ANALYSIS OF COCA AND MAIN LEGAL CROP PRODUCTION IN FOUR UPPER JUNGLE REGIONS OF PERU

MACROCONSULT S.A.

1990

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GLOSSARY OF ABBREVIATIONS BY INITIALS

APODESA: Apoyo a la Politica de Desarrollo Regional Selva Alta
(Support to Regional Development Policies in the Upper Jungle Region)

BAP: Banco Agrario del Peru
(Agrarian Bank of Peru)

RDC: Rural Development Centre
(Centro de Desarrollo Rural)

CORDE: Corporacion de Desarrollo
(Development Corporation)

ECASA: Empresa Comercializadora del Arroz
(Rice Marketing Company)

ENACO: Empresa Nacional de la Coca S.A.
(National Coca Company)

ENCA: Encuesta Nacional de Consumo de Alimentos
(National Food Consumption Survey)

INADE: Instituto Nacional de Desarrollo
(National Development Institute)

INEI: Instituto Nacional de Estadistica
(National Statistics Institute)

INIAA: Instituto Nacional de Investigacion Agroindustrial Alimenticia
(National Agroindustrial Food Research Institute)

CPI: Consumer Price Index

ONA: Organizacion Nacional Agraria
(National Agrarian Organization)

ONERN: Oficina Nacional de Evaluacion de Recursos Naturales
(National Bureau for the Evaluation of Natural Resources)

PEAH: Proyecto Especial del Alto Huallaga
(Special Alto Huallaga Project)

PEPP: Proyecto Especial Pichis - Palcazu
(Special Pichis-Palcazu Project)

UNDP: United Nations Development Project

CODEVA: Convenio para el Desarrollo del Valle de La Convencion y Lares
(La Convencion - Lares Valley Development Agreement)

GIS: Geographical Information System

RDU: Regional Departmental Unit

T.C.: Tipo de Cambio
(Exchange Rate)

LAND CLASSIFICATION ACCORDING TO CAPACITY

The land classification map of Peru, a technical document drawn up in 1982 by the National Natural Resources Bureau (ONERN), differentiates soil qualities in close relation to the bioclimatic conditions. This allows the qualification of productive potential (utilization) pinpointing the possibilities of intensive use, as well as the land's limitations (inclination, drainage and flooding) and climate.

The classification is as follows:

1. **Land suitable for tillage (A)** : Land that can withstand intensive farming and plowing and is suitable for a broad range of farming activities.

2. **Land suitable for permanent crops (C):** Land with ecological conditions that do not permit periodic and continued earth moving, but are suitable for permanent crops such as cocoa, coffee and fruit trees.

3. **Land suitable for pastures (P):** land with unsuitable characteristics for intensive or permanent crops but adequate for pasture land for profitable livestock-raising activities.

4. **Land suitable for forestry production (F):** represented by land with unsuitable characteristics for farming, but with favourable conditions for forestry production, providing they are technically handled to avoid causing deterioration of the productive capacity of these resources, or altering the hydrological system of the river basin.

5.**Protective land (X):** Land with unsuitable conditions for tillage, permanent crops, pastures or forestry production. Mountain tops, snow-capped mountains, marshland, beaches, river basins, etc. are included, as these could be of value for the mining activity, energy supply, recreation or tourism.

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EXECUTIVE SUMMARY

ANALYSIS OF COCA AND MAIN LEGAL CROP PRODUCTION IN FOUR UPPER JUNGLE REGIONS OF PERU

MACROCONSULT S.A.
December 1990

The considerable expansion of coca cultivation during the last few years has caused much concern because of its moral and socio- economical effects in both producer and consumer countries. Serious economic distortions have arisen in Peru, which can only be put down to the enormous financial resources generated by drug-trafficking activities.

A diagnosis of the productive situation and the socio-economic implications of coca are an essential starting point for the design of an effective action strategy. The main purpose of this work is to quantify the area under coca cultivation, as well as the existing production and expansion potential in four areas of the country's higher jungle region. So that the coca phenomenon can be properly understood, this study provides complementary socio-economic and ecological information on each area.

The following areas are covered by this study:

A. ALTO MARAÑON - which includes the proximities of the Marañon river, specifically the provinces of Pataz, Bolivar and Sanchez Carrion in the Department of La Libertad and the province of Cajabamba in the Department of Cajamarca.

B. CENTRAL HUALLAGA - comprising the areas close to the Huallaga river and its tributaries, specifically the provinces of Mariscal Caceres, Huallaga, Bellavista, Lamas, Juanjui, Picota and San Martin in the Department of San Martin.

C. AGUAYTIA AND PACHITEA - which includes the proximities of the Ucayali, Aguaytia and Pachitea rivers and its tributaries, specifically the provinces of Padre Abad and Coronel Portillo in the department of Ucayali, the province of Puerto Inca in the department of Huanuco and the province of Oxapampa in the department of Pasco.

D. LA CONVENCION - LARES - including the areas close to the Ucayali, Vilcanota and Yanatile rivers, specifically the La Convencion and Calca provinces.

Below is a consolidated table showing the estimated area under coca cultivation (legal and illegal), the volume of production, the potential area for expansion, yield, profitability index and the labour force directly involved in this activity.

The total area under coca cultivation for the area covered by this study is estimated at 72,353 has., representing about 40% of the total area under coca cultivation in the country.

The potential area for expansion is equivalent to nine times the current coca area. Aguaytia-Pachitea alone concentrates 73% of the potential study area (1,048,697). In view of the fact that expansion areas are mostly located on land suitable for forestry, whether or not forestry policies exist will be a determining factor as far as environmental protection is concerned, and will also have a direct effect on the possibilities for the expansion of coca.

It should also be pointed out that both the Central Huallaga region and La Convencion - Lares have an additional problem, as it is likely that the expansion of coca will take place on areas growing legal crops. This could occur as a result of the production and marketing problems faced by legal crops. Such a situation would also release more labour and management for the coca trade.

As regards the profitability of coca, it is a well known fact that this is much higher than any other crops in the area.

A. ALTO MARAÑON

Current Area Growing Coca

Estimates made for this area indicate 9,766 hectares of coca. Of these, only 613 are legal crops. The current area under coca cultivation represents 24% of the cultivated hectares in this region in 1989.

Current Area Growing Other Crops

Of the legal crops, wheat is the most important, reflected by the large area under cultivation. Other relevant crops are potatoes, barley and starchy corn. Including wheat, these cover a cultivated area of 26,470 hectares. The expansion potential for other crops depends on irrigation schemes and efficient technical assistance.

Potential Expansion of Coca

This has been estimated at 4,757 has. This calculation was based on forestry areas suitable for tillage crops and permanent crops (15,000 has.). From these, the UNDP correction factor was

CONSOLIDATED TABLE OF THE FOUR AREAS COVERED BY THIS STUDY: 1990

STUDY AREA	COCA AREA 1/ (Has.)	PRODUCTION VOLUME 2/ (MT)	POTENTIAL AREA FOR COCA (Has.)	COCA YIELD (MT/HA)	PROFITABILITY INDEX OF COCA 3/	LABOUR FORCE DIRECTLY INVOLVED
ALTO MARAÑON	9,766	10,811	4,757	1.10	117.40	7,325
CENTRAL HUALLAGA	45,000 4/	48,300 5/	282,523	1.07 5/	203.60	35,455
AGUAYTIA & PACHITEA	4,370	5,622	1,048,697	1.30	79.70	3,443
LA CONVENCION - LARES	13,117	9,050	95,598	0.70	89.40	9,689
TOTAL	72,253	73,783	1,431,575			55,912

1/ Legal or illegal cultivated area.
2/ Refers to dry leaves.
3/ Corresponds to the most representative technological level in the area.
4/ Corresponds to the minimum area of Central Huallaga (45,000 hectares).
5/ In order to make a comparison between other study areas, the estimated volumes of fresh leaves (144,900 MT) was converted at a ratio of 0.33%.

Source: MACROCONSULT S.A.

deducted (deducts means of communication, rivers and towns), and land currently used for farming as well as deferred land.

Coca Production Volume

The volume of coca production was estimated at 10,810.6 MT, the average annual yield being 1.11 MT/ha. However, in the Ongon district, Pataz province (close to Alto Huallaga), a higher annual yield is obtained (1.5 MT/ha.).

Production Volume of Other Crops

The largest production volumes pertain to potatoes (10 MT), starchy corn (1.2 MT), barley (10 MT and wheat (0.960 MT). If productions for the years 1988 and 1989 are analysed, a drop in most crops will be appreciated.

Socio-economic Features

The Alto Marañon is a rural area par excellence, since 80% of the population is concentrated in this region. Total population for this area has been estimated at 146,902 people. The total EAP amounts to 79,433 people and the EAP in the farming sector reaches 39,821.

This area supplies the labour force for the Alto Huallaga region and the Ongon area. It is also a connecting point between Tocache (Alto Huallaga) and Trujillo. It partly supplies inputs to the former, and is occasionally used as an outlet for BCP.

Labour Force Involved in Coca Production

Coca is the crop that demands the most annual labour per hectare (198 man/hours, not counting crop installation). For the total area covered by this study, 7,325 people are required.

The labour balance sheet shows that during April there is a deficit (3,870 people), whereas during the rest of the year there is a surplus (in July, when the supply is highest, there is a surplus of 16,710 people).

If the potential expansion area - 4,757 hectares - were to be cultivated, 3,568 people would be required. These could easily be obtained from the unemployed EAP.

Credit and Profitability

The lack of credit funds available for this region is partly responsible for the production problems faced by legal crops. Andean crops in this region have low yields and are considered

highly risky, therefore they are not given priority by the BAP (loans unlikely to be recovered). Furthermore, it must be borne in mind that this bank has a shortage of funds.

The lack of financing for legal crops aggravates the effects of the highly profitable coca crop, which is consistent with its high level of technology.

The Ongon area (high technology) shows high profitability levels for coca - 117.4%. Legal crops show profit rates of 57.4% for wheat, 25.9% for potatoes, 15.4% for corn and 9.4% for barley.

Coca has a guaranteed profitability rate, due to its high price and the fact that its market is assured. Legal crops on the other hand do not enjoy this security, except for barley, which supplies a malt factory in Lima. It should be clarified that the profitability of legal crops has been estimated from the information supplied by the Peruvian Agrarian Bank, which mainly considers high and medium levels of technology, although low technology predominates in the area.

Natural Resources

As far as the forestry activity is concerned, this has been reduced to a limited utilization of lumber, palmetto and wild animals in the district of Ongon, and reforestation with eucalyptus trees, led by the Ministry of Agriculture in the highland environment.

B. CENTRAL HUALLAGA

Current Area Growing Coca

Estimates point to a minimum of 45,000 has and a maximum of 63,000 has. for 1990. If we assume the minimum area, this surface would represent 39% of the total number of has. cultivated in 1989.

The most important coca areas are Mariscal Caceres and Bajo Huallaga, where the coca area is larger than the area on which legal crops are grown.

Current Area and Potential for Other Crops

Of the legal crops, hard yellow corn is the most important, reflected by the large area under cultivation (51,954 has.). Other relevant crops are rice, sorghum, bananas and beans. The expansion potential for other crops (37,503 has.) is mainly suitable for tillage (A), the Bellavista province being outstanding.

Potential Expansion of Coca

This has been estimated at 282,523 hectares, distributed in 278,044 hectares of forestry land and 4,479 has. of land suitable for permanent crops. If the potential coca area were to be cultivated, the current area under cultivation would be 6.5 times larger.

Coca Production Volume

Fresh leaves were used to estimate the volume of annual coca production, amounting to 144,900 MT. In order to compare this with the other study areas, a conversion rate of 0.33% was applied, which in terms of dry leaves, would amount to 48,300 MT.

Production Volume of Other Crops

The largest volumes correspond to hard yellow corn with 104,181 MT, rice with 39,660 MT and bananas with 23,568 MT. It should be pointed out that the level of technology for hard yellow corn and bananas is low, only rice showing a mostly high technological level.

Socio-Economic Features

The population in this area for 1990 has been estimated at 213,949 people. The total EAP consists of 91,089 people and the EAP in the farming sector, 59,526 people. It should be pointed out that the latter showed a growth rate of 1.9%, which is higher than the national rate of 1.5%.

Labour Force Involved in Coca Production

Coca is the crop that demands the most annual labour, requiring 35,455 people (208 daily labourers per hectare).

As regards the local supply of EAP, there are nine months in the year during which there is a deficit; as a result, seasonal markets are satisfied through migration from neighbouring areas with different farming schedules.

