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Problems in Three New Land Settlements In Andean Countries

Eduardo Durand and Jos Hilhorst

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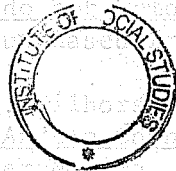


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I. INTRODUCTION

1.1 General

There is an ongoing migration into the Latin American, African and Asian jungles of settlers searching for a better life for themselves and their children. Many migrate under the aegis of government projects, as in Indonesia or Malaysia, but as many or more venture into the rainforest with no direct support. This study is about three such groups of settlers: two in Colombia, in the area of Caquetá and one in Northwest Ecuador, in the province of Esmeraldas.

The relevance of this subject for regional planning is at least two-fold. First of all, planners have a direct interest in population movements, since they are involved in the planning of the transport, communications, and social service networks to which citizens should have access. Secondly, planners have a direct interest in studying access to those economic services such as agricultural credit, inputs and technology, that enable settlers to survive and to contribute to the national economy. It is clear to us that, due to a series of scarcities, governments do not always provide these services. But other reasons for this failure — of specific interest to planners — may include errors in the ways priorities are set or programmes evaluated, or incorrect assumptions regarding the nature of the process of pioneer settlement.

This section provides a framework for the analysis and explanation of settler behaviour, and because this is partly shaped by government policy, some of the most important reasons for the success or failure of such policies will be examined. In this regard, we make use of the recent work of Oberai (1986), who discusses the relative success of land settlement policies in developing countries in terms of their effectiveness and efficiency. In sections 1.2 and 1.3 we discuss the relevance of these criteria to the study of settlement policies; section 1.4 covers settler motivation and behaviour and the conditions that shape this behaviour; and section 1.5 sets forth hypotheses arising from this approach to land settlement analysis and assessment. The analytical framework described in section 1.4 is used to examine three new land settlements: one in Ecuador and two in Colombia.

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1.2 Effectiveness

Government policies in the field of new land settlement serve various objectives, ranging from increasing agricultural production through ensuring established national borders, to avoiding or decreasing rural-to-urban migration or relieving population pressures in areas of existing settlements. Hiraoka (1980), in his study of the settlement of the Upper Amazon, makes it clear that over the past 40 years in East Bolivia all these objectives played a role. Sometimes a number of goals were pursued simultaneously, or new objectives were mentioned in defence of continued government expenditure for settlement projects. In addition, changes in external economic conditions or changes in governmental ideology have caused serious ups and downs in sums allocated for new settlements. The same phenomena can be observed in Ecuador, Peru and Colombia.

These shifts in the bureaucratic and political environment of new land settlement projects make it very difficult, if not impossible, to judge the effectiveness of settlement policies in terms of their stated objectives. The process of new land settlement takes at the very least a period of about 10 years and evaluation studies should cover a similar period, but it is nearly impossible to find a decade-long stretch in which objectives remained stable or funds were forthcoming in accordance with original plans.

It is not always clear who or what should be included in evaluative studies of settlement policies. No doubt the evaluation of *directed* settlements must consider the criteria by which people who arrived in government-constructed schemes are selected, the credit and extension programmes — all in the context of the crop selection done for the settlers, the layout of villages, the type of housing and so on. But whether and how penetration roads should be taken into account is not always clear. These are sometimes built in connection with mineral resource development (e.g. oil) as was the case in East Ecuador, where a directed settlement project was developed after the road was constructed. Further complications arise from the fact that directed settlement projects are almost always accompanied by spontaneous settlement, making it difficult to determine where a study of settlement policy effectiveness should begin or end.

Oberai (1986) identifies six objectives of land settlement policies: population redistribution, development of border areas, provision of land to landless people, regional development, agricultural development and improved welfare of migrants. Dunham mentions similar objectives, but

adds that in the evaluation of settlement policies researchers have tended 'to view "political factors" as an external influence (disrupting the adequate planning of settlement schemes), rather than as an integral part of the planning process itself' (Dunham, 1982: 46-7). Oberai concludes that land settlement programmes:

so far ... have made no more than a modest contribution to the solution of the problems of populations distribution, unemployment and poverty. Very few programmes have reached their stated objectives (1986: 158).

Dunham concludes that:

it is not sufficient to focus on the success or failure of settlement projects as phenomena apart, divorced from their historical and political context, and that it may not be enough simply to assess them in terms of their stated objectives (1982: 58).

In his evaluation of settlement programmes, Oberai rightly points to the need to consider settlement projects in their regional context, arguing that planning should take account of the dynamics in the life of such projects: second-generation problems could then be avoided and off-farm employment more easily generated. Thus, Oberai focuses on the need to look at the internal economic and demographic dynamics of settlement projects, while Dunham addresses himself to the external political dynamics.

Helmsing (1982) in turn considers external economic dynamics: the importance of profitable production in existing settlements for the development of agriculture in new settlements. For example, he shows how cattle farming in older settlements in Colombia was replaced with cotton growing, rice farming and sugar production, allowing cattle farming to become feasible in new areas.

This crucial aspect of crop selection has often been overlooked, so that quantities of labour and other resources were wasted in directed settlement projects. Although it seems only marginally related to government objectives, it is of eminent importance to the motivation of settlers deciding whether to remain in a settlement area.

Oberai, Dunham and most other scholars in this field implicitly assume that settlers, especially pioneers (the first arrivals in an area), are resolved to remain, and that desertion is a sign of failure. Helmsing

disagrees. In his view (and in ours) a certain proportion of settlers, especially in government-sponsored schemes, consider their land-clearing labour as a way to create savings, which are realized by selling the pioneer plot. These savings are then available for investment in another new land settlement or in their village of origin.

1.3 Efficiency

Nelson (1973) and others have made it clear that the rate of return on capital invested in government-directed settlement projects in Latin America is either very low or negative. There is some evidence from other countries, especially Malaysia, that such poor performance is unnecessary, but in practice it appears that low returns on capital should be assumed.

Although we do not wish to remake all existing studies using a different methodology, nor to praise governmental performance in the field of settlement programmes, it appears justified to question the results of these studies on methodological grounds. This is directly related to the question of what should be included in policy evaluation studies. Section 1.2 refers to inputs: housing and sewerage systems, the penetration road, the clearing of forest by spontaneous settlers outside the pre-defined limits of the scheme. There are also problems of definition on the output side. Is 'income' only that income generated by settlers on land developed under the scheme, or must the income generated by additional settlers on lands outside the scheme's boundaries, together with the value of the infrastructure they create on their own initiative, be taken into account?

Just as all analyses are effected by the definitions used to include or exclude data, the assumptions underlying the calculation of a project's internal rate of return can mislead. Common assumptions include the settler's ability to grow the pre-selected crops, the prices that are obtainable for output, the price of inputs, the availability of credit and of extension services, good transport facilities to markets and last but not least, the settler's commitment to remain in the settlement.

The organization and implementation of settlement schemes to a large extent attempts to create conditions that reflect the planner's assumptions, and Bunker gives an interesting summary of what happened in Brazil in this regard:

These agencies also transferred the goals, the procedures, and the technologies appropriate to the economy and ecology of the centre — south to their operations in the Amazon. Because of their emphasis on agricultural credit, and their orientation to commercialization, there was little interest in the improvement of subsistence crops and strategies, although health instruction — primarily focussed on sanitation — was stressed (1985: 105).

Hence, in designing these projects, planners tended to overlook the basically primitive circumstances surrounding new land settlements. A comparative statics approach appears to dominate, while essential elements such as production for subsistence tend to be forgotten. How one gets from year zero to the year in which all is fine appears to receive little thought from planners, so that the process of settlement proper lacks considered planning and attention. Again, therefore, we are faced with the problem of adequately taking settler motivation into account. In addition to being one aspect of understanding settlement processes, settler motivation is relevant to the evaluation of the man-made conditions that go into planned settlement schemes.

1.4 Settler motivation and behaviour

For Mougéot (1985) migration to the agricultural frontier in Brazil is part of a displacement process that implies the 'escape' of labour-intensive, traditional and low-return activities to less contested areas. In his view, this process is mostly fed by spontaneous settlers who are able to survive — be it at low levels of income — as long as commercial agriculture and associated government services remain at a distance. However, once these penetrate frontier areas, such pioneers tend to be displaced.

Moran (1985:97) reports that throughout Spanish-speaking Latin America the rates of attrition from colonization projects are even more discouraging than in Brazil:

Rates as high as 95 per cent have been reported in the first three years of the Alto Beni of Bolivia, 60 per cent in Santa Cruz de Bolivia...[due to]...lack of all-weather roads, lack of basic health and educational services and insecurity of title.

Obviously, what Moran concludes to be the causes of desertion may contain some truth — even a great deal of it — but he provides no proof. Mougeot's 'escape' hypothesis is interesting and may be close to the true motivation of a number of settlers, but again, it is not based upon direct motivation studies. Paradoxically, while Mougeot says that desertion will increase with the advent of good roads and government services, Moran says that desertion is motivated by their absence. The seeming contradiction arises because Mougeot refers to spontaneous settlers of the pioneer type, while Moran speaks of settlers in government-sponsored schemes. While both may have similar motivations, the latter may have quite different expectations. Those who decide to conquer the jungle on their own — the true pioneers — must have a mental make-up that differs from that of those who expect the protection of a government-sponsored scheme.

There is a second aspect to the two findings that requires some attention: both authors refer to the incorporation into the national economy of agricultural production on the frontier. In fact, new land settlement constitutes the spatial expansion of all national economic, socio-political and administrative systems. We cannot *a priori* assume the dynamics of each of these systems to be the same, and it seems reasonable to expect that they will differ in directed, semi-directed and spontaneous settlements. The motivations and expectations of settlers in each of these types of settlement may be expected to differ, and the nature of the various processes of incorporation ought logically to be influenced by these differences. Policies related to incorporation must therefore adequately take these differences into account.

The present study considers two aspects of incorporation: it attempts to obtain insights into the motivation of settlers by studying their strategies from the moment of arrival, and it examines the impact upon settler behaviour of some aspects of economic incorporation.

We start from the idea that settlers have certain characteristics in terms of the resources they have at their disposal; labour, capital and technology, the latter especially in relation to its appropriateness for the agro-climatic zone in which they settle. Armed with these resources, they will try to reach their objective, which we assume to be a higher level of living than they had in their areas of origin. Hence, settlement in another area may only be of instrumental value for a number of them: they may wish to return to their area of origin to buy the land 'they always wanted to own'. Similarly, to settle definitely on the first plot they obtain in a new land settlement area

may not be consistent with their final objective, i.e. a higher standard of living. In the same way that a salaried person might migrate in order to increase income, a settler may wish to move on to what is perceived as a better opportunity.

In making this type of decision, settlers are constrained by the natural conditions of the settlement area, by man-made conditions and by the attributes they possess. Four attributes appear to be of eminent importance: a) the number of labour units available to the household; b) the amount of capital the household can command; c) the knowledge of agricultural technology relevant to the area of settlement; and d) the social abilities of the household. This last attribute is related to the importance of a settler's ability to organize for common tasks and to represent settler interests in government circles. Most Andean governments will deal with cooperatives or associations of spontaneous settlers, but not with individuals. In spontaneous settlements in particular, this attribute is of great importance if health or other services are to be obtained. But even in directed settlements, the organization of settlers is important for dealings with government agencies. The relevance of the other attributes appears obvious.

