the promotion of irrigation and fruit production are expected to contribute to a reduction of emigration of rural population to the cities, especially to the Southeast. The creation of employment and better living conditions in the middle of the Sertão should stop emigration processes, an objective already achieved in Petrolina-Juazeiro and some other project areas.

Table 2: Population increase in Petrolina/Juazeiro 1980-1996

(in 1000)	Population 1980	Population 1991	Population 1996	Increase 1980-96 (%)
Brazil	119.002,7	146.825,5	157.079,6	32,0
Northeast	34.812,4	42.497,5	44.768,2	28,6
Pernambuco	6.142,2	7.127,9	7.399,1	20,5
Bahia	9.455,4	11.868,0	12.541,7	32,6
Petrolina	104,3	175,4	191,2	83,3
Juazeiro	118,2	128,8	172,1	45,6

Source: IBGE, Censo Demográfico 1980, 1991; Contagem da População 1996.

The greatest novelty of the new model of irrigation presented by CODEVASF is the transfer of project management and costs to the water users. Bearney (1993) considered missing organizational structures for the participation of farmers a main failure of the public irrigation projects. The state is opting now for a reduction of his participation in project management, for more decentralization, tries to recover implementation costs, stimulates private enterprise and joint-ventures and selects water users by their professional capacities to ensure efficiency and success of the projects. Small growers who work less efficiently and companies with less know-how or less financial capacity to buy lots or modern irrigation techniques will drop out of the projects by market mechanisms. In macroeconomic terms, agribusiness is a more efficient resource user than subsistence cultivation, but the latter should not be neglected (Caviedes and Muller, 1994). The policy change from the creation of isolated public irrigation projects with certain social motivation towards incentives to private engagement and efficiently run market-oriented projects is expected to hasten the expansion of irrigation leading to the take-off phase of modern agriculture in the semi-arid Northeast. Public intervention is now strengthened in professional and environmental education for rural population (e.g. Projeto Amanhã) and in improvement and divulgence of the regional advantages for private investment, especially production and export of tropical fruit. A new slogan shall convince investors: "Fruit-growing in the Brazilian Northeast: An investment guaranteed by nature".

### **5. The development of export-oriented fruit growing in the Northeast**

While other tropical and sub-tropical countries already developed an important fresh fruit export sector, especially for bananas and pineapples or off-season products like apples, Brazil's participation in international fruit trade remained low. On the background of market liberalization and the need of export diversification, Brazil discovered the Northeast's potential for tropical fruit production, especially for non-traditional fruits filling market niches in Europe and Northern America, responding to the increasing demand for these products. The new perspectives converted the main factor traditionally blamed for regional development problems, the semi-arid climate, into a competition advantage. The dry tropical conditions favor fruit growing and quality due to better illumination, less disease and pest attack, and the possibility to control picking seasons by irrigation, thanks to almost constant temperatures. Timing the harvest of determinate crops helps growers to adapt exports to prices and demand. The availability of good quality water for irrigation, mainly from the São Francisco river, enables them to produce without depending on rain. Problems with water

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salinity are more likely to appear in other areas of modern fruit growing like Rio Grande do Norte, where groundwater use is an important factor. The geographical isolation of the different irrigation areas in the Sertão helps reducing chemical pest control. Another advantage of the region is its location not too far from large consumer markets, so that perishable fruits like mango can be shipped to Europe crossing the Atlantic in 10 to 12 days, thanks to modern transport techniques, whereas many other production areas have to depend on expensive air freight. Therefore the implementation of good export infrastructure and logistics and the access to market information and market channels are requisites to make use of these advantages.

Land use patterns of the CODEVASF projects differ very much, but in general, small settlers and also some of the companies start cultivating their lots with food crops requiring less capital investment and offering rapid harvests and later gradually change to permanent crops. Strong investors even start with fruit orchards of hundreds of hectares. The Nilo Coelho project began on 1983 with annual crops planted by “colonos” on their 5 ha lots. “Empresas” received larger lots, but without the irrigation infrastructure installed. Both farm types changed their crops during the consolidation process, but the former in a lesser degree and later than the latter. Between 1993 and 1998, market orientation towards tropical fruits led to the strongest change from annual to permanent crops within the Nilo Coelho project: While maize almost disappeared and beans were heavily reduced here, coconuts, grapes, mangos and other fruits experienced a dynamic expansion.