Credit and Profitability

The Central Huallaga region has become specialized in the cultivation of rice and corn, thanks largely to the participation of the State's marketing companies (ENCI and ECASA).

Credits granted by the BAP have been concentrated on these two crops. This tendency responds to the Government's logic of favouring the crops included on the national programme.

The profitability of coca amounts to 203.6%, followed by cocoa, coffee and bananas, with profitability rates of 32.9%, 47.3% and 46.2% respectively.

Predominant crops such as corn and rice show profitability rates of 18.8% and 9.9% (high technological level). This tends to be contradictory, since the rice cultivated under a high level of technology is affected by the high input costs and by the fact that favourable prices are non existent; although it has the highest yield per hectare, its relative profitability is thus reduced.

Natural Resources

The Central Huallaga area shows a drop in the production of forestry resources. According to the Agrarian Unit's records for 1989, 296 cubic metres of sawn timber were produced, compared to the 3,891.9 cubic metres produced in 1985. As a result, the industry in Tarapoto has been greatly reduced. Of the six sawmills operating in 1985, only two remained in 1989.

C. AGUAYTIA AND PACHITEA

Current Area Growing Coca

Estimates for this year indicated 4,370 has. of coca. The Aguaytia region concentrates 85% of this amount (3,700 has.).

Current Area of Other Crops

Legal crops in this area cover 25,990 has., of which 61.2% pertain to annual crops and 38.8% to permanent crops. The most important are bananas, corn and rice, mainly found in Coronel Portillo. In the Puerto Inca and Oxapampa areas, there is some support for permanent crops (anatto, cocoa and coffee), provided by the United Nations Development Programme and the Pichis Palcazu Project.

The potential area for other crops reaches 245,700 has., of which 26.5% (65,100 has.) are for annual crops (mainly cassava, rice and cow peas) and 73.5% (180,600 has.) for the production of permanent crops (anatto and "pijuayo" for palmetto).

Potential Expansion of Coca

The potential expansion area for coca is 1,048,697 has., 65% of which are concentrated in the Pachitea region.

In order to make this estimate, ecological parameters (greater soil capacity) were taken into consideration, as well as quantifiable strategic factors. The pattern followed by the Geographical Information System was used, which deducts rivers, roads and areas close to towns. Likewise, native communities were deducted, as part of the social parameter.

Coca Production Volume

The volume of dry coca leaf production was estimated at 5,622 MT per annum, with an average yield of 1.6 MT for Padre Abad, the main producing province. In Pachitea, where there is a low level of technology, the average only amounts to 600 kg/ha. It should be mentioned that crops are recent in the latter area.

Production Volume of Other Crops

The largest production volumes correspond to bananas (63,000 MT), which concentrate 93% of the total volume of permanent crops.

Second in importance is cassava, an annual crop with an annual production of 25,128 MT, followed by rice, another annual crop, with a production volume amounting to 11,375 MT.

Cassava and bananas are for self-consumption, since they are an important part of the dwellers' staple diet, and are marketed through the local market, whereas rice, corn, cocoa, anatto and coffee are aimed at nearby areas, a smaller proportion being for the extra-regional market.

The yield for most legal crops is insignificant, due to the low level of technology used, characterized by an intensive use of labour and a lack of fertilizers.

Socio-economic Features

With respect to the socio-economic characteristics of the study area, the growth and migratory flow of the population is strongly linked to the boost of the forestry activity and road construction. This is evident mainly in the Puerto Inca province (Huanuco) where the accumulated annual growth rate reached 5.12% during the 1980 - 1990 period, whereas the growth rate for the entire study area was 3.7%.

Considering the total population in the provinces covered by this study, the estimated EAP for 1989 was 107,467 people, and the EAP in the farming sector was 49,614 people (46% of the total EAP). The growth rate for the latter (2.1%) between 1980 and 1989, is above the national average. The same occurs with the total EAP (3.5% against 2.6%), which also has a higher growth rate than the national average.

Labour Force Involved in Coca Production

Coca is the crop that demands the most annual labour per hectare (208 man/hours). For the total number of hectares in the study area, 3,443 people are required.

The labour balance sheet reflects that labour is supplied locally. It should be mentioned that there is a strong surplus throughout the year, including during the months when the demand is highest (May and June). With this surplus labour, 48,926 new has. of coca could be cultivated.

Credit and Profitability

The profitability of coca with a high technology level (79.7%) is considerably higher than for the remaining crops, despite the fact that it pays the highest wages as well as an additional sum for food, transport and lodging. The most profitable crops after coca, are bananas (38.3%), beans (30.2%) and cassava (24.5%).

As far as credit availability is concerned, in the case of Oxapampa, loans have been obtained mainly for coffee, potatoes (in the highlands), cassava and bananas, although credits are mostly concentrated on coffee and cassava, which together account for 36% of the amount assigned to farming. In Puerto Bermudez, credit is also concentrated on cassava and bananas (80.4% of the amount assigned to farming).

Natural Resources

The forestry activity is profitable and well-developed, mainly in the Pachitea region. The selective felling method is used and the species with the most commercial demand are cedar, mahogany, Ishpingo, tornillo, copaiba and others.

D. LA CONVENCION - LARES

Current Area Growing Coca

Estimates for this area point to 13,177 has., of which the 7,877.3 registered by ENACO are are considered legal. In 1988, ENACO carried out a survey at which time 8,942 has. were declared.

The area currently growing coca represents 24% of the total cultivated area in this region in 1989.

Current Area and Potential for Other Crops

Of the legal crops, coffee is the most important, which is reflected by the higher proportion of cultivated hectares in 1989 (49%). For the same year, cocoa was the second most important product with 13% of the area. The area dedicated to "other crops" amounts to 87,894 has. The expansion potential is 347,620 has., of which 198,900 are for annual crops and 148,720 for permanent crops.

Potential Expansion of Coca

The potential expansion of coca is 95,598 has. If all this area was to be cultivated, the current area would be seven times as large. The area with the most potential is Pongo de Mainique, which has been favoured with the recent construction of a highway, and because of its proximity to the maceration centres in Kiteni and Yanatile, where coca leaves obtain a higher price than the sum paid by ENACO.

Coca Production Volume

In 1990, the production volume of dry coca leaves was estimated at 9,050 MT, the average yield being 0.7 MT/ha. Of this, 70% is marketed by ENACO, whereas the difference is aimed at drug-trafficking or smuggled for mastication purposes.

Production Volume of Other Crops

The highest production volumes correspond to cassava (38,951 MT), coffee (21,507 MT) and bananas (14,300 MT).

Socio-Economic Features

In 1990, the population was estimated at 177,241 people. The total EAP for 1989 comprised 69,666 people and the EAP in the farming sector, 39,022 people. During the 1980 - 1989 period, the total EAP showed a higher annual growth rate than the EAP in the farming sector, mainly due to the fact that the farming activity has deteriorated during that period.

Labour Force Involved in Coca Production

The annual demand for coca per hectare is 195 man/hours. For the total number of hectares growing coca in the study area, 9,689 people are required. It should be pointed out that in this area, coffee uses more labour due to the larger cultivated area (35,845 has. compared to 13,117 has. on which coca is grown).

As regards the labour balance, there is only an excess demand during three months. Mainly in April, when the corn, coffee and cocoa harvests coincide, and in September, coinciding with the culture work for anatto, coffee, cassava, tea and the cocoa and citrus fruit harvests. The labour deficit is covered by peasants who temporarily migrate from higher regions such as Canas and Sicuani. They come down for the harvests of main crops, prompted by their depressed income levels.

Credit and Profitability

The lack of human and logistic resources as well as the shortage of funds in the Agrarian Bank, means that credit assistance in this area is limited and selective.

As far as profitability is concerned, it should be pointed out that coca shows 89.4% for a low level of technology. Profitability of the remaining crops is lower, bananas showing 43.0% (medium level of technology). The remaining crops showed negative profits in 1989.

Natural Resources

With respect to forestry utilization, the Selva Alta (Higher Jungle) and Selva Baja (Lower Jungle) show different characteristics. In Selva Alta as far as Pongo de Mainique, the activity is mainly aimed at logging.

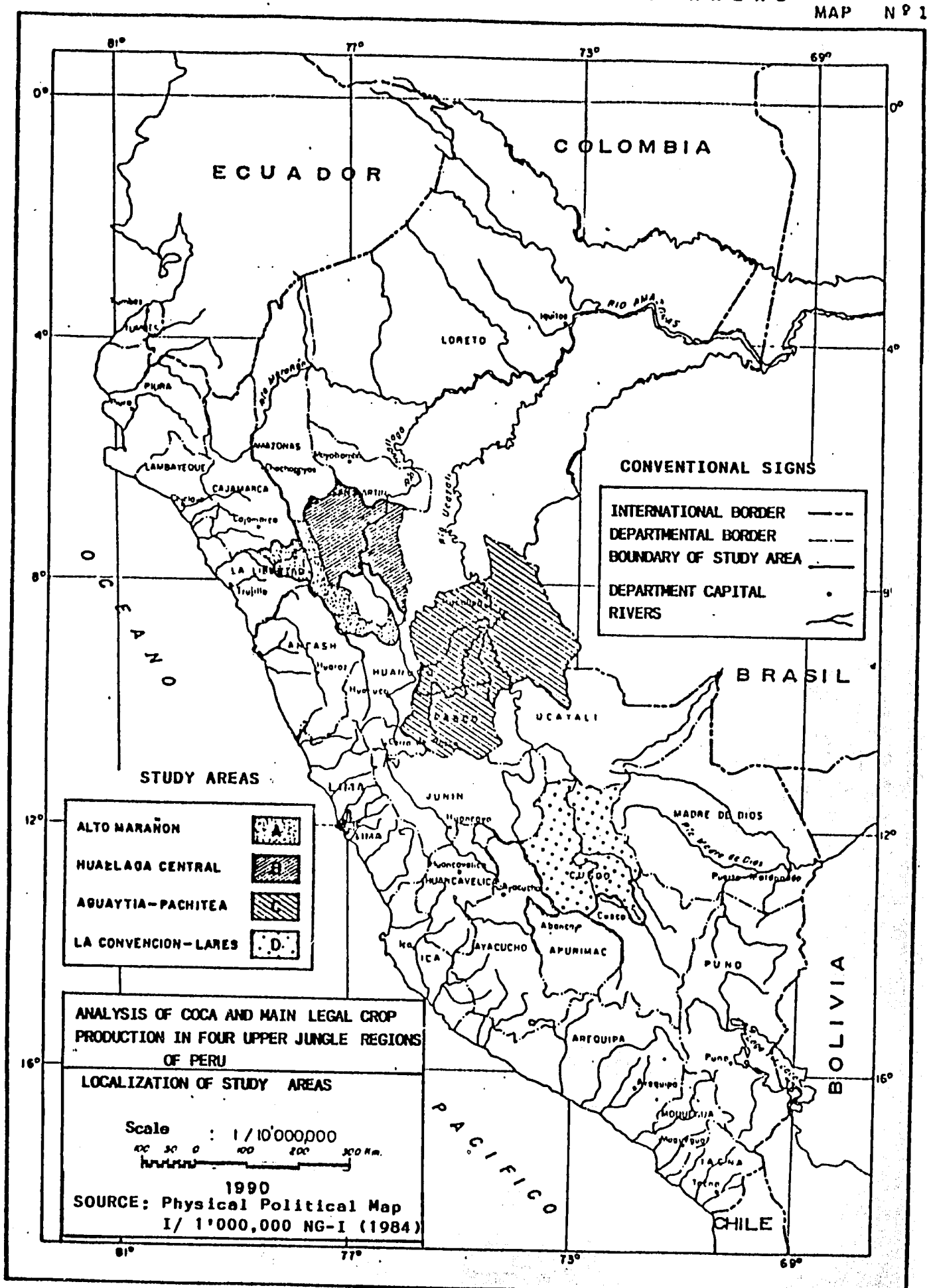
Although there are 27 species exploited, 44% of the production corresponds to only four species: walnut, "sandimatico", "zarzafras' and "aguano". The forestry administration in Quillabama restricts the number of permits and contracts, as a control measure to avoid irrational utilization of valuable lumber species.

The volumes of sawn lumber decreased from 3,581.35 m^3 in 1981 to 354,112 m^3 in 1989; the number of permits and contracts also decreased. However, these figures do not reflect the real volume of utilization, since it is known that the volume is higher, as clandestine activities take place. The local market absorbs 67% of the production, Cuzco 22% and Arequipa 11%.