The behaviour of equally equipped settlers within the same settlement may differ, depending on their motivation, the most important factor being whether they plan to stay permanently or are working the land in order to establish themselves elsewhere. We may assume that the behaviour of settlers who are intending to stay will be very similar, as long as man-made and natural conditions are virtually equal for all.

Conditions within the same settlement may not be the same, however. The problem of access to water in new land settlement schemes combined with irrigation schemes is of course very well known. In the cases discussed in this paper, other natural conditions, such as soil quality, can also differ significantly within the same settlement.

Man-made conditions include the layout of the settlement, which has a direct bearing upon access to social and centrally located services and transport facilities, and upon the granting of preliminary and formal title, the availability of production and investment credit, the cost of such credit (interest rates), the availability and price of inputs, the arrangements for marketing and so on.

Man-made conditions will generally be the same for all settlers, although within a given settlement differences in plot location may influence

settler behaviour, since settlers located on the outskirts of a large scheme may be too far from central services such as primary schools. For example, assuming that soil and climate indicate that farms of 50 to 100 ha are needed to provide a reasonable family income (as is the case in many Amazonian areas) then farming families will be greatly dispersed: no more than two families per square km. In a similar situation in Ecuador (Wood, 1972: 616) where 'travel within a cooperative is on foot or on horseback, it is almost impossible for a community centre to function efficiently. Only 100 families will live within the four-kilometer radius which marks approximately one hour's travel time from the centre'. Thus people located more than four kilometres from the centre may decide to resettle elsewhere, the more so if their plot will fetch a good price. This argument is summarized in figure 1.

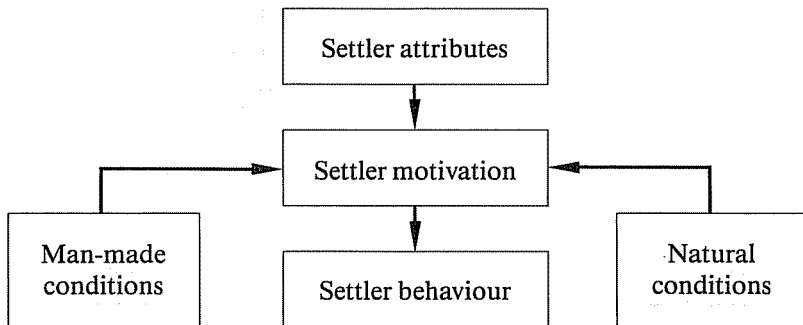


Figure 1: Assumed basic determinants of settler behaviour.

This argument does not sufficiently take into account the attitude a settler may have towards settling on new land. Among otherwise equal settlers, it is possible (and in both spontaneous and directed settlement areas in the Amazon basin even likely) to observe at least two attitudes toward settlement: 'stayer-attitudes' and 'mover-attitudes'. Evaluations of settlement projects generally attach great importance to the percentage of stayers observed in a settlement, and are unable to locate sufficient data on settlers who move, because they are unavailable for interview. Did they always intend to leave, or did conditions force them out in search of better opportunities?

In addition, as Helmsing (1982) explains, the mover attitude may develop through a learning process that implies at least the following characteristics. The combination of soil quality and the maximum plot size for pioneers may indicate that the resulting settler farms cannot be economically viable. At the same time, other and often richer people have learned that land in settlement areas can be obtained in various ways and that the value of such land tends to increase over time. New land settlements are thus subject to speculation, and speculators have discovered ways to obtain land rights without actually ever living on it. These plots are cleared by stewards or by transient pioneers, the real 'movers', who also know that land values rise. Thus speculators support the ambition of movers, and the need to consolidate undersized plots into viable farms creates a supply of land both for speculators and for a second wave of capital owning stayers. Settler behaviour has to be studied within this framework of additional forces.

Keeping this in mind, we now discuss in more detail the effects of man-made and natural conditions upon settler behaviour. From the point of view of new land settlement planning, two aspects of the settler behaviour appear to be of special importance: a) the speed at which the land is cleared, and b) whether the settlers stay in the settlement. The stayer who arrives as a pioneer will start to clear an area of land sufficient for satisfying the subsistence needs of the household. Since stayers all tend to do this, the market prices for subsistence crops will generally be too low to warrant their marketing. Sending the produce to other markets will generally be economically unattractive because of the high transport costs involved.

As long as cash crops (cattle, tree crops) do not yield, a considerable shortage of cash will exist in the settlement area, and in order to buy needed goods and services, members of stayer households will probably seek work outside their plot. In general, stayers tend to insist on the supply of social services — health and education for their children — and on the improvement of transport systems. They will also be interested in constructing good quality dwellings and other buildings. The more expensive 'imported' products are, the more time the stayers will have to spend off their farms, so that they have less time to clear their own land, and less cleared land available for cash crops. Other things being equal, if natural fertility of the land is high, stayers will need to clear and plant fewer hectares for cash crops than if fertility is low. However, where a marketing organisation for settlers exists, land clearance need not be as advanced,

since the better market structure will tend to increase the value added per acre. The higher and more stable income obtainable in such a situation once the cash crops yield sufficiently and the market has stabilized relieves settlers from the need to obtain cash income by working outside their own plots, allowing them more time to devote to clearing land.

Hence stayers tend to clear more land the higher the wage rate outside the settlement, the more investment credit available to substitute for wage income, the better the cash crop marketing system, the less fertile the land, and the more labour and capital available to the household.

Movers, on the other hand, while they are undifferentiated from stayers with regard to subsistence crops, tend to devote more time to land clearance even if they are uninterested in growing cash crops. Movers are more likely to be found in areas where the plot size available to a pioneer is below that of a viable farm. It is obvious that this proposition needs to be tested by comparing behaviour in a number of settlement areas, since fertility and plot size are generally similar within a single area. As already noted, this is generally also the case for man-made conditions, with the exception of proximity to centrally located services.

Meanwhile, man-made conditions, e.g. credit, marketing, transport and social services, partly define the way in which the activities of a new land settlement area are incorporated into the country's economy. Clearly, a stayer may become a mover if conditions become too adverse. Therefore, we may expect that where soils are poor there will tend to be a higher percentage of movers than in an area with relatively good soils. Nevertheless, settler households that are large and well endowed with capital and technology at the time of arrival will tend to be stayers *if* the aforementioned man-made conditions are favourable.

Obviously, given the influences of natural and man-made conditions upon settler behaviour, it will be very difficult to distinguish between stayers and movers in any given settlement without a very carefully-targetted survey. We consider this distinction to be very important, and although our survey addresses the issues involved in a rather indirect way, it has helped us to sort out some of the basic characteristics of stayer and mover behaviour.

1.5 Basic hypotheses on settler behaviour

Although the present study is placed within the general analytical context discussed in section 1.4, it has not been possible to clarify the impact of all the mentioned variables, because the pertinent data is lacking. We decided to focus on both the impact of key natural factors on three representative aspects of economic incorporation: credit availability, markets for output, and the availability of transport facilities. All other aspects of man-made conditions are set aside, however important they may be.

It is important to specify the conditions under which economic incorporation takes place. One of these conditions is of course the legally determined size of the pioneer plot. If plots are too small to allow for a reasonable family income, the phase of clearing the land must necessarily be followed by a phase of consolidation during which some *colonos* leave the settlement. This phase will tend to come sooner the more adverse other conditions are. In terms of our main variable, this means that if credit is not available, if the market structure is monopsonistic and if transport facilities are poor, that the pioneer will tend to give up sooner. Since these three variables are basically the same for all *colonos* in a given settlement, their impact can only be studied by inter-settlement comparison.

A second condition is given with the economic characteristics of the crop to be grown, and those of its market. If it is relatively light and non-perishable (e.g. coffee but not cattle) it seems reasonable to assume that the negative impact of poor transport facilities is lessened. Similarly, if only live cattle are in demand, the availability of investment credit is more important than if tree crops can be sold relatively easily. Tree crops require on the whole less cash investment per hectare. Finally, although this is not always the case, market structures for tree crops tend to be more competitive than those for cattle, possibly because the initial investment for tree crops tends to be smaller and entry into the market is less closed to assembler/traders. This second general condition of economic incorporation may be different for settlers in the same settlement, that is, if they are producing different types of products.

These two basic conditions under which incorporation may take place are mutually dependent. It follows from our observations on farm size that some crops might become economically viable only after consolidation has taken place, such as when a second-wave settler with considerable capital buys a number of pioneer plots and forms a ranch

large enough for a crop (e.g. cattle) that was economically impossible for the small, unmoneyed, pioneer.

This study was unable to follow the initial generations of settlers. We arrived to observe the results of a process in which consolidation had taken place. It is thus not possible to identify the impact of these two basic conditions of incorporation with precision, but some preliminary conclusions seem feasible. It does appear that the following hypotheses may be formulated.

- i. Pioneers may be divided into two groups: stayers and movers. The former will tend to move on because of adverse man-made or natural conditions; the latter will move on within approximately five years.
- ii. All pioneers will start out by clearing an area of forest that is sufficient to grow the family's subsistence needs; in addition, they will tend to seek a source of cash income in the area.
If natural fertility is low, the clearing of land for subsistence purposes will be continued and the uncultivated land can be planted with tree crops or sown to grass for cattle.
- iii. On highly fertile soils the turnover of settlers will be smaller than on poor soils, since on the latter plot consolidation will be required for a viable family farm.
- iv. The level of output of pioneer farms of similar size is determined by the number of labour units available to the household.
- v. The tendency to stay in a settlement increases with the availability of labour and credit, and with the pioneer's prior knowledge of the production technology required for local conditions.

On the aspect of incorporation we put forward the following hypotheses:

- vi. Within the same settlement there will be a tendency for farms of particular sizes to emerge; this tendency will be stronger the greater the gap between the legal size of a pioneer plot and the size of a viable family farm.
- vii. In settlements where there is demand for cash crops requiring relatively little investment, and that can be transported with relative ease, there will be a tendency for pioneers to stay longer.
- viii. The degree of monopsony as measured by the gross margin obtained by assembler/traders will tend to be lower for those products that require little investment on their part.

In view of the complexity of the various issues at hand, this study serves more as a means to generate hypotheses than as one that can arrive at definite conclusions.

1.6 Outline of the study

Sections 2 and 3 present data on three projects: one in Quinindé in northwestern Ecuador, and two located in Caquetá in Eastern Colombia: Maguaré and Valparaiso. Conclusions are offered at the end of each section, which are then taken up and compared in section 4, followed by a formulation of the most important conclusions to be drawn from the cases.