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Table 3: Mango growing in the projects of CODEVASF 1998

nr.	Projects (ha)	crop area total	annual crops	permanent crops	Mango			mango area %
					peasants	firms	total	
1	Nilo Coelho	14.809	3.026	11.783	1.416	2.506	3.922	26,5
2	Tourão	11.346	1.079	10.267	19	451	470	4,1
3	Jaíba	7.232	4.707	2.525	80	5	85	1,8
4	Maniçoba	5.133	1.298	3.835	587	-	587	11,4
5	Curaçá	4.843	1.989	2.854	315	1.067	1.382	28,5
6	Formoso A	4.398	2.248	2.150	54	176	230	5,2
7	Gorutuba	3.789	262	3.527	30	150	180	4,8
8	Betume	2.500	2.487	13	-	-	-	-
9	Boacica	2.101	2.101	-	-	-	-	-
10	Mirorós	1.936	1.656	280	3	-	3	0,2
11	Estreito	1.898	232	1.666	240	-	240	12,6
12	Propiá	1.767	1.767	-	-	-	-	-
13	Itiúba	1.744	1.744	-	-	-	-	-
14	Pindoba	1.401	1.263	138	-	6	6	0,4
15	Bebedouro	1.301	690	611	68	-	68	5,2
16	Barreiras S.	1.141	562	579	174	-	174	15,2
17	Lagoa G.	1.127	15	1.112	-	-	-	-
18	Nupeba	836	830	6	-	-	-	-
19	Mandacaru	649	500	149	75	455	530	81,7
20	Pirapora	628	16	612	-	148	148	23,6
21	Riacho Gr.	526	516	10	-	-	-	-
22	Ceraíma	341	31	310	82	-	82	24,0
23	Formosinho	316	152	164	68	-	68	21,5
24	Marituba	211	211	-	-	-	-	-
	gesamt	71.973	29.382	42.591	3.211	4.964	8.175	11,4

See project-numbers on the map of figure 1.

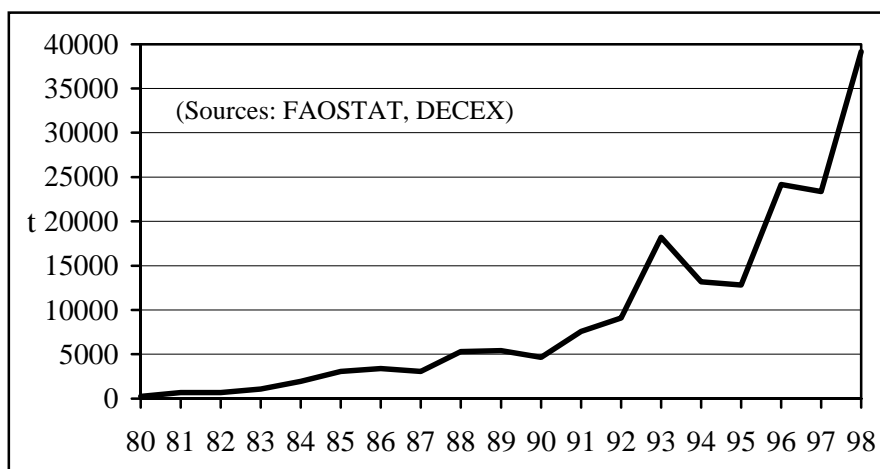
Source: CODEVASF (1999): Relatório de Produção 1998.

Reaching 8.175 ha in the CODEVASF projects in 1998, mango is the leading export fruit, although smaller farms are mainly oriented to the domestic market due to a lack of capital, technology, volume and knowledge about market and logistics. After 1985 a growing number of companies began to introduce Florida varieties of mango (Haden, Tommy Atkins, etc.) from the important production area in the State of São Paulo to the Northeast where a lot of native varieties were grown traditionally and sold to the markets in the Northeast and the Southeast of Brazil. The new varieties responding to foreign demand began to displace the native varieties also from the national market. The first mangos were exported by air freight, but as reefers transporting large amounts of melons from Rio Grande do Norte to Europe and modern container technologies came up, sea transport opened the way for competitive fruit prices, larger volumes and a continuous increase of production. Growers with more than 100 ha of mango used to build a packing house to export their own fruits, and some of them also commercialize fruits of smaller farmers. These producers adopt modern production methods from larger export enterprises and in some cases become their suppliers, but this implies that they meet the same standards and modernize their production (Caviedes and Muller, 1994). Large plantations with up to 400 ha of mango can afford to introduce the most recent innovations, use modern technology and know-how, have better marketing facilities and



achieved permission to export to the USA applying hot water treatment against fruit fly infestation. The great demand for trees of the new varieties favored the establishment of specialized nurseries in the area, not existing before. Public and private research activities help to improve knowledge about irrigated tropical fruit growing in the Sertão. While large companies have direct access to international knowledge markets, smaller farmers depend on neighboring innovators and public rural extension. Specialists, importers and investors from different countries visit the area, and a growing number of input and service firms convert Petrolina into a boom-town. The mangos of the São Francisco valley entered the European market precisely in the unsaturated October to January season filling a market niche. Now some producers already are able to obtain fruit almost all the year round applying new cultivation techniques.