In Selva Baja, between Pongo de Mainique and the Mishaima river, the activity is aimed at the utilization of fine wood, mainly cedar and mahogany, which are carried downstream to the sawmills in Shepaima, Atalaya and Pucallpa in the Ucayali region. This activity is controlled by the forestry administration in Atalaya.

LOCALIZATION OF STUDY AREAS

MAP Nº 1



XII

ANALYSIS OF COCA AND MAIN LEGAL CROP PRODUCTION IN FOUR UPPER JUNGLE REGIONS OF PERU

December 1990

INTRODUCTION

The considerable expansion of coca cultivation over the past few years, is a matter of national and international concern, due to the moral and socio-economic effects of this phenomenon in both producer and consumer countries. In our country, serious distortions have resulted from the expansion of coca, particularly as far as the economy is concerned, which have led to erroneous economic policies being maintained. In addition, the existing relationship between coca cultivation and the problem of terrorism, makes it even more difficult to find a solution to this phenomenon.

A prior diagnosis of the area covered by coca is an essential starting point, with respect to outlining the most effective measures to be taken. The main objective of this work is to quantify the number of hectares on which coca is grown, as well as the corresponding production and expansion potential. Although it is true that similar quantitative efforts of much value have previously been made - which have helped to identify the coca-growing areas under expansion - none of these have suitably described or systematically quantified the coca producing areas, except for the work carried out in the Alto Huallaga region. It is well known that the highest percentage of illegal coca is concentrated in this area, however some more accurate information concerning the extent of the illegal production of this crop in other areas, will enable a solid anti-drug trafficking strategy to be drawn up.

In order to analyse the coca problem under different perspectives and thus bear in mind the extent and impact of such a phenomenon, an approach has been made to the productive problem in four coca-producing areas. In Peru, these areas have the most potential as far as expansion in concerned. This study is centred on the economic, social and ecological problems of each of these areas, so that the causes and consequences of this phenomenon and its expansion potential, may be fully understood.

The areas covered by the study are as follows:

a. Alto Marañon Valley:

This consists of the area bordering the Marañon River, specifically the provinces of Pataz, Bolivar and Sanchez Carrion, which belong to the department of La Libertad. The province of

Cajabamba, pertaining to the department of Cajamarca, is also included because it is influenced by the same river and has the same ecological conditions.

b. Aguaytia-Pachitea Region

This comprises the Padre Abad and Coronel Portillo provinces in the Department of Ucayali; the Puerto Inca province in the department of Huanuco; and the Oxapampa province in the department of Pasco. All these provinces are influenced by the Ucayali, Aguaytia and Pachitea rivers and their tributaries.

c. Central Huallaga Valley

This area includes the Picota, Bellavista, Juanjui, San Martin, Mariscal Caceres, and Lamas provinces, as well as the Bajo Huallaga, and covers all the areas that are influenced by the Huallaga river and its tributaries.

d. La Convencion Lares

This area consists of the La Convencion and Calca provinces in the lower jungle areas of the department of Cuzco, influenced by the Urubamba, Vilcanota and Yanatile rivers.

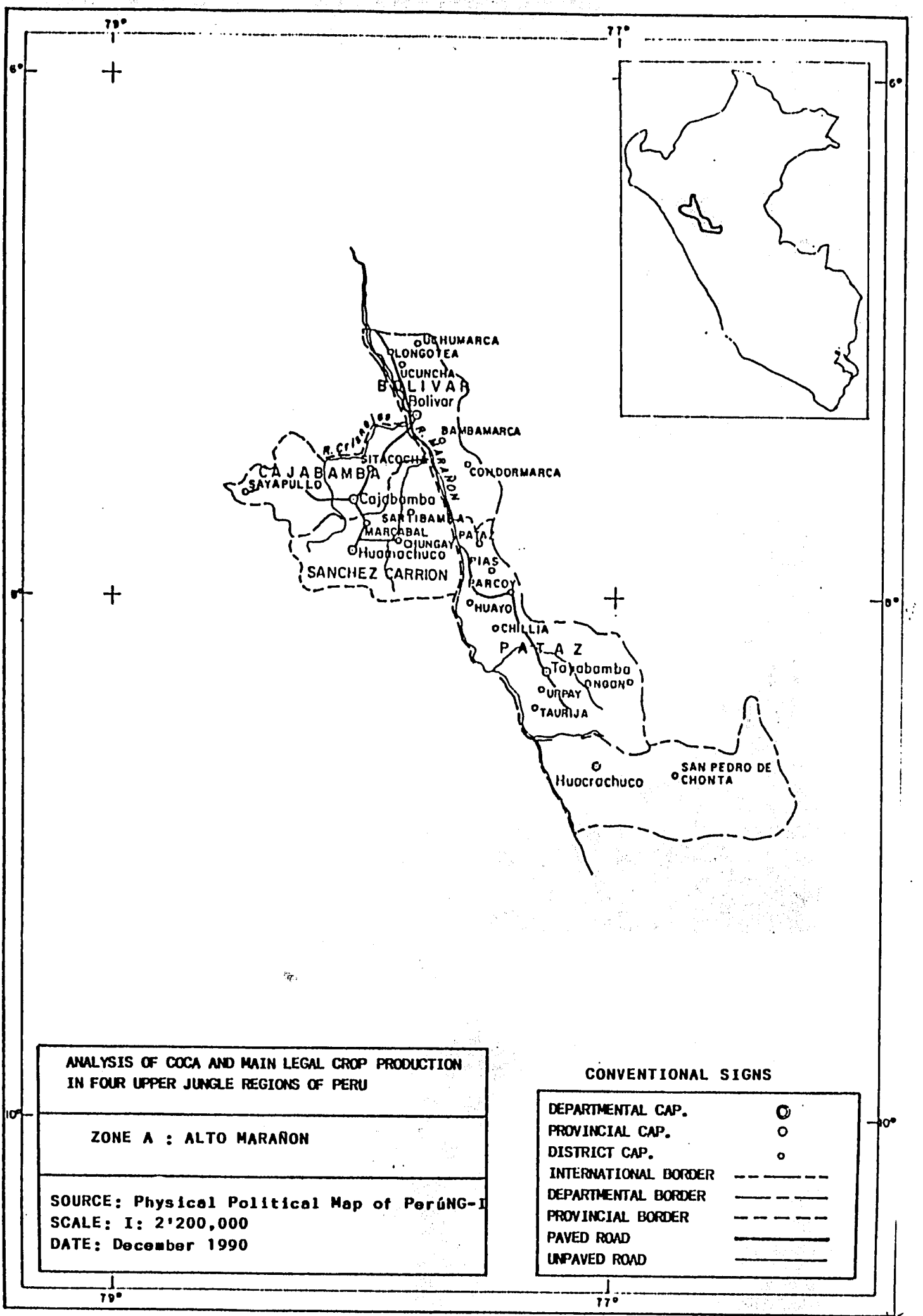
As far as the methodological aspects are concerned, all existing information concerning the coca phenomenon has been reviewed and analysed, and the areas covered by the study have been visited. With respect to the field work, flights over the area have taken place and surveys and interviews have been made to farmers, State officials, trade union organizations and professionals and entrepeneurs from the private sector, in order to identify and quantify the areas cultivated with coca, the costs of production and the labour requirements in each production area; likewise, the current production of legal crops and their expansion potential have been estimated.

Finally, with respect to the limitations of this study, it should be mentioned that because of the magnitude of this problem, among others, and faced with the need to find urgent solutions, the multi-disciplinary teams have had to face a number of challenges, such as field work security, a lack of standarized information, and a shortage of available time.

The working teams were comprised of the following consultants: Rita Osnayo, Miguel Arevalo and Alfredo Olivos for the Alto Marañon area; Dewey Cardenas, Guillermo Davila and Carla Giraldo for the Central Huallaga area; Julio Ocaña, Carlos Vargas, Nicolas Vitor and Claudia Pescetto for the Aguaytia and Pachitea area, as well as Mrs. Osnayo and Mr. Arevalo, assisted by Patricia Monica Casas, for the La Convencion - Lares area.

MAP N°2

ZONE A : ALTO MARAÑON



ANALYSIS OF COCA AND MAIN LEGAL CROP PRODUCTION IN FOUR UPPER JUNGLE REGIONS OF PERU

ZONE A : ALTO MARAÑON

SOURCE: Physical Political Map of PerúNG-I
SCALE: I: 2'200,000
DATE: December 1990

CONVENTIONAL SIGNS

DEPARTMENTAL CAP.	◎
PROVINCIAL CAP.	○
DISTRICT CAP.	○
INTERNATIONAL BORDER	– – – – –
DEPARTMENTAL BORDER	—— – ——
PROVINCIAL BORDER	– – – – –
PAVED ROAD	———
UNPAVED ROAD	———

A. ALTO MARAÑON

A.1 INTRODUCTION

This study covers the area located between 76o.50' and 78o.30' longitude west and 07o.00' and 08o.30' latitude south, comprising the Sánchez Carrion, Bolivar and Pataz provinces in the Department of La Libertad and the Cajabamba province in the Department of Cajamarca.

Within the above mentioned provinces, 22 districts are directly involved in the production of coca leaves. They all belong to the Alto Marañon basin, with the exception of Sayapullo (province of Cajabamba) which belongs to the Chicama river Basin (Pacific), and Ongon, which belongs to the Huallaga hydrographic system and therefore forms part of the coca area in Alto Huallaga.

Because of its geographical location and the lack of means of communication, access to this region is complicated. The only existing road, which is partly surfaced, joins Trujillo with Huamachuco, at which point it splits into two: one road leads to Cajamarca, passing through Cajabamba, and the other leads to Huacrachucro in the department of Huanuco, passing through Parcoy and Tayabamba. Bridle paths provide access to most districts. Most of the districts in La Libertad are joined to Cajabamba via Cajamarca and access to Bolivar is through Celendin in the department of Cajamarca. Lastly, access to the Ongon region in the Pataz province, is by air or by road, and by bridle path from the Alto Huallaga.

The area covered by this study consists of small inter-Andean valleys located at altitudes that vary between 1,000 and 2,500 metres above sea level (m.a.s.l.). The lowest of these are Ongon at 780 m.a.s.l. and Huayo at 1,560 m.a.s.l. Because of their depth, these are heated by surrounding hills. Due to the prevailing physiography and climate, farming activities are fairly restricted. Heavy rainfall causes considerable soil erosion, therefore farmers usually let their fields rest until they naturally recover their fertile nature. Moreover, they also have to face periods of drought that destroy harvests.

Judging by the vegetation, coca growing areas could be defined as dry brush tropical forests, with rainy seasons lasting 4 - 5 months.

Only a small part of the area under cultivation is irrigated, as can be appreciated in Table A.1.1.

The main crops under irrigation are permanent crops such as coffee, cocoa, coca and fruit trees. Annual crops such as corn, wheat, barley, potatoes and peas on the other hand, are rainfed.

Table A.1.1
CLASSIFICATION OF CULTIVATED AREA
ALTO MARAÑON

Province	Has. Cultivated	Rainfed Area	Irrigation Area
Cajabamba	56,573	11,409	45,164
Bolívar	5,661	773	4,888
Pataz	30,013	4,922	25,091
Sánchez Carrión	48,341	3,614	44,727
Total	140,588	20,718	119,870

Source: Development Problems and Alternatives for the Cajabamba Province, CORDE – Cajamarca, 1987.
Socio-economic Study of Bolivar Province CORDE – La Libertad, 1986.
Socio-economic Study of Pataz Province CORDE – La Libertad, 1988.
Socio-economic Study of Sanchez Carrion Province, CORDE – La Libertad, 1988.
Drawn up by: MACROCONSULT S.A.

The areas covered by this study do not fall within the scope of any special project, nor have any surveys been made of their soils or their climate; the attention they receive from regional government entities is very limited, and this also applies to the tropical areas in which coca is grown. Thus, official statistics for highland crops only show tropical crops such as coffee, cocoa, citrus fruits, mangoes, bananas and paw-paws.

Forestry activities are reduced to a limited utilization of timber, palmetto and wild animals in the district of Ongon; and reforestation with eycalyptus trees carried out by the Ministry of Agriculture in the highland environment.

The existence of terrorism has forced the State to withdraw from the region, therefore this region is not only at a disadvantage statistics-wise, but also the State's presence at a service and infrastructure level is very limited.

In order to identify the areas under coca cultivation as well as their productivity and production, official information available in Lima, Trujillo and Cajamarca was considered, as well as testimonies obtained from people in the area, in production centres and during field visits. Furthermore, flights over the Pataz province took place.