Map 1: Location of Quinindé and Nueva Jerusalén



2. THE CASE OF NUEVA JERUSALÉN IN QUININDÉ

2.1 Background

Quinindé is situated in the province of Esmeraldas in northwestern Ecuador (see map 1). The province had a total 1980 population of 250,000, and a 4 per cent annual growth rate. Soils are of medium fertility and fairly deep. Altitude ranges from sea level to 400 metres and the topography is mainly plain to undulated. Temperature (averaging 25 degrees C) and rainfall (averaging 2400 mm) combined with soil fertility make the cultivation of perennials and pastures possible, the main crops being banana, plantain, African oil palm, coffee, cacao and citrus, while maize and rice are the subsistence crops. Existing stands of virgin forest are being exploited by concession holders.

Quinindé is a canton with a population of about 70,000. Over the past 15 years its annual growth rate was close to 9 per cent. More than 90 per cent of the population lives in small scattered settlements and 78 per cent of the labour force is engaged in primary activities. The average income per capita is close to US \$300. Infant mortality in the area is 65 per thousand, illiteracy among persons of 9 years of age and older is 33 per cent; primary school attendance encompasses only 60 per cent of the school-age population (6-12 years) and 95 per cent of the dwellings lack public water supplies and electricity.

The settlement of Quinindé must be seen in the context of agricultural development in Ecuador, which until about 1965 was characterized by its susceptibility to consecutive waves of influence of the world market. The last of these waves occasioned the banana boom of 1955-65, which ended when disease forced plantation owners and smallholders alike out of business. The banana boom had led to a high rate of land development in the Pacific provinces when wage labour and spontaneous small settlers flowed into the areas fit for banana production, the main variety being Gross Mitchell. However, when the disease struck, the areas not fit for growing the more resistant Cavendish variety had to be abandoned, leaving the people in these areas in considerable economic and social disarray. Some owners converted their land into pastures, others divided it among their workers and still others abandoned it and left it to invading small settlers.

Towards the end of the 1950s a road was opened running from Quito, via Santo Domingo de los Colorados, through Quinindé to the Pacific port city of Esmeraldas. During the early years of road construction various large enterprises received forestry concessions. By 1975 the road had been paved, and many small settlements could be found along it. At about the same time, the most important firm in the Quinindé area — *Palmera de los Andes* — received rights to 10,000 hectares to plant African oil palm, and by 1979 it occupied some 3,000 hectares. Next, the firm *Plywood* arrived, buying its timber mainly from settlers, although its concession amounts to 12,000 ha. CODESA, a forestry firm with a 2,000 ha concession, also arrived in the 1970s.

There are some 150 indigenous Cayapas families in the area, in addition to a second ethnic group that originated outside the city of Esmeraldas. The latter are largely of negro origin (*morenos*) and own about 20 per cent of the holdings, these being generally smaller than 20 hectares. The building of the road, and the gradual opening of the area to exploitation and settlement, took place without seriously involving this original population in decision making.

The general situation in the canton of Quinindé with regard to the distribution of holdings according to the 1974 agricultural census is presented in Table 2.1.

A comparison of Table 2.1 with Table 2.2. shows that the settlement of Nueva Jerusalén is not typical for the canton, since it contains almost no holdings of less than 20 hectares. The smallholdings go back to the era of the invasions of the former banana plantations, but also include the holdings of the original inhabitants, such as the Cayapas.

Table 2.1
Distribution of land in Quinindé, 1974

Size of Holding	Holdings (no.)		Area (ha.)	
	Absolute	percentage	Absolute	percentage
0 - 5	649	12.3	1294	0.6
6 - 20	1072	20.5	11533	5.3
21 - 50	1885	36.0	57728	26.3
51 - 100	1246	23.8	69808	31.8
101 - 500	366	7.0	60078	27.4
> 500	22	0.4	18940	8.6
TOTAL	5240	100.0	219381	100.0

Since 1974 the number of smallholdings has been diminishing as owners sell out to Palmera de los Andes and to *abacá* plantations situated along the main road. The activities of these plantations are important in various other ways as well, the most important perhaps being that they determine the wage rate for *jornaleros* (day workers) in the area and the price of land (MAG, 1979).

Most of the new settlers came from adjacent coastal provinces (Manabá, Los Rios) and have had to interact with the plantation owners, the wood firms, the Cayapas and the *morenos*. Government was present in the form of IERAC, the Ecuadorian Institute of Agrarian Reform and Settlement, which legalized the occupation of land, imposing legal requirements to keep holdings between 30 and 50 hectares and awarding preliminary ownership papers only to settlers who joined cooperatives. In 1977 the government started a project in the Quinindé area in order to provide assistance to the settlers (cf. OAS, 1982).

Nueva Jerusalén is a cooperative composed of 160 owners of holdings. The settlement of the same name is connected to the town of Quinindé by an unpaved road. The data below, collected in July/August 1980, refer to this settlement.

2.2 Settler Characteristics

Most settlers (82 per cent) came from the province of Los Rios. Almost 70 per cent of all settlers had previously been employed as agricultural workers, while 28 per cent had been small freeholders or tenants. It is noteworthy that 68 per cent of the settlers were pioneers, that is to say first occupants. The process of occupation has been relatively slow: 38 per cent of all settlers interviewed in 1980 had been resident since 1964, and another 30 per cent had arrived prior to 1974. After 1974, new arrivals in the area would buy land from *colonos* who were leaving. Almost 30 per cent of the holdings have been purchased, nearly all of these since 1974.

About 18 per cent of all those interviewed in 1980 had sold their previous property, with about half of them becoming pioneers and the rest buying their Nueva Jerusalén land from pioneers. Among the pioneers, approximately 35 per cent came with initial capital. Among the buyers this percentage is slightly higher.

The average settler's household is rather large, with eight members. The reason for this is that in addition to members of the nuclear family, the household consists of *allegados* or *arrimados*, that is to say, relatives or friends who contribute their labour. There are five or fewer members in 23 per cent of all households; 53 per cent have six to ten members, 21 per cent have eleven to fifteen members, and 3 per cent have more than fifteen members, the mean size of each group being 3.9, 7.8, 12.0 and 17.0 respectively.

In 1980, the average head of the household was 46 years of age, 6 per cent of the heads of households being less than 30 years old and 10 per cent being 61 or older. The vast majority (91 per cent) said that they had attended primary school for at least 3 years; 55 per cent claimed 5 or 6 years of attendance. In summary, it can be said that at their time of arrival settlers were fairly young — around 30 years of age, that they came mostly from similar climatological areas, that they had received very little education and that in the first years they had had opportunities to earn cash by working for the various companies in the area. They were all spontaneous settlers.

2.3 The Holdings

Holdings are located between the Blanco and Guayllabamba rivers east of the paved road from Quinindé to Santo Domingo. Some of the holdings fronting both sides of a feeder road, are 250 metres wide and about 2000 metres deep, with an area of about 50 hectares. However, a number have been either subdivided or consolidated, depths vary, and many are located away from roads or tracks (see Map 2). The distribution of holdings is given in Table 2.2.

Map 2: Original layout of plots, Cooperativa Nueva Jerusalén

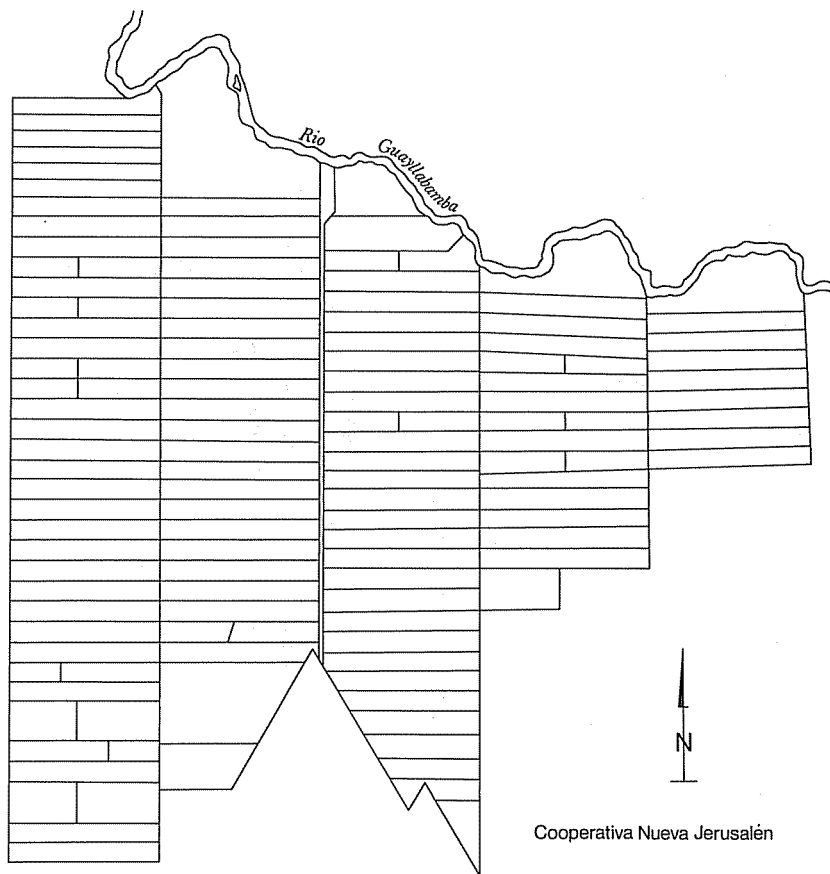


Table 2.2
Number of holdings by size and main activities, 1980

Size of Holding (ha)	Number		Total abs. (ha)	Area %	Mean Area (ha)	Main Type of Activity (No. of Holdings in survey)	
	abs	%				Agriculture	Mixed farming
≤ 25	10	29	250	17	24	8	2
26 - 50	18	53	826	55	46	10	8
51 - 100	5	15	297	20	59	2	3
> 100	1	3	125	8	125	--	1
TOTALS	34	100	1498	100	44	20	14

Land-use in the settlement is shown in Table 2.3.

Table 2.3
Land use by size of holding, 1980

Size Holding (ha)	Crops (ha)		Pastures (ha)	Total Used (ha)	Unused	
	Tree	Subsistence			ha	%
≤ 25	93.0	17.5	23.0	133.5	116.5	47
26 - 50	214.5	40.0	91.0	345.5	480.5	58
51 - 100	80.1	29.0	26.0	135.1	161.9	54
> 100	39.0	1.0	35.0	75.0	50.0	40
TOTALS	426.6	87.5	175.0	689.1	808.9	54

The fact that so much land remains unutilized — even after 16 years occupation — is indicative of a number of problems in the area, as the following sub-sections will indicate.

The process of occupation follows basically the following steps. First a holding is demarcated. Then clearing starts and, where roads exist, the resulting timber can be used or sold. If roads are lacking, the timber is not marketed and trees are cut and burnt. Once a plot has been cleared, maize or rice is sown at the beginning of the rainy season. As more land is cleared, coffee or cocoa is planted, banana or plantain trees providing a fast growing provisional shadow. If cattle raising is the eventual aim, the settler will sow grass. In both cases the aim is to have perennials, either in the form of trecrops or as pasture.

Smallholders devote relatively more land to tree crops than do other settlers, perhaps because the relative investment (in seedlings) for cocoa and coffee is less than that for cattle. Cattle farmers, as beef producers, aim at holdings and herds that are sufficiently large to provide most of their income. This means that they have an interest in consolidation and in buying out other farmers.