Figure 2: Dynamic increase of Brazilian mango exports (1980-1998)



Smaller growers take up knowledge from the successful exporters. More than mango, they prefer highly labor intensive grape production obtaining two and a half harvests per year, providing a good distribution of income along the year. Important growers succeeded to organize commercialization founding the Brazilian Grape Marketing Board, mainly directed to regional and national markets, but with growing export perspectives. This form of organization permits small growers the access to postharvest infrastructure and export markets receiving the same facilities and prices as larger grape exporters (Collins, 1995). In a context of traditionally dominating large land properties, farmer cooperatives are still an exception. An increasing number of producers and exporters is associated to “Valexport” organization (Petrolina), that initiated also a group for mango commercialization, but most of the larger firms still do not join the group because of their independent export activities, so that it cannot work like a marketing board. Another recent initiative of Valexport is the creation of a Integrated System for Commercialization (SIC) expected to concentrate market activities like a Dutch Veiling being under construction next to the Petrolina airport, that also has been adapted for direct fruit exports. After the still increasing success of São Francisco mangos on domestic and export markets, a greater diversification of fruit production is expected. Valexport just founded a coconut producer group and presented fresh fruit for coconut water as a new product on a European trade fair in 1999.

Export oriented tropical fruit growing in the Northeast is a relatively young sector still needing consolidation in production and commercialization. Good experiences and export perspectives moved the Government to support the dynamic evolution of this sector starting a new development program (Programa de Apoio e Desenvolvimento da Fruticultura Irrigada do Nordeste, 1998), integrated in existing programs for irrigation and development in the Northeast and characterized by a holistic perspective including different aspects of the production chain up to marketing and environmental and social sustainability. Intensive modern fruit production is presented as a profitable and efficient investment creating employment, giving an alternative to dependence on irregular rainfall, improving living conditions in the Sertão. Thus, emigration to the coastal and Southeastern cities is expected to decrease as well as the demographic pressure on the Caatinga in the Northeast and on the Amazonian rainforest. The shift from expansion of extensive land use in young settlement areas towards intensification and modernization in the traditional problem areas would be a novelty in Brazilian agricultural policy, although not obtained by agrarian reform but by market orientation and support of private enterprise.

### **6. The perspectives of development by world-market integration**

Non-traditional fruit crops can be exported only if they meet the expectations of importers and consumers and fulfil determinate quality criteria transmitted to the producers. Market integration means dependence on and adjustment to the demand and makes knowledge exchange essential for competition. Knowledge transfers from outside and within the production area are necessary to obtain the desired qualities by adequate preparation of producers, labor, management and organization (Cavalcanti, 1997). Individuals become integrated into a complex production chain and have to find organizational forms that enable them to compete with producers in other regions and countries. Recent policy changes try to support market participation, offering improved conditions for investment and research, commercial infrastructure, trade fairs, quality control, education, etc. Nevertheless, the risks of market integration are demonstrated by sudden variations of exchange rates, interest rates, trade regulations or the market activities of other competitors. New expanding market niches also attract more producers to gain market share in a context of increasing competition (Luck, 1999). The great advantage of Brazil is a large and growing domestic market, more receptive than those of most other exporting countries. The MERCOSUR represents a potential market still not exploited. A necessary further step should be investment in industrial transformation of fruits in the Northeast to reduce dependence on changing export prices.

Trade liberalization with parallel policy reforms give non-traditional exports a chance, and examples from Central American countries with smaller national markets show that associated small producers also try to participate in the export market, but with considerable problems in management and market adaptation (Stamm, 1997). A better access to markets is possible if small farmers have the opportunity to use postharvest infrastructure and logistics of larger specialized companies, as experiences with grapes (Collins, 1995) and production contracts for melons (Silva, 1997) in the Northeast of Brazil demonstrate. If fruit companies open the way for the participation of small and medium growers transferring knowledge and stimulating new initiatives, the success of irrigation policy will not be limited to large landowners. Irrigated fruit production in the Northeast provided investment opportunities for large enterprises, quality products for foreign trade companies to include into their activities, but also market access to a growing number of small farmers and employment for landless labor force, although by far not enough. The new dynamic production areas are still contrasting islands in the poverty stricken Northeast. Persisting regional and social disparities,

job insecurity, low wages, hunger, migration, criminality, land conflicts and environmental destruction need more time and willingness for consequent reforms to be resolved. The future of the rural poor should not be restricted to represent an abundant resource of cheap labor for agribusiness. Ignoring the social context of irrigated agriculture, a consolidation of the new export sector cannot be guaranteed. The sustainable development reclaimed by recent programs can be achieved only if smaller farmers and landless labor are integrated into the process and if the use of resources is really controlled.

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