A.2 IDENTIFICATION AND QUANTIFICATION OF AREAS GROWING COCA AND LEGAL CROPS

In order to identify the areas under cultivation in the region, it is important to predetermine which these crops are and where they grow. These can be classified as follows: Andean crops: wheat, barley, potatoes, starchy corn, peas and broad beans; Tropical crops: coca, sugar cane, coffee, cocoa, hard yellow corn, cassava and rice (see Table A.2.1).

Table A.2.1
IDENTIFICATION OF MAIN CROPS
IN ALTO MARAÑON

	PROVINCES			
CROPS	Cajabamba	Bolívar	Pataz	Sánchez Carrión
Peas	–	*	*	*
Cocoa	*	*	*	–
Coffee	*	*	*	*
Barley	*	*	*	*
Citrus fruits	*	*	*	*
Beans	–	*	–	*
Broad beans	–	*	*	*
Yellow corn	*	*	*	–
Starchy corn	*	*	*	*
Potatoes	*	*	*	*
Wheat	*	*	*	*
Cassava	–	*	*	*

Source: RDU Trujillo, RDU Cajamarca.
Drawn up by: MACROCONSULT S.A.
N.B.: * Cultivated.
– Not cultivated.

A.2.1. Areas Producing Coca Leaves

Coca is produced in every hot valley in the region, and is channeled through district capitals. As far as the legal coca-growing area is concerned, the Empresa Nacional de la Coca

(ENACO) took a census of all coca-growing areas in the country in 1978. This census covered 613 areas in Alto Marañon, and it should be emphasized that to date, ENACO's purchases are made in accordance with this register.

This register is shown in Table A.2.2., in which it is emphasized that 38% of the hectares legally cultivated are in the province of Sanchez Carrion.

In order to estimate the areas that are not officially registered, the first step was to contact all the organizations connected with coca cultivation (the Ministry of Agriculture and the National Coca Company), to obtain information on the hectares under cultivation and production in the area, however there was no updated information available.

Secondly, interviews were held with the people specifically involved, through their work, in the sowing and production of coca. Thus, contact was made with one of ENACO's field supervisors who had carried out inspection surveys in the provinces of Pataz and Bolivar in 1988 and early in 1989.

Subsequently, an official of the Banco Central de Reserva was interviewed in Trujillo, who had carried out studies (at a macroeconomic level), based on interviews with ENACO officials and members of the Police Force who operate in such areas.

Thirdly, flights over the province of Pataz took place, to identify the areas under coca cultivation.

In the Condebamba Valley in the province of Cajabamba, contact was made with personnel from ENACO, the Ministry of Agriculture and the Cajamarca Development Corporation, in order to estimate the existing number of hectares in these districts that could be referred to as coca-growing areas.

The same Table A.2.2. shows figures representing the area of illegal coca and the total figure, including the registered area plus the illegal area.

Of the total 9,766 hectares of coca in Alto Marañon, 613 correspond to the legal area and 9,153 to the illegal area. Of these, 96.7% pertain to the department of La Libertad, i.e. 8,848 hectares, whereas in Cajabamba, the illegal area amounts to merely 306 hectares.

A.2.2. Areas Producing Other Crops

Since all four provinces have similar ecological features, they also produce the same main crops, both in the higher and lower parts (See Section A.2.1.)

Table A.2.2
COCA PRODUCTION AREAS: 1990
ALTO MARAÑON

Department	Province	District	Valley	Areas (has.) Legal 1/	Illegal	Total
CAJAMARCA				174.36	306	480
	CAJABAMBA			174.36	306	480
		Sayapullo	Condebamba	130.32	230	360
		Sitacocha	Chicama	44.04	76	120
LA LIBERTAD				38.92	8,848	9,286
	BOLIVAR			75.37	468	543
		Bolívar	Sute	13.40	82	95
		Bambamarca	Chacta	30.43	150	180
		Condemarca	Capillanía	7.83	92	100
		Longotea	Chirana	14.70	95	110
		Uchumarca	Chirana	3.40	27	30
		Ucuncha	Huayo	5.61	22	28
	PATAZ			131.06	7,582	7,713
		Tayabamba	Cajas	0.13	20	20
		Chillia	Supaybamba	24.09	326	350
		Huayo	Cajas	32.19	618	650
		Ongón	Mishallo	26.99	5,173	5,200
		Parcoy	Parcoy	0.20	50	50
		Pataz	Hualonga	42.52	706	748
		Taurija	Araucante	1.25	107	108
		Pias	Infiernillo	3.69	310	314
		Urpay	Huancas	-	150	150
		Challas	Challas	-	123	123
	SANCHEZ CARRION			232.49	798	1,030
		Chugay	La Sequia	1.07	29	30
		Cochorco	Muyuque	29.56	220	250
		Macabal	Chusgón	0.30	50	50
		Sartimbamba	Gansul	201.56	498	700
TOTAL				613.28	9,153	9,766

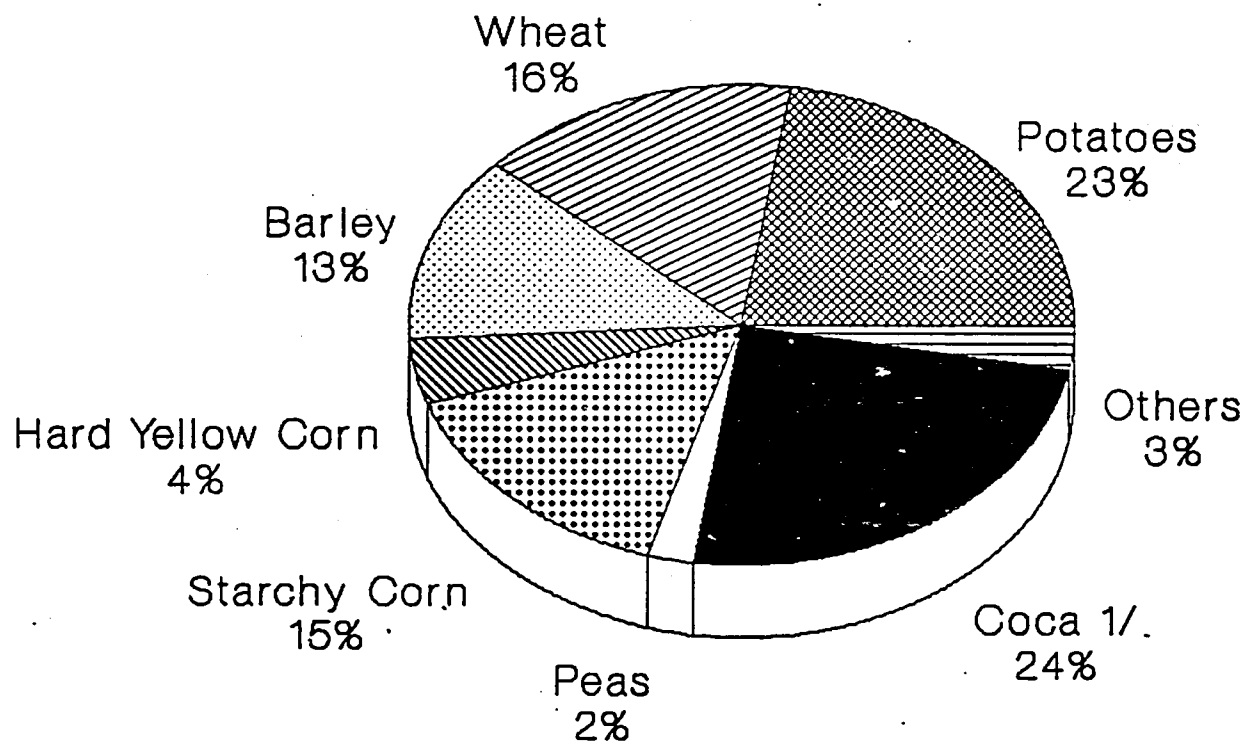
Source: Register of ENACO Producers 1988; MACROCONSULT S.A. Surveys, 1990.
Drawn up by: MACROCONSULT S.A.

Table A.2.3
AREA OF OTHER CROPS
ALTO MARAÑON
(In hectares)

Province:	Crop:		1985	1986	1987	1988	1989
Bolivar			5648	6821	5777	6568	5236
	Annual	Wheat	2050	2550	1700	2000	1910
		Potatoes	1050	1732	1141	1562	632
		Barley	1350	1014	1200	1235	1150
		Starchy corn	780	1087	1200	1235	1150
		Broad beans	370	360	420	420	300
	Permanent	Cocoa	10	40	56	54	35
		Coffee	38	38	60	62	59
Pataz			6499	7873	7353	7240	6267
	Annual	Wheat	2100	2663	2600	2610	2500
		Potatoes	1410	2102	1730	1650	1500
		Peas	400	220	250	250	300
		Barley	450	637	650	655	500
		Hard Corn	1100	1239	1060	990	700
		Alfalfa	675	640	720	740	412
		Cassava	160	180	185	170	180
	Permanent	Cocoa	18	22	18	30	30
		Coffee	186	170	140	145	145
S.Carrión			8419	10126	9617	11445	11249
	Annual	Wheat	1406	2096	2050	2670	2480
		Potatoes	3485	4137	3780	4203	3037
		Peas	335	267	200	80	607
		Barley	878	1509	1600	1965	2360
		Starchy Corn	2000	1917	1902	2490	2740
		Broad Beans	315	200	85	37	25
Cajabamba			7088	7593	7240	9830	7617
	Annual	Potatoes	1469	1938	1881	1852	1138
		Wheat	2261	1880	2106	2332	2209
		Barley	845	910	996	1083	1049
		Hard Corn	825	1220	1116	1127	1106
		Starchy Corn	1688	1645	1141	3436	2115
Total			27654	32413	29987	35083	30369

Source: RDU Trujillo and RDU Cajamarca
Drawn up by: MACROCONSULT S.A.

Graph A.1
AREA UNDER CULTIVATION 1989
ALTO MARAÑON



1/The coca area corresponds to 1990

Source: RDU La Libertad, RDU Cajamarca.
MACROCONSULT S.A.
Drawn up by: MACROCONSULT S.A

Table A.2.4 POTENTIAL EXPANSION OF COCA ALTO MARAÑON	
A,C,P and F capacity lands	15,000
Correction factor 1/	0.8650718
Total hectares	12,976
Current farming use	6,322
Deferred hectares	1,897
Hectares under expansion	4,757
1/ Applied to Alto Huallaga by UNDP.	
Source: MACROCONSULT S.A. Surveys, October 1990. Drawn up by: MACROCONSULT S.A.	

Table A.2.3. shows the history of main crops between 1985 and 1989, by provinces. It is important to mention that the most significant are the so-called highland crops, wheat being the most highly cultivated, although this crop covers a smaller area than the number of hectares assigned to coca. It should be pointed out that the hectares under coca cultivation are equivalent to 37.3% of the area of the four main legal crops (wheat, potatoes, barley, starchy corn), which together cover an area of 26,470 hectares.

As can be appreciated in graph A.1, coca covers 24% of the total number of hectares cultivated in 1989. Among the legal crops, potatoes are outstanding, representing a total, with coca, of about 50% of the total area.

A.2.3 Potential expansion of coca

To calculate the potential expansion of coca in Alto Marañon, specific procedures had to be followed, since there are no studies available on land classification by capacity.

To that end, we have divided the area into two categories:

1) Dry lands, located in the Alto Marañon and Chicama basin, where there is little potential for the expansion of coca with the present infrastructure. Although the valleys are small and difficult for police to control, because they are scattered and in view of the increasing terrorist

activities in the area, it is felt that there is no potential for expansion because, after all, the area has no irrigation systems to make it feasible to grow this crop.

2) Rainfed lands, located in the Alto Huallaga basin, where there is enough rainfall to grow coca all year round. The lack of information is greater in this district, since there is no aerophotographic coverage carried out by the National Geographic Institute. Bearing in mind the conversations held with staff who have worked in the area and the personal opinions obtained during our inspection flight, it was estimated that there is a potential for the expansion of 15,000 hectares in the district of Ongon (A,C,P and F type lands).

Applying the correction factor estimated for Alto Huallaga by the UNDP (it must be remembered that Ongon belongs to the Alto Huallaga hydrographic system), which eliminates means of communication, rivers and settlements, a total of 12,976 hectares was obtained, not counting the 6,322 currently used for farming and the deferred lands (30% of those currently used for farming). We therefore arrive at a figure of 4,757 hectares that could possibly be expanded. (see table A.2.4).