Most farmers with fewer than 25 ha plant coffee, and the productivity of these holdings is relatively low: 42.4 quintals per ha, while with improved technology 65 quintals per ha would easily be feasible. Cocoa is also produced by the smallholders, but in terms of land use it is more important for 26-50 ha farms. Yields, however, are higher on the smallholds: 11.6 quintals per ha compared with 10.7 quintals per ha on the 26-50 ha farms.

2.4 Labour Availability and Use

Assuming that full-time adult male farmers make available 1 labour unit per annum for farm work, that women (who also are responsible for household chores, child-rearing and other tasks) make available 0.5 labour units for farm work, while older children attending school make available 0.5 units during part of the year as temporary family workers, we can calculate the number of permanent labour units available per holding. Children below the age of ten are assumed not to work in the farm.

Based on these assumptions, 60 per cent of the smallholders and 30 per cent of the settlers having between 26 and 50 hectares have only 1.5 family labour units available per annum. For all farms in the sample, 98 labour units are available, or 2.88 on the average (see Table 2.4).

Table 2.4
Average number of permanent labour units available by farm size and per hectare

Size (ha)	Family	permanent Labour Hired	Total	per Hectare in Use	per Hectare in Farm
≤ 25	2.20	0.10	2.30	0.17	0.09
26 - 50	2.80	0.06	2.86	0.15	0.06
51 - 100	3.40	0.40	3.80	0.14	0.06
> 100	6.50	2.00	8.50	0.01	0.07
All farms	2.90	0.18	3.08	0.15	0.07

Permanent labour is hired by 12 per cent of the settlers. Only 10 per cent of the smallholders, 6 per cent of the farmers with 26-50 ha and 20 per cent of the farmers with 51-100 hectares hire labour. The large farmers all have permanent hired labour.

At least 35 per cent of the farmers hire no help at all, not even temporary help, although they may be engaged in helping each other. Those who do hire farmhands do so for periods of one to three months, mainly for tasks connected with clearing land.

Total labour availability per hectare in use is highest on the smaller farms where the more labour-intensive crops such as cocoa and coffee are grown, whereas the larger farms tend to be involved in cattle raising.

Another point of relative importance is that 18 per cent of the heads of household have off-farm jobs, a fact that seems indicative of cash shortages, especially for farmers with fewer than 50 ha.

2.5 Level of Technology

The quality of the soils is relatively high. Although some plots have been in use now for close to a generation, fertility has declined only slightly.

Hardly any chemical fertilizers are used in the area and only 35 per cent of the *colonos* claim to use insecticides or pesticides — these mainly for coffee. Even fewer (26 per cent) purchase salt, drugs or vaccines for their cattle. As to equipment: only three per cent of all farms use more than the basic *machete*, axes and shovels of traditional farming. Agricultural extension is not very active in the area, only 12 per cent of the respondents said they had received any attention in this regard.

The data on use of inputs correspond to the view settlers have of their present problems: in 71 per cent of the holdings plant diseases were considered a serious problem. In 26 per cent of the holdings the lack of credit facilities was considered a problem, the lack of extension services coming third (18 per cent) and high costs of hired labour being fourth (12 per cent).

2.6 Credit

Although credit is important for all agricultural activities, it is especially so for *colonos* who have to start from scratch. To have no credit prior to the initial harvest means that either savings must be available and/or that cash income be obtained through wage labour. In Nueva Jerusalén 38 per cent of the settlers had capital at the time they arrived. Half of these acquired it by saving, while the rest used the proceeds from the sale of their previous holding as initial capital. None of those interviewed received any loans upon arrival, either from official agencies or from middlemen.

Of the *colonos* who later received credit, only 38 per cent received bank credit, while 76 per cent took credit from middlemen. Of those who obtained bank credit, 6 per cent acquired investment credit, the majority receiving it for maize production.

Credit from merchants is given mainly by those dealing in coffee, to whom the smaller farmers in particular were indebted before the rise in coffee prices in the 1970s altered the situation.

Thirty per cent of the small farms had initial capital available, as did 39 per cent of the 26-50 ha farms, 40 per cent of the 51-100 ha farms, and all of the largest holdings. Institutional production credit was made available at least once to 40 per cent of smaller farms, 17 per cent of 26-50 ha farms, 40 per cent of the 51-100 ha farms and, again, all of the largest farms, although this last figure is not statistically significant. Only six per

cent of the settlers received institutional production credit more than once and none obtained it more than three times. The *colonos* complained that acquiring credit was a cumbersome process, involving numerous trips to the bank in Quinindé.

2.7 Commercialization of Produce

The main cash crops in the area are cocoa, coffee and palm oil. The last is entirely in the hands of the plantation mentioned before and is not discussed here.

Before addressing ourselves to the issue of commercialization we may note that hypothesis iv. was not refuted by the data for farms of less than 50 ha, the standard deviations for larger farms being too large to derive any meaningful conclusions. In other words, for smaller farms the level of output increased as the number of labour units available to the household increased.

Buyers and channels of commercialization are the same for coffee and cocoa. The buyers can be classified as local assemblers, zonal assemblers, assemblers/processors and exporters (although there are no exporters in Quinindé). Three channels exist: (i) producer - local assembler - zonal assembler - exporter; (ii) producer - zonal assembler - exporter; (iii) producer - assembler/processor - exporter. The first of these three is the most common and accounts for about 80 per cent of the produce of the area of Quinindé and 95 per cent of the produce from Nueva Jerusalén.

About a dozen local assemblers are located in the Quinindé area, depending on the season. Some of them are general store holders in Quinindé or elsewhere, and some set up shop temporarily. A third group works mainly as transporters within the canton of Quinindé, preparing commercial loads of produce for transport assemblers. Transportation to the local assembly points usually takes place on Friday night or Saturday morning and can be onerous for settlers in distant holdings. The cost of transport may vary from 10 sucres per quintal (from Nueva Jerusalén) to 40 sucres per quintal from the most distant areas, whence mules, canoes and vehicles have to be used in sequence. Only in times of great demand (for example in 1977) will middlemen enter the production areas and buy at the farm gate.

Export prices are fixed by the central government, based on international prices. These constitute the minimum export prices. Since this price is the basis for export taxes and for buying from producers, exporters have an interest in keeping it as low as possible. The minimum export price is taken as an indicator for the production areas. For coffee the local assembler receives 25 per cent of this price per quintal of green coffee. The producer receives this amount minus the margin taken by the local assembler. It is generally said by people in the area that the merchants are given to dishonest weighing practices, with the margin increasing accordingly. Hence, coffee producers hardly ever receive more than 20 per cent of the minimum export price, while cocoa producers (cocoa is dried by the producers) receive about 60 per cent.

According to data from the Quinindé government project, for coffee the local assembler takes on the average an 18 per cent margin, the zonal assembler 13 per cent and the exporter 16 per cent, while in the case of cocoa the percentages are 10, 11.5 and 18.5 respectively. In view of the fact that producers must carry the cost of transport, it is worthwhile to note that from the price they obtain from the local assemblers they must subtract from 3 to 10 per cent for coffee and from 0.5 to 3 per cent for cocoa to arrive at the farm gate price.

The value of sales given in Tables 2.5 and 2.6 represent 95 per cent of the produce marketed by the farmers of Nueva Jerusalén. The price variations indicated in the tables reflect seasonal differences and variations in quality, amount sold, international prices and the day of transaction. If the average price for coffee obtained from local assemblers for the 1979/80 harvest is estimated at 470 sucres per quintal, the average gross value of production per hectare would be 21,700 sucres. At the time of the survey production costs per hectare averaged 11,300 sucres.

With 46.1 quintals per hectare produced, transport cost per hectare amounts to 461 sucres (10 sucres per quintal). Hence net production value in Nueva Jerusalén for coffee would be 9,940 sucres per hectare or 216 sucres per quintal. Gross profit per quintal of coffee would therefore be $470 - 216 = 254$ sucres per quintal.

For cocoa, gross profit per quintal amounts to 720 sucres. Producers generally do not store their produce: 91 per cent sell their weekly harvest each weekend. The settlers of Nueva Jerusalén mainly use public transport to travel to Quinindé. Almost half complain about price levels, about which all are well informed. At the time of the survey, the Quinindé project staff

Table 2.5
Value of coffee production in Nueva Jerusalén by size of holding, 1979/80

Size of holding (ha)	No. of growers	% Growers Selling	Average Price ¹		Value of Produce ²		Production Value per Hectare ³
			min.	max.	min.	max.	
≤ 25	10	90	390	560	783	1123	20.1
26 - 50	18	83	380	530	930	1287	22.7
51 - 100	5	100	370	560	346	520	25.5
> 100	1	100	350	570	88	144	16.6
All holdings	34	88	380	550	2147	3074	21.7

Notes: ¹ in sucres per quintal
² in thousands of sucres
³ in thousands of sucres, taking the average price.

Table 2.6
Value of cocoa production in Nueva Jerusalén by size of holding, 1979/80

Size of holding (ha)	No. of growers	% Growers Selling	Average Price ¹		Value of Produce ²		Production Value per Hectare ³
			min.	max.	min.	max.	
< 25	10	80	1800	2200	576	729	22.9
26 - 50	18	94	1600	2400	1842	2768	20.3
51 - 100	5	100	1500	2300	368	577	13.9
> 100	1	100	1300	2500	160	308	11.4
All holdings	34	91	1600	2300	2946	4382	18.7

Notes: ¹ in sucres per quintal
² in thousands of sucres
³ in thousands of sucres, taking the average price.

was involved in an attempt to market the produce of the settlers through their cooperative.

2.8 Problems in the Settlement

Asked whether their personal situation had changed since their arrival 24 per cent of the settlers answered that it had improved considerably; 73 per cent said that it had improved only moderately, while 3 per cent did not answer. All wanted to bring more land into cultivation: 91 per cent for agriculture and 61 per cent for cattle ranching. More than 97 per cent of the settlers were members of the cooperative while 85 per cent had a favourable opinion about the usefulness of social organization.

Asked about the main problems they encountered upon arrival, 41 per cent of the *colonos* answered that the lack of roads was a great hindrance; 29 per cent mentioned the lack of cash income, while 21 per cent referred to diseases, such as malaria. Only 6 per cent had encountered no serious problems; these were all late arrivals.

2.9 Main Conclusions

Colonos in Nueva Jerusalén are mostly pioneers who have had very little assistance from the government. From the beginning to the present, they have had to cope with serious transport problems and almost no investment credit. Only a minority has been able to acquire institutional production credit. Most credit is provided by coffee and cocoa merchants and most settlers specialize in coffee and cocoa. In 1980 more than half of the available land had not been cleared or brought into production.

The settlers appear to have a labour surplus because so many heads of households work outside the farm. However, this actually points to a cash-income problem, and is perhaps also related to the level of technology used. More intensive farming practices could bring presently uncultivated land and unutilized labour into production if more modern equipment and industrial inputs were available. For this to happen, credit facilities in connection with extension services would have to be improved considerably.