A.2.4. Potential Area for Other Crops

As a result of the "Salaverry-Juanjui Road Survey", it has been estimated that in the four provinces, a total of 133,346 hectares are suitable for farming. This is a smaller area under cultivation than in 1989, which amounted to 140,588 hectares, not counting deferred pasture lands.

Since A type lands (see Land Classification Appendix) are alluvial terraces and benefit more from irrigation; and since irrigated lands are mostly used for permanent crops, it is rather contradictory that annual crops - which have higher nutritional values - should be grown in non-irrigated lands of an inferior category (type C, P or F). It is therefore unlikely that the area of legal crops will expand, unless irrigation work is carried out and technical assistance improves.

A.3 PRODUCTIVE ASPECTS OF AREAS COVERED BY THE STUDY

In this chapter, the production volume will be analyzed, both for coca leaves and for the area's main crops, as well as yields, so that the subsequent feasibility analysis may be implemented.

A.3.1. Volume of coca leaf production

The production of coca in Alto Marañon may either be legal or illegal. Both cases are described below.

A.3.1.1. Volume of legal production

Table A.3.1. details the legal production of coca leaves, which involves both the area and the volume of production registered in 1978.

In the census of producers taken by ENACO S.A., it was established that at that time, there was a surface area of 613 hectares and a referential volume of 287.6 MT per annum in the area covered by the project. At that time, Cajabamba had the highest volume with 98.3 hectares, followed by Sanchez Carrion with 91.6 MT, Pataz with 60.1 MT and Bolivar with 37.6. It is worth mentioning that the plantations were young, therefore they subsequently increased their productivity.

Most of this production volume was obtained by ENACO through their Trujillo branch and their agency network. In the project area, the agencies involved were in Huamachuco and the storage centres established in the productive areas of Chilia, Retama, Chagual and Sartimbamba, where the main production was stored. On average, this amounted to 330 MT per year during the last five years, according to surveys carried out in the area.

However, ENACO S.A. only reported 390 tons for the last five years. The approximately 1,260 remaining tons may have been aimed at illegal drug trafficking and for mastication purposes.

Furthermore, it should be pointed out that since 1986, these storage centres, which were located within the scope of the Pataz province, were closed down as a result of the subversive actions that blew up the storage centre in Chilia.

A.3.1.2. Volume of Illegal Production

Table A.3.1. details the volume of illegal production and the estimated total production of coca leaves in the areas related to Alto Marañon. The district of Ongon in the province of Pataz is prominent, with 7,787.2 M.T., representing 74.0% of the illegal coca production in the area. This is explained by the fact that the Huallaga technology is applied in Ongon, which raises the crop's yield and cultivation is more intensive. On the other hand, the lowest coca leaf production was recorded in the province of Cajabamba, with 141.M.T.

Total production (legal plus illegal) reaches a volume of 10,810.6 M.T. 93% is aimed at the manufacture of BCP, the remaining 7% is for contraband (used for mastication) and is mainly produced in the Bolivar and Sanchez Carrion provinces.

As far as Cajabamba's production is concerned, 50% is aimed at meeting the demands of the highland rural population who dedicate themselves to farming, and who use coca for mastication purposes.

Table A.3.1
VOLUME OF COCA LEAF PRODUCTION: 1990
(tons)

	Legal 1/	Illegal	Total
CAJAMARCA	98.3	141.7	240.0
CAJABAMBA	98.3	141.7	240.0
Sayapullo	66.8	113.2	180.0
Sitacocha	31.5	28.5	60.0
LA LIBERTAD	189.3	10,381.3	10,570.6
BOLIVAR	37.6	252.9	290.5
Bolívar	6.0	60.5	66.5
Bambamarca	17.2	72.8	90.0
Condemarca	2.4	47.6	50.0
Longotea	8.1	46.9	55.0
Uchumarca	2.4	12.6	15.0
Ucuncha	1.5	12.5	14.0
PATAZ	60.1	9,499.0	9,559.1
Tayabamba	0.0	14.0	14.0
Chillia	10.0	235.0	245.0
Huayo	15.1	439.9	455.0
Ongón	12.8	7,787.2	7,800.0
Parcoy	0.1	34.9	35.0
Pataz	20.6	503.0	523.6
Taurija	0.3	75.3	75.6
Pias	1.2	218.6	219.8
Urpay	0.0	105.0	105.0
Challas	0.0	86.1	86.1
SANCHEZ CARRION	91.6	629.4	721.0
Chugay	0.2	20.8	21.0
Cochorco	3.0	172.0	175.0
Macabal	0.0	35.0	35.0
Sartimbamba	88.4	401.6	490.0
TOTAL	287.6	10,523.0	10,810.6

Source: ENACO, MACROCONSULT S.A. 1990 Surveys
Drawn up by: MACROCONSULT S.A.

The other 50% is used for maceration for making basic paste, under favourable circumstances in view of the existence of outbreaks of subversion which encourage illegal coca leaf production.

As far as Pataz is concerned, practically 100% of the coca produced is aimed at drug-trafficking, since the production is gathered in the Chilia, Urpay and Ongon areas, which are basic cocaine paste processing centres. The latter two places have the necessary transport infrastructure (landing strips) so that the BCP production can be flown to Uchiza and Trujillo.

A.3.2. Volumes of Production of Other Crops and Livestock

With respect to the production of other crops, production volumes for the main legal crops in the different areas covered by the study, are indicated in Table A.3.2.

With respect to the Bolivar province, the highest production volumes correspond to rainfed crops in the highlands, such as potatoes, wheat, starchy corn and barley. The current area of permanent crops is very small, therefore volumes of cocoa and coffee are not significant.

Furthermore, the rudimentary nature of the exploitation technique in farming areas affects productivity. If this is added to the climatological factors, the result is that producers must defer a percentage of their lands from one year to the next; production volumes for these crops reflect these limitations.

If we analyze the production for the years 1988 and 1989 (table A.3.2), we observe a drop in most crops, which is likely to continue in 1990 due to the strong drought affecting the farming activity.

With respect to the Pataz province, preference is maintained for the crops that predominate in the Bolivar province, the most important of being potatoes, cassava, wheat and alfalfa. Nevertheless, except for potatoes (the main crop for the highland areas in this province, the bulk of which is aimed for the city of Trujillo on the coast and which increased in 1989, though not reaching 1987 levels) these products have shown a tendency to drop.

With respect to the volumes produced in the microregion of Sanchez Carrion, annual crops such as potatoes, barley and starchy corn are prominent, which proves the Andean tendencies of these settlements.

The main crop is the potato, with 28,395 MT in 1989, followed by starchy corn and wheat, which maintain volumes bordering on 2,877 and 2,728 MT respectively.

Cuadro A.3.2
PRODUCTION VOLUME OF OTHER CROPS
ALTO MARAÑON
(tons)

Province:	Crop:		1985	1986	1987	1988	1989
Bolívar			7766.5	11035.8	8182.8	10251.3	6077
	Annual	Wheat	1435	1785	1190	1400	1337
		Potatoes	4515	7447	4906	6716	2717
		Barley	945	709	840	864	910
		Starchy corn	546	760	840	864.5	815.5
		Broad beans	296	288	336	336	240
	Permanent	Cocoa	6	24	33.6	32.4	21
		Coffee	23.5	22.8	37.2	38.4	36.5
Pataz			41292.7	45064.1	50837.7	48093.3	35844.2
	Annual	Wheat	2520	3195	3120	3132	3000
		Potatoes	8460	12612	15397	12015	13350
		Peas	320	176	200	200	240
		Barley	450	637	643.5	648.4	495
		Hard Corn	1133	1276	1091.8	1019.7	721
		Alfalfa	27000	25600	28800	29600	16480
		Cassava	1280	1440	1480	1360	1440
	Permanent	Cocoa	14.4	17.6	14.4	24	24
		Coffee	115.3	110.5	91	94.2	94.2
S. Carrión			48188	45540	41833	47075	37808
	Annual	Wheat	1806	2305	2255	2937	2728
		Potatoes	43184	38680	35343	39298	28395
		Peas	214	614	460	184	1396
		Barley	1522	1509	1600	1965	2360
		Starchy Corn	1424	2012	1997	2614	2877
		Broad Beans	38	420	178	77	52
Cajabamba			21884	27221	25902	29348	20041
	Annual	Potatoes	14690	19380	18810	18520	11380
		Wheat	1892	1573	1762	1952	1849
		Barley	735	791	866	942	912
		Hard Corn	2035	3010	2753	2780	2728
		Starchy Corn	2532	2467	1711	5154	3172
Total			119131.2	128860.9	126755.5	134767.6	9 770.2

Source: RDU Trujillo and RDU Cajamarca
Drawn up by: MACROCONSULT S.A.

The livestock activity in Alto Marañon is complementary to the agricultural activity in the peasant economy, its production being mainly for self-consumption, contributing to generate employment in the Andean areas where coca is not sown.

In the project area, there is an extensive, traditional form of cattle raising. Natural pastures are used for fodder; no genetic improvements are made, but rather an empyrical type of crossbreeding which degenerates the cattle and therefore reduces productivity. Table A.3.3. proves that sheep and beef-cattle are prominent. Also, a decreasing tendency can be observed for the different livestock species, as a result of the fact that the majority of the animals had to be sold in order to face constant price increases.

The livestock in Alto Marañon in 1989 consisted of goats (6%), sheep (58%), pigs (11%) and beef-cattle (23%).

Table A.3.3
LIVESTOCK PRODUCTION
ALTO MARAÑON
(heads of cattle)

Years	Goats	Sheep	Pigs	Beef-Cattle
1979	31,500	215,000	41,000	86,500
1980	26,000	208,000	37,000	80,000
1981	24,500	126,600	35,000	79,500
1982	23,275	186,150	34,450	70,884
1983	22,400	183,982	34,250	71,440
1984	22,120	181,700	33,448	69,978
1985	21,800	181,000	32,579	68,549
1986	20,200	181,200	32,120	68,400
1987	19,500	181,400	32,050	67,900
1988	19,200	182,000	32,000	67,440
1989	20,100	181,700	31,800	66,590

Source: Region III Planning Office,
La Libertad - San Martín
Drawn up by: MACROCONSULT S.A.

A.3.3. Yield of Coca and Other Crops

With respect to coca yields, Table A.3.4. shows uneven results, because of the different varieties of coca and the various levels of technology used.

Table A.3.4
YIELD OF COCA LEAVES: 1989
ALTO MARAÑON

	YIELD	
	(Kgs./Ha.)	(25 lb.Units/Ha.)
CAJAMARCA	500	43.5
CAJABAMBA	500	43.5
Sayapullo	500	43.5
Sitacocha	500	43.5
LA LIBERTAD	1,138	99.0
BOLIVAR	535	46.5
Bolívar	700	60.9
Bambamarca	500	43.5
Condemarca	500	43.5
Longotea	500	43.5
Uchumarca	500	43.5
Ucuncha	500	43.5
PATAZ	1,239	107.8
Tayabamba	700	60.9
Chillia	700	60.9
Huayo	700	60.9
Ongón 1/	1,500	130.4
Parcoy	700	60.9
Pataz	700	60.9
Taurija	700	60.9
Pias	700	60.9
Urpay	700	60.9
Challas	700	60.9
SANCHEZ CARRION	700	60.9
Chugay	700	60.9
Cochorco	700	60.9
Macabal	700	60.9
Sartimbamba	700	60.9
TOTAL	1,107	96.3

1/ The only district in Alto Marañon with a high technological level.

Source: MACROCONSULT S.A. Surveys.
Drawn up by: MACROCONSULT S.A.

Thus, in the province of Bolivar, the referential production indicates a productivity of 46.5 25 lb. units ("arrobas") of coca leaves per hectare.

In the province of Sanchez Carrion, productivity is 60.9 25 lb. units per hectare, and in Pataz, the average yield is 107.8 25lb. lb. units.

The greatest productivity of the Ongon district (more than double that of other areas), determines that at a provincial level, the average yield is higher than in the remaining districts, reaching 60 25 lb. units per hectare.

As indicated above, in Alto Marañon there are two levels of technology for the production of coca leaves. One of these is high, used in the district of Ongon in Pataz province, which follows the procedures used in Alto Huallaga - higher density (number of plants per hectare is greater), hilling work is done, the single crop system is used and pesticides are applied. In addition, the crop obtains the benefit of the heavy rainfall prevailing in the area.

The other technological level is low, with less density. No hilling is done and the crop is mostly a companion crop.

With respect to the productivity of other crops, we find that within each province, which is considered a mini-region, there are different groups of peasant families responsible for the number of hectares they possess. This is in concordance with the higher degree of technology used and at the same time, directly affecs the yield per hectare. A background of the main crops is detailed below (see table A.3.5.).

Potatoes

This is a traditional crop for the area, and although productivity does not reach its genetic potential, it has become the area's most important crop. The highest yield is obtained in Cajabamba, where the average yield for 1989 was 10,000 kg. per hectare.

Wheat

This is an easily handled annual crop, though it only develops within certain climatic and altitude conditions. It is cultivated in rainfed areas with a low technological level. Because of the lack of technical assistance - which could improve the implementation of culture work and lead to higher yields - farmers prefer to sow more profitable crops. The average yield in the Alto Marañon region is about 960 Kg/Ha. However, in the Bolivar area, it only amounts to 700 Kg/Ha. and in Pataz it reaches 1,200 Kg./Ha.

Table A.3.5
YIELD OF MAIN CROPS: 1989
ALTO MARAÑON
(kilos per hectare)

Province:	Crops:		1989
Bolívar	Annual	Wheat	700.0
		Potatoes	4299.1
		Barley	791.3
		Starchy corn	709.1
		Broad beans	800.0
	Permanent	Cocoa	
		Coffee	618.6
Pataz	Annual	Wheat	1200.0
		Potatoes	8900.0
		Peas	800.0
		Barley	990.0
		Hard Corn	1030.0
		Alfalfa	40000.0
		Cassava	8000.0
	Permanent	Cocoa	800.0
		Coffee	649.7
S.Carrión	Annual	Wheat	1100.0
		Potatoes	9349.7
		Peas	2299.8
		Barley	1000.0
		Starchy Corn	1050.0
		Broad Beans	2080.0
Cajabamba	Annual	Potatoes	10000.0
		Wheat	837.0
		Barley	869.4
		Hard Corn	2466.5
		Starchy Corn	1499.8

Source: RDU Trujillo and RDU Cajamarca
Drawn up by: MACROCONSULT S.A.

Barley

Like wheat, it is grown on rainfed land. with low technological levels. The Pataz and Sanchez Carrion provinces obtain the benefit of the facilities granted by Malteria Lima to producers whose yield is approximately 1,000 Kg/Ha.

Starchy Corn

This crop adapts favourably to the region's agro-ecological conditions, replacing the coastal yellow corn in staple diets. It is easy to handle and adaptable to the low level of technology used by small farmers - i.e. the vast majority of highland producers. Its yield is 1,500 Kg/Ha. in Cajabamba and 1,050 Kg/Ha. in Sanchez Carrion.

Hard Yellow Corn

This crop is grown on small plots in the hot parts of this region, both on rainfed areas and on land requiring little irrigation, with yields of 1,030 Kg/Ha. in Pataz and 2,470 Kg./Ha. in Cajabamba.

Coffee and Cocoa

These crops are grown in hot areas under irrigation, on small plots that are hard to evaluate. However, it is estimated that the average yield as far as coffee is concerned, is about 635 Kg./Ha, whereas cocoa yields between 600 Kg./Ha. in Bolivar and 800 Kg./Ha. in Pataz.

A.4 SOCIO-ECONOMIC FEATURES OF THE AREA COVERED BY THE STUDY

The area covered by this study, is mostly characterized as a depressed Andean region. Although little coca is grown in the inter-andean valleys, it acquires special importance for two reasons.

First of all, because it supplies labour for the coca production in Alto Huallaga and at the same time, the Ongon district is a crop expansion area. Secondly, the town of Urpay is operating as a liaison between Tocache and Trujillo, for the supply of inputs and as an outlet for the BCP production.

A.4.1 Population: Structure and Growth

The last census was taken in 1981, at which time the total population [illegible] amounted to 219,269 people; the rural population consisted of 84% of the total, whereas the remaining 16% corresponded to the towns located in urban areas.

Table A.4.1
DISTRIBUTION OF THE POPULATION: 1961-1981
ALTO MARAÑON

Area under Study	1961 Urban %	1961 Rural %	1961 Total inhab.	1972 Urban %	1972 Rural %	1972 Total inhab.	1981 Urban %	1981 Rural %	1981 Total inhab.
Total	14.7	85.3	188,967	15.8	84.2	201,543	16.1	83.9	219,269
CAJAMARCA	15.2	84.8	749,938	17.4	82.6	919,161	20.2	79.8	1,044,689
Cajabamba	13.6	86.4	59,788	15.7	84.3	61,279	17.1	82.9	69,441
LA LIBERTAD	41.7	58.3	582,243	60.0	40.0	783,728	65.4	34.6	960,537
Bolivar	35.3	64.7	10,116	32.2	67.8	12,072	32.3	67.7	13,005
Sanchez Carrión	14.1	85.9	64,039	14.3	85.7	77,076	14.0	86.0	83,933
Pataz	12.7	87.3	55,024	14.4	85.6	51,116	14.1	85.9	52,890

Source: Héctor Maletta & Alejandro Bardales
Perú: The Provinces in Figures 1876 - 1981.
Drawn up by: MACROCONSULT S.A.

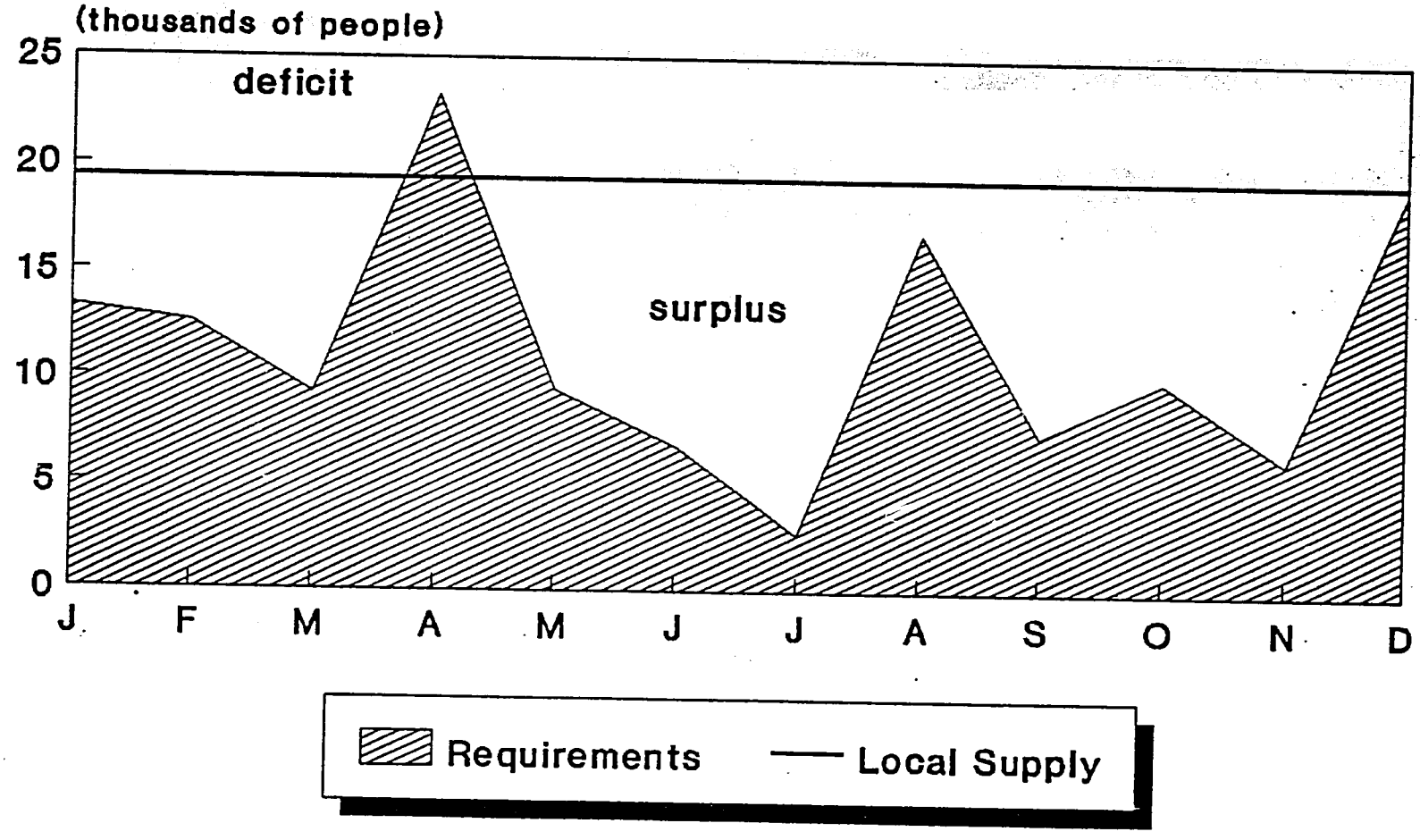
Table A.4.2
POPULATION: GROWTH AND DENSITY: 1980 – 1990
ALTO MARAÑON

AREA UNDER STUDY	POPULATION 1980	POPULATION 1990	ANNUAL GROWTH RATE 1980-1990	AREA (Km2)	DENSITY (Pop/Km2) 1980	DENSITY (Pop/Km2) 1990
TOTAL	132,520	149,107	1.19	7508.69	17.65	19.86
CAJABAMBA	15,851	20,221	2.46	829.61	19.11	24.37
Sayapullo	7,800	10,049	2.57	239.67	32.54	41.93
Sitacocha	8,051	10,172	2.37	589.94	13.65	17.24
BOLIVAR	13,883	15,978	1.42	1718.86	8.08	9.26
Bolívar	3,779	4,127	0.88	740.58	5.10	5.57
Bambamarca	2,636	3,166	1.85	165.20	15.96	19.16
Condomarca	1,918	1,898	-0.10	331.26	5.79	5.73
Longotea	1,639	1,899	1.48	192.88	8.50	9.85
Uchumarca	2,834	3,615	2.46	190.53	14.87	18.97
Ucuncha	1,077	1,273	1.69	98.41	10.94	12.94
PATAZ	47,694	50,199	0.51	3661.93	13.02	13.71
Tayabamba	10,844	10,631	-0.20	339.13	31.98	31.35
Buldibuyo	3,729	3,877	0.39	130.09	28.66	29.80
Chillia	8,629	9,276	0.73	300.04	28.76	30.92
Huancaspata	6,157	5,579	-0.98	99.61	61.81	56.01
Challas	2,528	3,199	2.38	129.44	19.53	24.71
Huayo	3,204	3,360	0.48	124.63	25.71	26.96
Ongón	1,915	1,878	-0.19	1394.89	1.37	1.35
Parcoy	6,232	6,968	1.12	304.99	20.43	22.85
Pataz	2,960	3,963	2.96	467.44	6.33	8.48
Pias	1,496	1,468	-0.19	371.67	4.03	3.95
SANCHEZ CARRION	55,092	62,709	1.30	1298.29	42.43	48.30
Huamachuco	27,299	30,927	1.26	229.57	118.91	134.72
Chugay	11,936	14,409	1.90	416.31	28.67	34.61
Cochorco	6,433	8,066	2.29	258.04	24.93	31.26
Sartimbamba	9,424	9,307	-0.12	394.37	23.90	23.60

Source: Population Projections by Calendar Years, by departments, provinces and districts 1980-1990. INEI.
Peru in Figures 1990. Cuánto S.A.
Drawn up by: MACROCONSULT S.A.

Graph A.2

BALANCE OF LABOUR: 1989
ALTO MARAÑON



Source: INEI, MACROCONSULT S.A.
Drawn up by: MACROCONSULT S.A.

Table A.4.1. shows that the structure of the population has been maintained since 1961, in other words, the Alto Marañon area continues to be predominantly rural.

The Pataz province consists of both Andean and jungle areas and it also has the most densely populated districts, in which coca is produced. On the other hand, the density of the population in Ongon is low, despite the fact that it has the highest coca leaf production. This is explained, among other factors, by its large expanse of land and by the seasonal migration to nearby districts (see table A.4.2).

Within the rural scope, Pataz and Sanchez Carrion provinces contain the highest proportion of the population, who dedicate themselves to farming as their only means of survival.