Incorporation into the Ecuadorian economy takes place largely via the middlemen for cocoa and coffee. Producers are generally on the weaker side of the market, although the gross margins taken by assemblers are fairly modest. Once produce has left the area, margins become quite high.

3. THE CASE OF CAQUETÁ

3.1 Background

New land settlement in Colombia takes place in the *departamentos* of Meta, Boyacá, Casanare and Auraca and the Intendencia del Caquetá — which are located in the Amazon Basin - in the *Departamento* of Antioquía (Gulf of Urubá) and in those of Cauca and Chocó, on the Pacific Coast. In Caquetá, altitude varies between 300 and 500 m, the average annual temperature is between 24 and 28 degrees C., and rainfall ranges from 3,000 to 3,500 mm. Thus originally, Caquetá was occupied by tropical rain forest. Soils are in general poor, about 90 per cent of them suitable for grass and African oil palm, the remainder for rubber, maize and paddy.

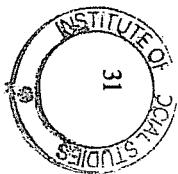
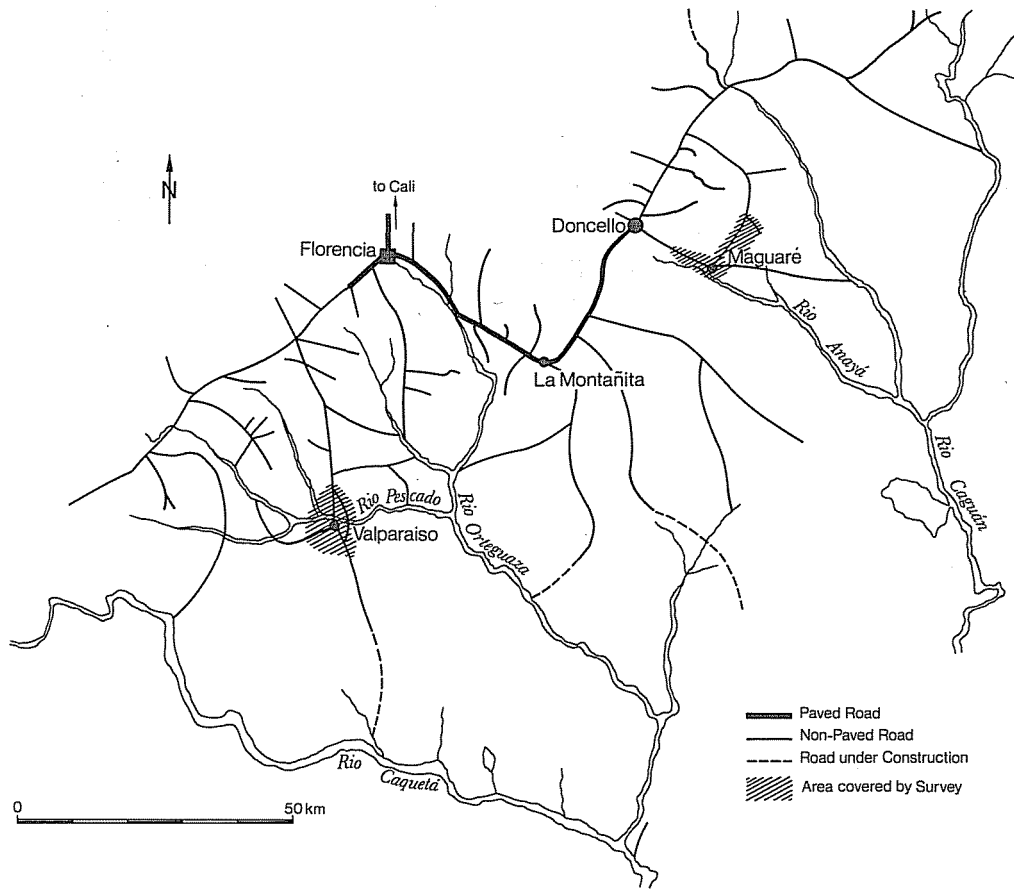
The Caquetá area started to be opened up at the beginning of this century in response to the rubber boom. In that period also, what is now the main city, Florencia, was founded (see Map 3). After the end of the rubber boom, settlers from the Andes continued to flow to the area, without there being much attention paid to them by the authorities. After the *Instituto de Parcelaciones, Colonizaciones y Defensa Forestal* was created in 1948 its functions were taken over by the *Instituto de Colonizaciones e Inmigraciones* in 1953.

By the end of the 1940s, serious problems arose in Colombia that were closely related to the land tenure system and in a large part of the country armed conflicts took place, which lasted till the early sixties. This period, referred to in Colombia as *la Violencia*, fostered an agreement between the *Caja de Crédito Agrario*, the government bank for agriculture and the *Oficina de Rehabilitación* (the Reconstruction Office), a government body in charge of solving economic problems related to *la Violencia*. It led to the selection of six zones in Caquetá, where directed settlement would take place. Initially three zones were identified: La Mono, 60 km southeast of Florencia; Maguaré, 85 km north of Florencia, and Valparaiso, some 70 km east of Florencia and southwest of la Mono (see Map 4). In 1963 the responsibility for these three zones was transferred to the *Instituto Colombiano de Reforma Agraria* (INCORA), which remains in charge of land settlement and land reform. The transfer implied a reorientation from *directed* to *semi-directed settlement* as defined by Nelson (1973), and in 1964 Caquetá Project I was created, mainly consisting of a programme of investment in roads, health and educational facilities,

Map 3: Location of the study area



Map 4: Location of Valparaiso and Maguaré



of land titling and of supervised credit. In 1971 the World Bank provided a loan for Caquetá Project II, which was being completed (and a new loan was being negotiated) at the time of the survey in 1980.

The population of the Caquetá area had a 7.6 per cent overall annual growth rate in the period 1964-1972, the 1964 population being close to 100,000. The 1980 population was estimated to be about 320,000. Florencia's 1980 population of 50,000 was growing rapidly, as the only place in the area with road connections to other parts of the country. Secondary centres in Caquetá are Doncello, Morelia, Belén, Puerto Rico, Montanita and San Vicente, each having between two and eight thousand inhabitants.

One aspect of the general economic situation and the distribution of income in Caquetá is clarified by Gomez et al. (1977). They provide data on household income in cash in the region, based on a representative sample survey. They found that in 1976, 20.3 per cent of the households had no cash income and thus were pure subsistence farmers. For 41.3 per cent of the households, cash income was less than 40,000 pesos per year. Net cash incomes of 40-80,000 pesos were earned by 19.6 per cent, while 18.8 per cent earned more than 80,000 pesos per year. Gomez shows that 69 per cent of the households had a net income below the average of 45,217.

The (1980) surveys reported on in this study refer to the central areas of Valparaiso and Maguaré, where 17 and 85 per cent respectively of the holders were involved in the directed settlement efforts begun in the early 1960s.

3.2 Settler Characteristics

In Valparaiso, 65 per cent of the settlers were born in the mountainous sections of Huila (43) and Tolima (22), while 22 per cent have come from other parts of Caquetá. In Maguaré, 76 per cent originate in Tolima (34), Antioquía (23) and Caldas (19), while only 4 per cent are internal migrants. These 1980 percentages for Valparaiso and Maguaré are rather different from those found for Caquetá as a whole in 1972 and 1977. In 1972 (INCORA, 1972), the main origins of settlers in the entire area were (in percentages): Huila (30.2), Tolima (21.3) and Antioquía/Caldas (12.0), while in 1977 (Gomez et al., 1977) they were Tolima (22.5), Huila (19.0) and Caquetá (19.0). These differences indicate increasing internal movements,

but they may also indicate that people arriving from a given department tend to arrive at the same destination, a phenomenon often noted in migration studies. Of the settlers in Valparaiso 61 per cent had owned a farm before, and of these 71 per cent had come from another farm in Caquetá. Almost 22 per cent had worked in or near Caquetá as farmhands, while 17 per cent had pursued other occupations. In Maguaré only 28 per cent of the *colonos* had owned a farm before, and of these 10 per cent came from another farm in Caquetá. More than 42 per cent worked as *jornaleros* before acquiring their new land, and 15 per cent of the settlers came from other occupations. Hence, on the average, *colonos* in Valparaiso had more farm management experience than those in Maguaré.

The data for Valparaiso support the earlier impression of high degree of mobility among settlers, but in Maguaré mobility is considerably lower.

In Valparaiso 70 per cent of the settlers had initial capital, in Maguaré only 38 per cent did. In Valparaiso the source of initial capital was generally the sale of a previous farm — 83 per cent of the farms in Valparaiso were purchased, and of these, more than half were paid for by farmers who used their previous farm as payment. In Maguaré, where 62 per cent were buyers, about half of them had arrived with capital exceeding half the value of the farm they bought.

3.3 The Holdings

The Valparaiso settlers surveyed have their holdings along the three roads that converge in the town. In order to compare the survey data with previous studies of settlers who arrived under the government-sponsored programmes at the end of the 1950s and early 1960s, the holdings surveyed are all within ten km of Valparaiso. For Maguaré, sample selection was based on the same principle. This means that holdings located away from the roads are not included.

In general, the plots are rectangular and front on a dirt road. These roads are parallel, so that the ends of two plots meet. The dirt roads lead to main roads, and since these roads are also in general part of the system, some settlers have their land on the main roads. In Valparaiso there are more rivers and rivulets than in Maguaré.

Table 3.1
Distribution of holdings by size, Caquetá, 1980

Size Holding (ha)	Valparaiso					Maguaré				
	No. of Holdings		Total Area		Average per Holding	No. of Holdings		Total Area		Average per Holding
	Abs.	%	Abs.	%		Abs.	%	Abs.	%	
≤ 49	2	9	60	2	30	2	8	80	3	40
50 - 99	10	43	694	25	69	17	65	1211	40	71
100 - 199	8	35	1057	37	132	4	15	541	18	135
200 - 299	2	9	420	15	210	2	8	400	13	200
≥ 300	1	4	600	21	600	1	4	800	26	800
All holdings	23	100	2831	100	123*	26	100	3032	100	117*

* Excluding the large farms, the average holding would be 103 hectares in Valparaiso and 89 in Maguaré.

Table 3.1 indicates the distribution of holdings by size in the two settlements. In both Valparaiso and Maguaré the majority of the holdings are between 50 and 200 hectares. Castellanos (1970) provides data on the distribution of land in 1968 and our 1980 data has been rearranged to enable a comparison (see Table 3.2). Consolidation in Valparaiso between 1968 and 1980 meant that the percentage of farms in the 51-100 ha range decreased in favour of larger holdings. In Maguaré consolidation into farms over 100 ha (but especially over 150 ha) has been entirely at the expense of the farms in the 26-50 ha range. Consolidation is necessarily linked to mobility, and thus a third indicator of this aspect of the settlement process is identified.

Table 3.2
Distribution of holdings by size, Caquetá, 1986 and 1980
(percentages of number of farms)

Size of Holding (ha)	Valparaiso		Maguaré	
	1968*	1980	1968*	1980
≤ 25	0	4.3	0	0
26 - 50	13.1	13.1	20.0	7.7
51 - 100	45.6	34.8	63.3	69.2
101 - 150	28.3	30.4	6.7	7.7
> 150	13.0	17.4	10.0	15.4
All holdings	100.0	100.0	100.0	100.0

* from Castellanos, 1970

In Maguaré almost 27 per cent of the holdings are occupied by pioneer settlers. Another 38.4 per cent bought their holding from a pioneer. Some 23.1 per cent bought from a non-pioneer, and 11.5 per cent did not know whether or not the seller had been a pioneer. In Valparaiso only nine per cent of the holdings are occupied by pioneer settlers. While 39.1 per cent bought their holding from a pioneer, 43.5 per cent bought from a non-pioneer and the remainder did not know the status of the seller. The turnover rate in Valparaiso is fairly high: 43.5 per cent have had their farms for less than four years (Maguaré: 15.5 per cent), 8.7 per cent for between four and eight years (Maguaré: 11.5 per cent), and 34.8 per cent for between eight and fifteen years (Maguaré 61.5 per cent).

Apparently, the size of a viable family farm in Valparaiso is well over 100 ha, while in Maguaré farms of 57-100 ha seem viable. Thus, since the legal size of pioneer plots in the Caquetá region was 50 ha, a process of consolidation started rather quickly, and by 1968 four clearly distinguishable farm size classes had emerged in the two settlements surveyed. This process continued in Valparaiso, where subdivisions took place, and in Maguaré. The possibility that the difference in viable farm size between the two settlements may be related to a slight difference in demand is discussed later in this paper (in Valparaiso the main 'cash crop' is beef, in Maguaré milk is also marketable). The subdivisions must have taken place, since this is the only explanation for plots of less than 30 ha. The reasons behind the phenomenon include the settlers' needs for cash, or problems of access (e.g. impassable rivers). In some cases patches of rather fertile land may have made subdivision possible.

Table 3.3. shows that most of the land in both zones has been converted into pasture, and Table 3.4 that cattle ranching is the main specialization. It is interesting to note that while no less than 26 per cent of the *fincas* (properties) in Valparaiso were worked by *administradores* (managers), only four per cent in Maguaré were. In both areas these are the main employers of permanent farmhands.

Table 3.3
Percentage distribution of land use, 1980

Land Use	Valparaiso (percentages of total area in holdings)	Maguaré
Crops	6.3	2.7
Pasture	69.5	71.1
Bush/Fallow	14.1	11.6
Not cleared	10.1	14.6
TOTAL	100.0	100.0

Table 3.4
Number of farms by farm type, 1980

Farm type	Valparaiso		Maguaré	
	No.	%	No.	%
Cattle ranching	13	57	17	65
Crops	4	17	1	4
Mixed	5	22	6	23
Subsistence	1	4	2	8
TOTAL	23	100	26	100

Looking at the data by farm size (Table 3.5), we find that in Valparaíso, farmers with 50-99 ha are relatively more interested in producing crops than their counterparts in Maguaré, although it is clear that all are basically aiming at cattle breeding. The table also shows that clearing has progressed further in Maguaré than in Valparaíso.

Table 3.5
Land use by farm size (ha), 1980

Size of Holding (ha)	Valparaíso			Maguaré			
	Crops	Pasture	Total in Use	Crops	Pasture	Total in Use	% in Use
≤ 49	15	32	47	7	65	72	90
50 — 99	93	425	518	63	851	914	75
100 — 199	64.5	637.5	702	11	471	482	89
200 — 299	—	370	370	3.5	330	333.5	83
≥ 300	—	550	550	4	450	454	57
All holdings	172.5	2014.5	2187	88.5	2167	2255.5	74

3.4 Labour

In both areas, permanent wage labour is rather rare, with families providing most of the needed labour. Table 3.6 gives the average number of fulltime equivalent labour days for owners who live on their holding.

Table 3.6
Average number of labour days per family by size of holding, 1980

	Size of holding in hectares				
	<50	50-99	100-199	200-299	>300
Valparaiso	1.25	1.7	1.9	2	1.5
Maguaré	2.5	2.8	2.25	4	3

Families in both areas are generally large, averaging 7.2 members in Maguaré and 6.45 in Valparaiso. Temporary labour is used by many, but generally for only a very few days each year. The Maguaré settlers consistently have more labour available than those in Valparaiso, at least in part because families are slightly larger and the average age of the children is higher. This may partly explain why more land has been cleared on the smaller farms in Maguaré, but given the data in Tables 3.1, 3.5 and 3.6, it is clear that the land is quite extensively used in both settlements.

3.5 Level of Technology

Valparaiso and Maguaré settlers have the same rather rudimentary level of technology. They generally use no more than *hachas* (hatchets), *machetes* and *palas* (wooden shovels), and sprayers that can be fastened to their backs.

Data on inputs used by the settlers are not sufficient to give a quantified result.

3.6 Credit

Institutional credit in Caquetá is provided by INCORA, the Caja Agraria, the Banco Ganadero, and the Cooperative. Since 1963, INCORA has been

experimenting with various types of credit for Caja Agraria settlements. They took over the settling-down credits provided by the Caja, consolidating the outstanding debts of the settlers at a great loss to INCORA. According to an official report on this action, (INCORA-IICA, 1974), the main causes for the original failure were: (a) the very poor infrastructure in the area forced settlers to use the loans for non-production purposes, such as transportation, housing and subsistence; (b) the fact that interest was discounted in advance, diminishing the amount available for investment; (c) low yields, just sufficient for subsistence; (d) poor matching of soils to the crop for which credit was given (studies were made only afterwards); (e) poor organization of the settlements and of food distribution; and finally (f) a poor procedure for the selection of *colonos*.

INCORA's second experience was similar. From 1962 to 1965 INCORA provided supervised credit, again with capitalized interest. This programme was mainly directed at cattle ranchers and its major problems were that settlers did not have as yet the experience required; that the quality of the cattle arriving in the area was low; that there was no grace period; and that cattle prices paid to settlers were much lower than expected due to high transportation costs (INCORA-IICA, 1974).

At the time of our 1980 survey INCORA operated a supervised credit programme, combining production planning and extension services with credit and supervision. Loans within this programme could be used for cattle ranching, for the production of maize and rice and for the construction of dwellings. The loans were administered by the Caja Agraria and the Banco Ganadero. Terms of payment were one year for cash crops, two to seven years for cattle ranchers and 10-15 years for permanent farm infrastructure and perennial crops. Since 1972 the rate of interest has been 10 per cent plus one per cent for insurance.

This background information leads us to Table 3.7 which provides data on credit used by settlers in the two areas under study.

The reasons for differences between the two zones are not immediately evident. First of all, it must be borne in mind that in Valparaiso there are hardly any pioneers left. Most owners there bought their land and 70 per cent of the owners surveyed had initial capital. Therefore, they had less need for long term credit than the people in Maguaré, where only 38 per cent reported having had initial capital. Secondly, as pioneers, the farmers in Maguaré were more eligible for long term credit than were farmers in Valparaiso.

Table 3.7
Use of Institutional Credit Over the Period 1960-1980
(per cent of settlers per size class)

Farm Size (ha)	Long term credit		Medium and short term credit	
	Valparaíso	Maguaré	Valparaiso	Maguaré
< 50	—	50	—	100
50- 99	20	65	70	82
100-199	75	50	63	50
200-299	—	50	100	—
> 299	—	—	100	100
TOTAL*	35	58	65	73

* percentages of all settlers surveyed.

Pioneer status, possession of initial capital (and also the titles owners hold) seem less important in relation to medium- and short-term credit, since in this regard, conditions in the two areas are basically similar (In Valparaiso 83 per cent had title, in Maguaré 73 per cent*). Differences might then be due to a difference in attitude of administrators in charge of the two areas or to other factors.

Most settlers are poorly informed about the various modalities of credit available to them. Often they don't even know the exact nature of the credit they have obtained. They are also unaware of the INCORA programme as distinct from the normal credit available from the Caja and the Banco Ganadero.

The need for additional credit does not appear to be extremely high in view of the fact that only 18 per cent of the farmers in both areas used credit from non-institutional sources such as friends, family or merchants. They have also devised a system of *al partir*, in which farmers pasture their cattle on another farmer's land, and in return for the grass and some care of the animals, the landowning partner receives half the increase in value. This system was used by 26 per cent of the settlers in Valparaiso and by 54 per cent of those in Maguaré. However, these systems may have developed in response to deficiencies in the available banking services.

* In Maguaré people without title received credit, as long as the cattle they bought with it was used as collateral.

3.7 Extension Services

In Valparaiso 74 per cent of the *colonos* received some form of assistance from INCORA. In Maguaré only half did. A few follow courses (5 and 21 per cent respectively) and the visits of extension officers are considered to be the most important channel for transfer of knowledge (62 and 35 per cent respectively). However, 29 per cent of the settlers in Valparaiso and 22 per cent of those in Maguaré complained that extension officers lacked experience.

3.8 Commercialization

Valparaiso markets 56 per cent of its crops, Maguaré only 30 per cent. Yields are not high: 0.7 tonnes per hectare for rice and 0.5 tonnes per hectare for maize. Producers in the area of Valparaiso sell maize to three types of buyers: wholesalers in Florencia, local assemblers who come to the farm gate and local merchants who in turn sell to wholesalers in Florencia. In Maguaré the system is slightly more complex because the government buying agency IDEMA operates there, but it receives no more than 15 per cent of total output.*

Rice is only of importance in Valparaiso, where 26 per cent of the farmers grow it. Total output by these farmers was 18 tonnes of which 15 were marketed. The organization of the market is equal to that for maize, although in this case wholesalers in Florencia occupy a more important position, taking 60 per cent of the market. Commercialization margins for rice in the area are about 10 per cent of the IDEMA support price.

In 1980 the IDEMA support price (payable by cheque) was 9,620 pesos per tonne. Valparaiso farmers selling directly to IDEMA, would have to pay about 100 pesos per tonne to get the maize to Valparaiso and an additional 800 to have it brought from there to Florencia, where IDEMA buys. Thus farmers would receive 8,720 pesos per tonne. This compares to 6,400 pesos an assembler would pay in cash at the farm gate. In order to turn a cheque into cash, the farmer would have to make at least one additional trip to Florencia — at a cost of about 2,000 pesos — while losing one labour day, valued at 300 pesos (if a temporary labourer were to be hired in replacement). Thus, the farmer would have a net receipt of 8,200 pesos per

* For Caquetá as a whole IDEMA bought about 20 per cent of the total supply.

tonne if marketing a single tonne. Wholesalers were buying at Florencia at 8.660 pesos per tonne, or 960 pesos below the support price, but paying in cash. Thus, for the assembler selling to IDEMA the gross margin would be $(9,620 - 6,400)/9,620$ or approximately one third of the support price, while he could sell the same quantity to wholesalers with a gross margin of $(8,660 - 6,400)/9,600$ or 23 per cent of the support price.

Cattleranching provides two types of output: cattle and milk. Milk production is encouraged by CICOLAC (Compañía Industrial Colombiana de Lácteos), a private dairy firm located in Florencia.