Table A.4.3
ECONOMICALLY ACTIVE POPULATION: 1980-1989
ALTO MARAÑON

Province:	TOTAL EAP		EAP in Farming	
	1980	1989	1980	1989
Cajabamba	21,011	25,975	16,184	18,906
Bolívar	4,165	5,010	1,846	1,938
Pataz	16,338	18,119	7,243	7,008
Sánchez Carrión	25,897	30,329	11,481	11,969
Total	67,411	79,433	36,754	39,821
Growth rate (%)		1.8		0.9
National	5,586,500	7,429,900	2,223,400	2,550,700
Growth rate (%)		3.2		1.5

Source: Evolution of the Peruvian Population during the 80's.
Special Bulletin No.12. Peru: Population Projections by Calendar Years by Departments, Provinces and Districts 1980-1990. INEI.
Drawn up by: MACROCONSULT S.A.

The Economically active population over 15 years of age increased at an annual rate of 1.8% during the 1980 - 1989 period, from 67,411 people to 79,433; the EAP in the farming sector has increased at a lower rate of 0.9%, which implies an increse of some 3,000 workers. Pataz

is an exception, as its EAP in farming has decresed, probably as a result of migration to Alto Huallaga (see table A.4.3). In both cases, growth rates are lower than the national average.

Despite the fact that this is a predominantly rural area, there has been a dynamic development of its economic activites.

EAP estimates were based on the department's EAP/departmental population, multiplied by the population in each province.

A.4.1.1. Migration

Within the scope of the study, the migratory phenomenon should be analyzed from two points of view. The provinces of Sanchez Carrion, Bolivar and Cajabamba show a tendency towards the expulsion or emigration of the population to the town of Trujillo, which is attractive because of its higher degree of development as a regional urban centre and because of the employment potential for the excess population in the tertiary sector and in the expanding agroindustrial sector.

Pataz also attracts migrants from these provinces for the farming and mining activities and above all for the coca industry. The migratory flow has expanded into the drug-traffing areas in Huallaga, such as Monzon, Uchiza and Tocache.

A.4.2. Labour force involved in coca leaf production

In the Alto Marañon area, the demand for labour for coca cultivation is 198 daily labourers per annum per hectare, which only involves crop maintenance. A schedule for the development of culture work and harvesting of coca leaves, by monthly labour requirements, is shown in Table A.4.4.

Considering that there are a total of 9,766 hectares, the number of daily labourers required for each harvest, which takes place during April, August and December in Alto Marañon, are 371,108. Thus, supposing that a peasant works 22 days per month and that each one represents one day's labour,the demand for labour during the harvest months amounts to 16,869 people, whereas the labour requirements for culture work varies between 2,600 and 5,300 people (see Tables A.4.5 and A.4.7).

It should be pointed out that the crop that demands the most culture labourers is coca and that in the areas under study, it is a source of financing for other crops as well as sustenance for family units, since there is a demand for employment all year round. Coca is the only crop that requires labour in July and August, and in general it predominates during over half of the year (see Table A.4.7).

Table A.4.4
LABOUR REQUIREMENTS: 1989
ALTO MARAÑON
(daily labourers per hectare)

CROPS	J	F	M	A	M	J	J	A	S	O	N	D	Total
Barley	4	2	1	6	17	10	-.-	-.-	-.-	-.-	-.-	-.-	40
Hard corn	14	14	15	15	1	-.-	-.-	-.-	-.-	-.-	9	13	81
Wheat	10	13	2	9	-.-	-.-	-.-	-.-	-.-	5	6	-.-	45
Potatoes	6	4	15	-.-	-.-	-.-	-.-	-.-	7	12	1	4	49
Subtotal	34	33	33	30	18	10	0	0	7	17	16	17	215
Coca	12	10	6	38	12	10	6	38	12	10	6	38	198
Total	46	43	39	68	30	20	6	38	19	27	22	55	413

Source: MACROCONSULT S.A. Surveys, 1990. ENACO, Peruvian Agrarian Bank's Basic Budgets.
Drawn up by: MACROCONSULT S.A.

Table A.4.5
TOTAL DAILY LABOURERS REQUIRED BY CROPS
ALTO MARAÑON
(total working days)

CROPS	J	F	M	A	M	J	J	A	S	O	N	D	Annual Total
Barley	20836	10418	5209	31254	88553	52090	0	0	0	0	0	0	208360
Hard corn	25284	25284	27090	27090	1806	0	0	0	0	0	16254	23478	146286
Wheat	90990	118287	18198	81891	0	0	0	0	0	45495	54594	0	409455
Potatoes	37842	25228	94605	0	0	0	0	0	44149	75684	6307	25228	309043
Subtotal (a)	174952	179217	145102	140235	90359	52090	0	0	44149	121179	77155	48706	1073144
Coca (b)	117192	97660	58596	371108	117192	97660	58596	371108	117192	97660	58596	371108	1933668
Total (c)	292144	276877	203698	511343	207551	149750	58596	371108	161341	218839	135751	419814	3006812
Working days (d)	22	22	22	22	22	22	22	22	22	22	22	22	264
Monthly Demand (a/d)	7952	8146	6596	6374	4107	2368	0	0	2007	5508	3507	2214	4065
Monthly coca Demand (b/d)	5327	4439	2663	16869	5327	4439	2663	16869	5327	4439	2663	16869	7325
Total monthly Demand (c/d)	13279	12585	9259	23243	9434	6807	2663	16869	7334	9947	6171	19082	11389

Source: MACROCONSULT S.A. Surveys, 1990. ENACO, Peruvian Agrarian Bank's Basic Budgets.
Drawn up by: MACROCONSULT S.A.

Table A.4.6
STRUCTURE OF DAILY LABOUR REQUIREMENTS: 1989
ALTO MARAÑON

	Legal Crops (%)	Coca (%)	Total Working Days
J	59.9	40.1	292,144
F	64.7	35.3	276,877
M	71.2	28.8	203,698
A	27.4	72.6	511,343
M	43.5	56.5	207,551
J	34.8	65.2	149,750
J	0.0	100.0	58,596
A	0.0	100.0	371,108
S	27.4	72.6	161,341
O	55.4	44.6	218,839
N	56.8	43.2	135,751
D	11.6	88.4	419,814
Total	35.7	64.3	3,006,812

Source: MACROCONSULT S.A. Surveys, 1990, BAP's Basic Budgets, INEI, ENACO.
Drawn up by: MACROCONSULT S.A.

Table A.4.7
BALANCE OF LABOUR: 1989
ALTO MARAÑON
(number of labourers required)

Month	Demand of Labour: Legal Crops	Coca	Total	Local Supply 1/	Balance
J	7,952	5,327	13,279	19,373	6,094
F	8,146	4,439	12,585	19,373	6,788
M	6,596	2,663	9,259	19,373	10,114
A	6,374	16,869	23,243	19,373	(3,870)
M	4,107	5,327	9,434	19,373	9,939
J	2,368	4,439	6,807	19,373	12,566
J	0	2,663	2,663	19,373	16,710
A	0	16,869	16,869	19,373	2,504
S	2,007	5,327	7,334	19,373	12,039
O	5,508	4,439	9,947	19,373	9,426
N	3,597	2,664	6,171	19,373	13,202
D	2,214	16,869	19,083	19,373	291

1/ EAP age 15 and over.

Source: MACROCONSULT S.A. Surveys, 1990, BAP's Basic Budgets, INEI, ENACO.
Drawn up by: MACROCONSULT S.A.

Using the same methodology to estimate the coca crop's labour requirements, estimates were made of the four main crops in the region. During peak months, 8,146 people are required, the most intensive labour demands being for hard yellow corn.

Making a balance between the available supply of labour - the EAP in farming in the four provinces - and the demand for labour, we can appreciate in Table A.4.7 (and graph A.2) that there is labour surplus throughout the year, except in April when the coca harvest takes place at the same time as the yellow corn, barley and wheat harvests. This can easily be covered by labourers from nearby farms. On the other hand, as a result of the surplus labour, unemployed workers are migrating to the Ongon and Huallaga areas.

This is related to the fact that other legal crops such as corn, wheat and potatoes are rainfed crops and culture work is only carried out during rainy seasons. The EAP is unemployed during dry seasons, for approximately 4 to 6 months.

Table A.4.5. shows the average annual requirement for 70% of the production (11,389 workers), since the remaining 30% correspond to various crops grown for self-consumption in family units.

A.4.3. Potential Labour

If we consider the potential area for coca, estimated at 4,757 Has., a monthly average of 3,568 additional farm labourers would be required. This result was obtained by multiplying the number of annual daily labourers by the number of new hectares, divided by the days worked each year, which can easily be obtained from the actual rural EAP and the nearby population who are seasonally unemployed due to poor crop diversification. During harvest months, monthly labour requirements would amount to 8,217 people.

However, the little attention paid to these areas by the Government, and the strengthening of terrorism, could lead to a more rapid transfer of the population to Ongon province for coca production, since the remaining areas have soil and climate difficulties. If the area growing potatoes and wheat was to be reduced by 50% due to the above reasons, 22% of the daily labourers dedicated to legal crops would become available. This would mean that without putting any pressure on the demand for labour, the number of hectares growing coca could have increased by 1,814 hectares in 1989, i.e. 38.1% of the hectares available for expansion.

In the case of the increase in the EAP in the farming sector, this basically tends to cover the labour deficit in Huallaga, since in general, Alto Marañon has a surplus. If the tendency shown during the 80s was maintained, i.e. if the growth rate continued at 0.8%, the EAP age 15 and over during a decade would amount to 42,828 people, exceeding the labour requirements for

all crops except for the peak period in April. Because of the above, it is unlikely that there will be a rapid increase in the EAP.

A.5 DIAGNOSIS OF THE MAIN CROPS PRODUCED AND MARKETED IN THE AREA COVERED BY THE STUDY

In the Alto Marañon valley, most of the main crops - for which registered information is available - are typical highland crops, potatoes, wheat, starchy corn, yellow hard corn and barley being outstanding.

In the Selva Alta (higher jungle region) there is no forestry activity except for lumber, however this type of activity could be carried out in the part that is not under the control of the Quillabamba Forestry Administration. There is an abundant extraction of palmetto in Ongon, for local consumption.

In the first place, we will make a situation analysis of the productive surroundings comprised in these micro-regions within the departments of La Libertad and Cajamarca, which are currently cultivated with coca leaves.

Below we shall analyse some of the indicators of the productive surroundings.

A.5.1 Production Problems

Peasant farmers in this area maintain an incipient, small-scale technology and face undulating geographical features which prevent them from expanding their farms. Moreover, they lack financial assistance.

A.5.1.1. Technical Assistance

Extremely low levels of technology are used in agricultural activities, influenced by the lack of technical assistance which limits soil improvement.

This lack of technical assistance is expressed by the non existence of training or farming extension centres in which pleasants can be taught to handle their lands properly, improve irrigation and use the crop rotation system. This knowledge would enable them to obtain income on the one hand, and on the other, preserve the natural fertility of their soils.

From a technological aspect, the level of the Pataz and Bolivar provinces in the department of La Libertad are characterized by the fact that mechanical energy is not used, there is a lack of selected seeds, tractors are not used, chemical and synthetic fertilizers are not applied, and there is a shortage of veterinary assistance.

Furthermore, there are no centres providing improved seeds for the main crops, nor programmes to control plagues and diseases, aggravated by the high cost of pesticides, which producers cannot afford.

The lack of credit assistance and the high cost of inputs, forces the majority of farmers to defer the lands on which they sow annual crops, so that these may be fertilized naturally.

A.5.1.2. Credit

Since the basic goods package mainly consists of Andean crops, credit availability to finance sowing is practically nil, owing to the Agrarian Bank's shortage of funds and the insecurity of loan recovery, due to the small yields produced by small-scale farmers.

Table A.5.1. shows the area for which the Agrarian Bank has advanced money (1989) in these provinces. In Sanchez Carrion this involves 65% of the total cultivated area, though it should be emphasized that in the case of potatoes, the areas for which farming credits have been obtained are double the size of the harvested area, which could mean that the final destination of this finance could be for other crops or other activities. In the case of Cajabamba, farming credits have been assigned to only 16% of the cultivated area. With respect to Pataz and Bolivar, the presence of the Agrarian Bank is insignificant, since farming credits in Pataz are equivalent to 4% of the total number of cultivated hectares in this region, whereas in Bolivar they are non existent, since the BAP agency in Celendin is not working with the province of Bolivar (although it is part of its jurisdiction) due to its lack of funds.

Thus, the low production level in these areas becomes more acute, because of the lack of support from credit institutions. This has negatively affected the welfare of the producer, who choses to defer his lands and enter into the coca regions as a temporary migrant. As a wage earner, he can then obtain income to sustain his family (who remain in the higher parts, growing crops for their daily sustenance). Occasionally, he becomes established as a temporary producer, to obtain considerably higher income from coca leaves, which will even help him to finance the crops on his farms in the higher Andean areas.