Seventy-eight per cent of the cattle in Caquetá are American Cebu (Brahman), the remainder being Creole (21 per cent) or Holstein, Brown Swiss or other breeds. Wiezer (1967) found that at the end of 1966 the average holding owned eleven head of cattle, or 0.57 head per hectare.

In Valparaiso and Maguaré, cattle ranching started some years later than in areas like La Mono and Florencia. By 1969, however, the average number of cattle on a farm had reached 27.9 per cent of the overall Caquetá figure in Valparaiso, and 32.0 per cent in Maguaré (Castellanos, 1970).

Many of the animals are held in joint ownership and respondents had great difficulty in answering questions related to this aspect of their situation. With the aid of INCORA officials it was possible, however, to estimate that 60 per cent of the herd in both areas belongs to individual *colonos** while 40 per cent is held in a profit-sharing arrangement with partners**. These *compañías* or arrangements are composed as follows: 60 per cent are with individual partners; 35 per cent with *Fondos Ganaderos* (from Huila or Caquetá) and five per cent with the *Cooperativa Agraria del Caquetá*. In the first case, the share is 50-50, in the others it is 65 per cent for the *colonos* and 35 per cent for the *Fondo* or *Cooperativa*. The arrangement consists in the raising and fattening of cattle after an initial estimate of their value. After one or two years, the cattle are sold and the profits (determined as sales price minus initial value) are shared out.

In view of the difficulties encountered in the survey on the matter of cattle ownership, the data provided below refer to only 13 holdings in Valparaiso and 18 in Maguaré.

* In a great number of cases, bought after loans were acquired.

** In 1969 Castellanos (1970) found virtually the same percentages.

Survey totals by area are: 2,259 for Valparaiso and 1,520 for Maguaré, bringing the averages per holding to 125.5 for Valparaiso and 66.1 for Maguaré.

Animal husbandry practices are rather rudimentary, and although all farmers provide salts and minerals, only half use vaccines.

In Valparaiso there were 1.12 heads per hectare in 1980, which is considered the upper limit for the area. The Maguaré figure is 0.7 so that

Table 3.8
Cattle inventory, 1980

Type of Cattle	Valparaiso			Maguaré		
	Heads abs.	%	Heads per holding	Heads abs.	%	Heads per holding
Cows (producing)	988	52.2	76.6	379	41.9	21.1
Cows (dry)	159	8.4	12.2	202	22.3	11.2
Heifers	313	16.5	24.1	176	19.5	9.8
Calves	274	14.5	21.5	75	8.3	4.2
Steers	118	6.2	9.1	56	6.2	3.1
Bulls	41	2.2	3.2	16	1.8	0.9
TOTAL	1893	100.0	146.7	904	100.0	50.3

the herd could theoretically increase. The composition of the herd in Valparaiso shows either fairly low birth or fertility rates and/or a tendency to sell animals at an early stage, the latter possibly indicating a high need for cash. This tendency is even more pronounced in Maguaré where calves and steers together are only 14.5 per cent of the herd.

The regional branch of the cattle owners association (the *Comité de Ganaderos*) affiliated with the *Federación Nacional de Ganaderos* estimated that the Caquetá herd totalled 1,000,000 head. The Comité estimates that in 1979 about 65,000 head were exported to other parts of the country, about 85 per cent of these to the city of Cali. Internal consumption in Caquetá thus accounts for about 30,000 animals. Cattle is exported on the hoof, and 90 per cent of such sales involve young animals.

Cali, the most important city in Southern Colombia, is located about 500 km from Florencia, across the Andes. The buyers from Cali dominate the Caquetá market and they have set up a monopsonistic structure of brokers or *despachadores* who control prices and quantities in accordance with demand in Cali. They buy directly from large farmers and from brokers acting for the small and middle-size farms. A few of the dozen most important buyers have farms of their own.

Prices for the internal Caquetá market are considerably higher, and traders selling locally are much more numerous. The quality is lower, and locally sold animals are normally old or infertile cows or animals that have suffered accidents.

The marketing of cattle in Caquetá is hindered considerably by transport problems. This affects *colonos* in the area both when they buy and when they sell. Imported cattle are expensive not only because of direct transport costs, but also because of weight loss and accidents. Trucks used for exporting steers have a capacity of 10 fattened animals, but cattle leaving Florencia are generally below the optimum weight of 450-460 kg, so the freight/weight ratio is too high. In addition, each animal will lose about 30 kg during the trip. Still, the freight per animal is 1,400 to 1,600 pesos from Florencia, while the cost to bring it there from the farm is about 400 pesos. Transportation contracts are normally made by private agencies that act as brokers. They assign freight to drivers who generally own the trucks they drive. Truck owners are nominally organized in cooperatives since in this way they can obtain a truck free of import duty. However, once they have their trucks they operate on an individual basis. Tariffs are set by time period on the basis of agreements with users of the service.

The marketing of cattle in the two areas surveyed follows the general pattern already described. Eight per cent of the 1979 Valparaiso herd was sold: 14 per cent of all female calves, 24 per cent of all male calves, and 17 per cent of the grown bulls. From a herd management point of view these figures are surprising, since one would expect more young bulls to have been marketed. However, in view of our earlier observations in connection with animal husbandry and the composition of the herd, other factors seem to be at work.

Local middlemen bought 66 per cent of the adult animals that were sold, brokers in Florencia bought 19 per cent and the remainder were bought by local settlers. The *colonos* generally received 27-30 pesos per kg live weight, the average weight being 300 kg. In Florencia the price was 33-35

pesos per kg, but most *colonos* in Valparaiso would not get the additional 1,050-1,550 pesos per head: only 12 per cent of the Valparaiso farmers sold their adult animals in Florencia, mainly because the Florencia market is not organized for small operations and transportation is scarce.

Young, fattened animals for export would fetch 37 pesos/kg in Valparaiso and 47 pesos/kg in Florencia, but again, most Valparaiso farmers sell in Valparaiso. The problem here is basically the same as that in the Caquetá market, further aggravated by the strong position of the *despachadores*. Settlers will not risk taking their fattened cattle to Florencia without having arranged the sale beforehand with a broker, for otherwise they would probably be unable to sell it. Previous arrangements include visual inspection of the cattle by the broker's personnel on the farm and agreeing to the price offered. Payments are normally made by cheque payable in 30 days. Thus, the *colono* is forced to finance the market operations of the *despachadores*.

At the time of the survey, in the main market of destination, Cali, fattened cattle from Caquetá brought 55 pesos/kg. The gross margin for the *despachadores*, calculated as the cost of an animal in Valparaiso ($425 \times \$37 = \$15,725$) plus \$450 for transport to Florencia and \$1,500 for transport to Cali, a total cost of putting a fattened young bull in Cali is therefore \$17,675. Assuming 30 kg of weight loss, the *despachador* will receive $395 \times \$55$ or \$21,725 per head. The gross margin is, therefore \$4,050 or 18.6 per cent of the Cali price, of which one point should be reserved for losses due to accidents.

In Maguaré eleven per cent of the herd is sold each year, and the tendency to sell young animals is even more pronounced: 37 per cent of heifer calves and 22 per cent of bull calves are sold each year. Marketing channels are much the same as in Valparaiso, although a much higher percentage (about double) of cattle is sold to other settlers. The middlemen are located not in Maguaré itself but about 15 km away in Doncello, which has a very good road connection to Florencia. No Maguaré farmer sells directly in Florencia, and prices in Maguaré are quite similar to those in the Valparaiso area.

Milk production for the market is becoming important in Maguaré: no fewer than 73 per cent of the respondents were selling to CICOLAC. Until 1977, and especially in the two areas surveyed, milk was used for consumption at home only. Some *cuajada* (cheese) was made and sold to local merchants. In that year, however, CICOLAC, which is linked to

Nestlé, started operations in Florencia. It buys milk directly from the producers at \$10 per litre payable twice a month. For this purpose it has trucks driving along the all-weather roads in the region. Also it has some cooling plants, one of which is in Doncello. INCORA officials estimate that every settler located within five km of these roads sells milk to CICOLAC.

Settlers have a positive attitude towards this company, which also provides extension services and sells inputs (salt, minerals, drugs) which are delivered at the farm gate. Milk sales provide them with a regular, although small, flow of cash which they badly need.

INCORA officials are less enthusiastic about CICOLAC. They argue that livestock ranching is negatively affected, with calves not getting enough milk due to excessive milking by the farmers. They also say that farmers are becoming dependent on the system, that CICOLAC is deriving too much benefit from the road system built by the government and from government loans provided to stimulate livestock production and not milk production.

In 1979 over 3,000,000 litres of pre-condensed milk were purchased from local farms.

3.9 The Personal Situation of Settlers

Taking the respondents of the two surveys together, 90 per cent of them answered that they had a slightly or well improved situation as compared to before their arrival at the holding. However, 33 per cent were willing to sell and 63 per cent were not. Of those wanting to sell, 38 per cent aspired to being a merchant, while 44 per cent would settle again elsewhere. The remainder (18 per cent) were not clear as to what they would do.

Medina (1971: 118) reported that 52 per cent wanted to leave, so that in 10 years time a certain change (from 52 per cent to 33 per cent) has taken place: more *colonos* seem to feel that they have reached their destination.

3.10 Main Conclusions for the Cases of Valparaiso and Maguaré

Both settlements are characterized by poor soil conditions, allowing few options other than ranching. The crops that are grown occupy a very minor

percentage of the land in use and mainly serve the subsistence needs of the farmers.

In both areas, farmers are trying to establish herds, but most own only part of the herd they tend. In view of the low level of technology employed, income per holding can increase only as the size of the farm increases. This is especially true in Valparaiso, where the number of heads per hectare has reached the upper limit. Hence, it can be expected that consolidation will continue in Valparaiso. This is supported by the fact that approximately one third of the settlers would be willing to sell. In Maguaré the situation seems slightly better, at least in terms of the possibilities for herds to increase.

For most settlers credit remains one of the most important (and least available) inputs, especially for those having less than 200 hectares. The short term credit that many of them receive is only relevant for their subsistence crops and does not help them to build up their herds.

The smaller settlers are also at a disadvantage in the cattle market. They are generally unable to sell in Florencia, and must content themselves with 82 to 86 per cent of the Florencia price. This, in turn, is about 81 per cent of the Cali price, so the gross margin for marketing cattle from Valparaiso and Maguaré to Cali is approximately 32 per cent. Incorporation into the economy, especially of settlers with holdings below 200 ha, is mainly via the product market, since almost no inputs are bought. The linkage to the credit system is becoming increasingly important.

It seems that climate, soil quality and scarcity of credit have negatively influenced the duration of stay of settlers. Poor soils, primitive technology and an adverse climate necessitate the consolidation of holdings, because the maintenance and support of a household will require a large farm, a reality evidenced by the data on Caquetá farm sizes for the period 1968-80 and the 1980 data on technologies in use. Hard data on reasons for selling could not be obtained, since sellers leave the area and are unavailable for interview; but the sub-optimal size of the initial plots assigned by INCORA is a stimulus for consolidation as long as technology levels remain low, output remains insufficient, and the payback requirements of loans farmers have taken exceed their ability to pay. An indication of the importance of credit is found in the fact that only 61 per cent of the settlers in Maguaré intend to stay, and less than 12 per cent of this group feel they could plan an expansion without relying upon credit.

Similarly, of the 77 per cent of the settlers in Valparaiso who plan to stay, only 6 per cent say that expansion might be possible without credit.

The building of herds is accomplished partly through the phenomenon of the *compañía*, and in both areas about 40 per cent of the herd is not owned by the *colonos*. Outside ownership will decrease over time, as long as the value of inputs provided by the settlers is lower than the share of the profits they obtain. However, without specific data on the value of the inputs, it is impossible to predict any trend.

The markets for subsistence crops in the Caquetá area are obviously structured against the *colonos*: middlemen take a high percentage, and the market is not structured to accept the small quantities marketed by individual settlers. The market for beef cattle to be transported to Cali is structured to the advantage of the *despachadores*, and incorporation into the Columbian economy is largely channelled via these brokers.

4. A COMPARISON OF RESULTS

In all three settlements the first pioneering step has indeed been the clearing of land for subsistence crops. Once these crops were established, the settlements diverged: in Nueva Jerusalén no less than 68 per cent of the pioneers turned out to be stayers who left more than half of their plots unused; in Maguaré and Valparaiso the rate of turnover of settlers was much higher, and more differentiation occurred.

We hypothesized that settlers would tend to stay longer the greater the number of family labour units available, the more initial capital available, the more technical know-how they possessed and the greater their socio-political abilities.

It was not possible to determine the impact of the last two attributes: no data was gathered on socio-political ability, and information on technical know-how is rather sketchy. Nevertheless, we have argued that settlers coming from a similar climate are more likely to have the required technical know-how than those from other climates, and thus should be more successful as 'stayers'. While this cannot be proven by the data, it is not refuted. The pioneers of Nueva Jerusalén came mainly from Los Rios, a quite similar area, where the main cash crops are also coffee and cocoa. In the cases of Valparaiso and Maguaré large percentages of the settlers came from mountainous areas quite unlike the settlements. According to the hypothesis, settlers in Quinindé should on average stay longer than those in Caquetá, and in fact in Quinindé 68 per cent of the settlers are pioneers, while the percentage in Caquetá is much lower.

Of the natural conditions, we have been able to consider soil fertility. Since this is higher in Quinindé, we expected the length of stay there to be longer than in Caquetá, and this is confirmed by the data. In both of the Colombian settlements, very few pioneers remained on the plots of less than 50 hectares: none in Valparaiso and only 18 per cent in Maguaré. No one in either area purchased a farm of fewer than 50 hectares, which implies that soil fertility did not permit people to produce an adequate income with 50 hectares, and that consolidation was necessary. This is borne out by the data for the more fertile area, Quinindé, where 26 per cent of the pioneers had 'small' farms and 40 per cent of the buyers had purchased farms of fewer than 25 ha, the legal size size for an initial holding there.

Table 4.1 summarizes the data on pioneers and initial capital in all three settlements. Pioneers are a minority: only 32 families or slightly

more than 38 per cent of all settlers interviewed were pioneers: 68 per cent in Quinindé, nine per cent in Valparaiso, and 27 per cent in Maguaré.

Table 4.1
Number of pioneers by length of stay and initial capital

Area	With initial capital				Without initial capital				Total
	<6	6-10	10-15	>15	<6	6-10	10-15	>15	
Quinindé	0	1	4	4	0	0	5	9	23
Valparaiso	1	0	0	0	0	0	1	0	2
Maguaré	0	0	0	2	0	0	0	5	7
Total	1	1	4	6	0	0	6	14	32

The data on initial capital do not support our hypothesis: it turns out that pioneers without initial capital stayed longer in all three cases.

A possible explanation for this is probably to be found in the way the hypothesis was formulated. Obviously, the hypothesis is one of the *ceteris paribus* type, in this case implying that among settlers with otherwise equal attributes, those with initial capital will stay longer. This hypothesis should be considered in conjunction with the hypothesis regarding family labour.

In view of the rather different man-made and natural conditions in Quinindé and Caquetá, the importance of the availability of labour and capital must be considered separately for each. (Valparaiso has been excluded since only two observations could be made.) For the cases of Maguaré and Quinindé multiple regressions were prepared based on the hypothesis that

$$x_0 = a_0 + a_1x_1 + a_2x_2 + a_3x_3$$

where x_0 = stay in plot by pioneer in years;

x_1 = dummy variable for initial capital: 0 if lacking, and 1 if present;

x_2 = number of family labour units available during the first four years of residence;

x_3 = size of the plot.

For Quinindé we found:

$$x_0 = 23.05 \quad -0.083x_1 - 4.991x_2 \quad + 0.007x_3 \quad R^2 = 0.997$$

$$(114.818) \quad (-0.426) \quad (-40.118) \quad (21.394)$$

and for Maguaré:

$$x_0 = 15.35 \quad -1.024x_1 + 0.141x_2 \quad -0.028x_3 \quad R^2 = 0.047$$

$$(10.027) \quad (-0.798) \quad (0.230) \quad (-0.787)$$

These are so-called adjusted correlation coefficients. The figures in brackets below the estimates of the regression coefficients are t-values. All three regression coefficients for Quinindé are significant at the one per cent level, but only one for Maguaré. The sign for x_2 in the case of Quinindé is not 'correct', but that for x_3 is, allowing us to at least conclude that plot size is an important variable in pioneer decision-making. In the Maguaré case, only the sign for x_2 is correct. However, the t-value is much too low to allow a conclusion. Thus, the hypotheses are only marginally supported by the data and the search for a better explanation of settler behaviour remains important.

The most important man-made conditions seem to be credit and crop selection. Both areas in Caquetá are directed settlements, while Esmeraldas is an area of spontaneous settlement. In Caquetá, many settlers - if not all - received initial credit, and they also received technical assistance from INCORA officials. In Esmeraldas government assistance during the first five years amounted to no more than making available the formalities required for legal ownership. But then the Caquetá *colonos* were required to plant crops that would not grow in the area (through supervised credit for certain crops only) while in Esmeraldas, the settlers were familiar with the climate, soil and the production technology that would give results. In Caquetá, both settlers and agronomists came from other natural zones (mainly the Sierra) and many had initial difficulties with crop production. Thus, there was a problem not only with the selection of *colonos*, but also with agricultural engineers and crops.

Hence, the credit available in Caquetá was not always used well, and there were few opportunities to raise cash through wage labour. In Quinindé, settlers could earn cash as lumberjacks or as seasonal workers on the plantations while waiting for their cocoa and coffee trees to bear. Thus, the settlers in Quinindé could avoid indebtedness, and the issue of

legal title turned out to have little relevance to them. For them, the existing arrangements with merchants and through their cooperative were sufficient to maintain the majority as 'stayers'.

As hypothesized in section 1.5, the importance of the main crop cannot be underemphasized. Credit or an *al partir* arrangement is almost a necessity for a settler in Caquetá, since after two to four years the land can be used only for cattle. As a means to establish a stock, the latter arrangement works very slowly, the more so since the need for cash requires the sale of some portion of the herd each year, other cash crops being unfeasible in any significant quantity.

Investment credit is only available for people with legal title to their land. In Valparaiso therefore, it would seem that credit has been more often than not a means for incorporating land - rather than settlers - into the economy, while in Maguaré, short term credit has been used to keep settlers in the area.

The hypothesis that pioneers would stay longer if their cash crops require relatively little investment is not refuted by the data: the investment per hectare in coffee and cocoa trees in Quinindé is considerably less than the per hectare investment in cattle in Caquetá, and in the latter zone settlers moved on much faster. This is, however, only a partial relationship and must be treated accordingly.

The hypothesis that the degree of monopsony will be higher the greater the investment to be made by assembler/traders, finds no confirmation in the data. Competition among these people in all three areas appears to be equally fierce if judged by their fairly low gross margins as described in sections 2.7 and 3.8. In both Quinindé and Caquetá, trade margins become large in the next phase, once the produce has left the area.

Since institutional credit for investment purposes has played a minor role in the three areas and since institutional production credit was given only for minor crops, credit has not been used as a means to incorporate settlers into the national economy. Incorporation takes place only in relation to the three cash crops: cattle, cocoa and coffee. The main instruments seem to be informal credit and marketing arrangements. Those who raise cattle face more difficult marketing conditions than do coffee and cocoa growers. Ownership of means of transport appears to play a role in all areas. As settlers use almost no inputs, incorporation is not effected through this potential link.

In summary, the most important physical differences between

Nueva Jerusalén (Quinindé) and Valparaiso and Maguaré (Caquetá) are the size of the farm and the type of production. Whereas in Caquetá the average holding is around 100 hectares and the main commercial product is beef, the Quinindé farms average about 45 hectares and are planted with tree crops. These differences seem to be reducible to differences in soil quality.

Farmers in Quinindé are less likely to move on than are those in Caquetá, presumably because conditions are more favourable for them. This also follows from the fact that Quinindé settlers have considerably less of their holdings in production even while using more labour. Nevertheless, there are important similarities: in both cases a high percentage of pioneers sell their land to later arrivals; credit facilities are scarce; the cash crop is capital intensive; the settlements are located far away from their markets; technology is primitive; marketing is in the hands of brokers and not settlers; and transport facilities are deficient. Another similarity is that the majority of all settlers feel that they are better off than before.

It follows that settler behaviour is determined more by the natural and man-made conditions studied than by individual characteristics or attributes. However, this does not mean that settler selection is irrelevant.

5. CONCLUSION

Studies of settler behaviour should explicitly distinguish stayers and movers, an aspect our study has only begun to address. To do so would require closely following a generation of pioneers in a series of settlements, since only in long-term studies would it be possible to fully identify the characteristics of stayer and mover behaviour and their relation to the various man-made and natural conditions that could turn an initial stayer into an eventual mover.

Regarding such changes in motivation, this study has generated the hypothesis that more stayers will become movers the greater the gap between the size of the pioneer plot and the size of a viable family farm, and the more difficult it is to obtain investment credit. It follows that we can also hypothesize that the smaller the pioneer plot, the higher the percentage of land cleared in a settlement area.

The impact of the distances between farms, service centres and markets upon settler behaviour also requires further attention. Again, this can only be studied over time, but our hypothesis is that greater distances discourage stayers.

Finally, more attention should be given to assessing and predicting the impact of the various man-made and natural conditions on settler behaviour. In addition to being able to say that plots x per cent below the size of a viable farm will cause y per cent of pioneers to move, it would be useful to be able to assess factors relating to, for instance, cash income and health. Income in this sense is not narrowly defined as the value-added extracted from the farm, but also encompasses off-farm earnings, since, where income can be earned outside the holding, it becomes possible to postpone or avoid the selling of a too-small plot.

From a policy-making point of view, these questions appear to be more relevant to the meaningful evaluation of a policy than an analysis in terms of desertion rates. Answers to the kind of questions raised here could potentially contribute to the creation of better conditions for new land settlement.

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