The shortage of working capital is a factor that limits production because it prevents available lands from being used for legal crops. It also prevents the improvement of productivity levels, since the use of better technology also implies higher costs.

A.5.1.3. Costs and Profitability

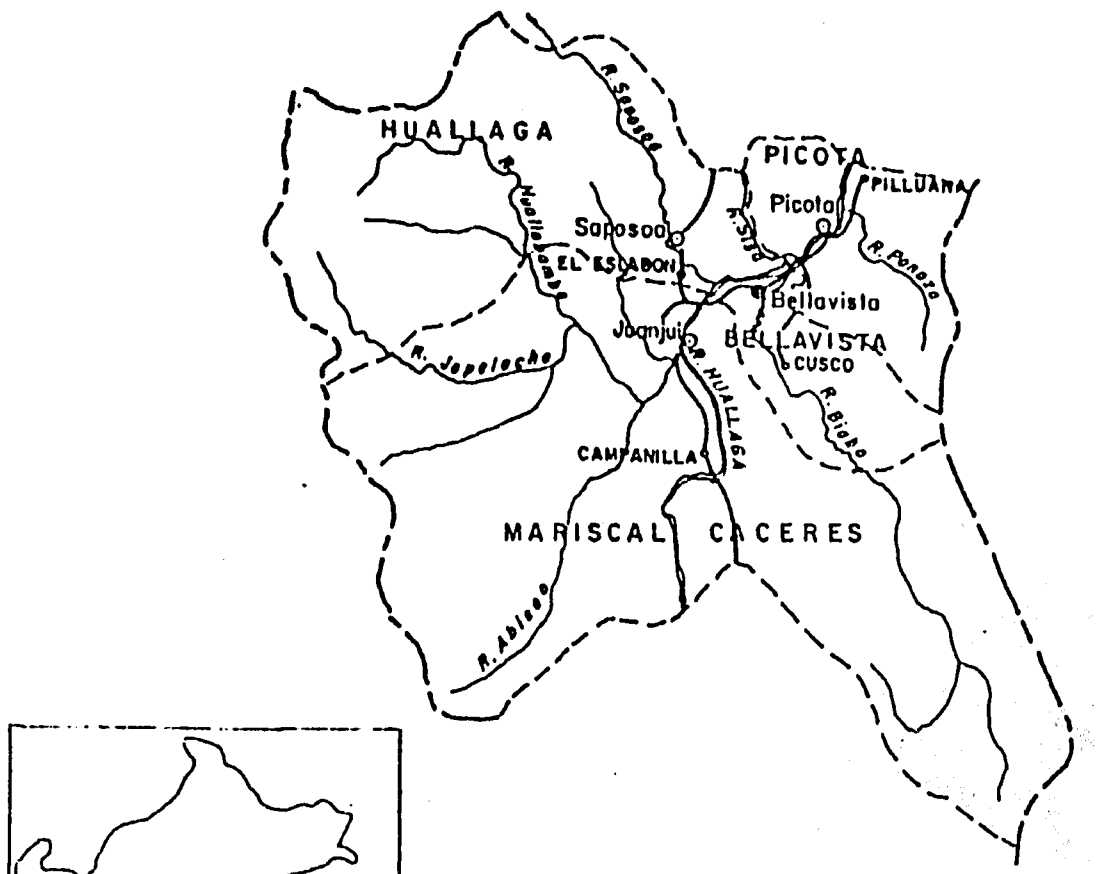
The information available for these crops considers the use of technology (t1, high and t2, medium), however in this area it is common for the same products to be cultivated with low technology (t3, intensive labour).

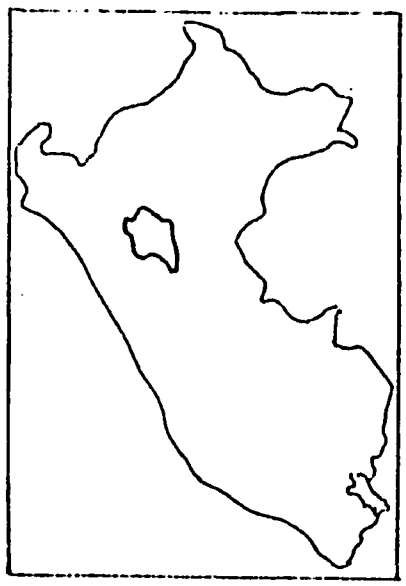
Table A.5.1
AREA FINANCED BY THE BAP: 1989
ALTO MARAÑON

CROPS	(1) Total Areas (Has.)	(2) Credit Area (Has.)	% (2)/(1)
SANCHEZ CARRION			
Peas	607	86	14
Sugar cane	45	28	62
Barley	2360	478	20
Beans	25	4	16
Broad beans	25	7	28
Yellow corn	-	952	-
Starchy corn	2740	2003	73
Potatoes	3037	6485	214
Wheat	2480	1450	58
Cassava	20	10	50
Others	6475	3	0.0
Total	17814	11506	65
PATAZ			
Peas	300	75	25.0
Barley	500	12	2.4
Beans	20	15	75.0
Starchy corn	1000	8	0.8
Potatoes	1500	37	2.5
Wheat	2500	102	4.1
Total	5820	249	4.3
CAJABAMBA			
Peas	1151	45	3.9
Barley	1049	14	1.3
Beans	-	17	-
Yellow corn	1106	28	2.5
Starchy corn	2115	148	7.0
Potatoes	1138	719	63.2
Wheat	2209	179	8.1
Others	-	295	-
Total	8768	1445	16.5

Source: RDU Trujillo, RDU Cajamarca, Peruvian Agrarian Bank.
Drawn up by: MACROCONSULT S.A.

ZONE B : CENTRAL HUALLAGA





ANALYSIS OF COCA AND MAIN LEGAL CROP PRODUCTION IN FOUR UPPER JUNGLE REGIONS OF PERU

ZONE B : CENTRAL HUALLAGA

SOURCE: Physical Political Road Map of Perú NG-I
SCALE: I: 2'200,000
DATE: December 1990

CONVENTIONAL SIGNS

DEPARTMENTAL CAP.	◎
PROVINCIAL CAP.	○
DISTRICT CAP.	∘
INTERNATIONAL BORDER	– – ——— – –
DEPARTMENTAL BORDER	——— – ———
PROVINCIAL BORDER	– – – – –
PAVED ROAD	———
UNPAVED ROAD	———

The profitability analysis has been carried out taking into consideration the structure of the Agrarian Banks's basic budget for 1989 and 1990. However, it should be pointed out that in 1989, prices of fertilizers and certain imputs such as fuel were subsidized, causing distortions in the analysis, particularly for crops that use medium and high technology. It is therefore considered that when there is a discrepancy the 1990 budgets should be considered as being more representative.

Table A.5.2
COST SUMMARY AND PROFITABILITY ANALYSIS
ALTO MARAÑON 1/
(thousands of intis)

	COCA 3/ t1	COCA 3/ t3	BARLEY t2	CORN t1	POTATOES t1	WHEAT t2
Price	818	393	75	140	35	70
Yield (kg/ha)	1,500	530	2,000	3,000	15,000	1,200
NET INCOME	1,227,522	208,083	150,000	420,000	525,000	84,000
Direct Cost	564,696	182,566	110,000	323,850	369,900	48,470
- Labour	60.0%	54.1%	34.5%	34.8%	11.5%	78.9%
- Inputs	40.0%	32.7%	65.5%	65.2%	88.5%	21.1%
- Others	0.0%	13.2%	0.0%	0.0%	0.0%	0.0%
Indirect Cost	-	-	-	-	-	-
Financial Cost 2/	-	-	27,038	40,103	47,171	4,898
TOTAL COST	564,696	182,566	137,038	363,953	417,071	53,368
PROFITABILITY INDEX	117.4%	14.0%	9.5%	15.4%	25.9%	57.4%
ACCOUNTING PRICE	376	344	69	121	28	44

t1 = High technical level
t2 = Medium technical level
t3 = Low technical level

1/ Annual cost per ha/year. Exchange rate al the time was I/.430,000.
2/ Interest rate to be deducted.
3/ Dry coca leaf.

Source: BAP, MACROCONSULT S.A. Surveys, 1990
Drawn up by: MACROCONSULT S.A.

These factors affect the profitability of legal crops, since although they have a positive index, it does not represent the majority of the crops.

Thus, it is important to mention that the the technological levels considered by the Agrarian Bank are only found on small plots within the region, since most of the areas growing corn, potatoes, barley or wheat are rainfed slopes with low technology, which considerably reduces yields (see Table A.5.2.).

As far as the profitability of coca is concerned, in Pataz, district of Ongon, under high technology (t1) the index is equivalent to 117.4%. Even at this technological level, mainly characterized by densely sown fields and the application of insecticides, rather than the use of fertilizers, production costs are relatively low, except for labour. Among other things, this is due to the lands being new and therefore do not require significant amounts of fertilizers and because the input supply centre is close by, therefore prices are not affected by freight. In this area, the coca selling price amounts to I/.818,348/kg.

In the Bolivar region, with a low technological level, the index is also positive, but significantly lower than in Ongon. In that province coca leaf production is quoted at an average selling price of I/392,609/kg.

As regards the structure of the total productive work, labour requirements represent 60% and 54% of total direct costs, respectively, for technological levels t1 and t3.

It can therefore be appreciated that coca has as many advantages as in other areas. In general, all crops are profitable, but considerably lower than the profitability of the coca production in Ongon, the only area in Alto Marañon where a high level of technology is used. Furthermore, its prices are much higher than the remaining crops and its market is assured. In the case of legal crops, the market is assured for barley, since its production supplies a malt factory in Lima.

As far as interest rates are concerned, it should be pointed out that during the last five years, loans made by the BAP had subsidized interests which were well below real financial costs; since August 1990, these have acquired real levels, which for the case of this analysis has been calculated at a real monthly interest of 2%.

A.5.2. Marketing Problems

Due to the low productivity of legal crops, these being mostly basic crops for self-consumption, we refer to the marketing of the region's main export product: potatoes.

The marketing of this crop is characterized by the following:

a) Potato exports to other regions, which amount to 35% of the area's production, could increase to 40% if we consider the estimates made by ENCA.

b) Over 80% of production is harvested during the first months of the year, mainly between February and May, which indicates its strong seasonal nature and its progress compared to other potato producing areas. The production in Sanchez Carrion is harvested two or three months before the bulk of the national production of this crop in the central highlands and in the southern part of the country; the same occurs with respect to the production of its main competitors on the Trujillo market.

This is fundamental for the analysis of the marketing problems suffered by this crop, since it shows the poor supply existing on the coastal market at the time production from these areas is offered, therefore higher prices can be obtained.

c) Practically all micro-regional exports flow towards the city of Trujillo and take second place in the annual supply, with approximately 37% of the total, after Otuzco, which supplies 50% of Trujillo's demand.

During the months in which the bulk of the micro-regional production is marketed, the supply has a clear advantage in the Trujillo market, which should have positive effects on the local farmers' income.

A.5.2.1. Marketing Channels

The following is the intermediation system for the potato crop:

a) The bulk of the export production is purchased from the farms by local suppliers or transport merchants, for resale to wholesalers in the city of Trujillo.

According to conversations held with producers in the area, 45% of the local production aimed at the extra-regional market is sold to local suppliers and 37% to transporters, mostly alien to the region, who arrive at harvest time.

As far as local suppliers are concerned, it should be pointed out that the method used is that the production is purchased on site from small farmers, packaged, and classified. When there is enough to fill a truck, one is chartered and the production is sent to Trujillo. Until that time, the product remains on the farm, which explains the precarious or non-existent storage infrastructure in the micro-region. Consequently, classification, packaging and storage services are assumed by the producer.

b) The cost of services, such as intermediation and transport for example, between the micro-region and the city of Huamachuco, involves a price increase which varies between 30% and 45%, 15% of which corresponds to freight.

As a result, the middleman obtains a benefit of between 15% and 30% above the farm price, for a simple, hardly risky activity which takes little time, therefore the return on capital investment takes between 3 and 7 days.

A.5.2.2. Road Infrastructure

In the area covered by this study, there is a very defficient system of road infrastructure, connections between towns being very poor. Present highways are rough coach roads that are never maintained, therefore transport costs are higher and it is impossible to develop this area.

Thus, in the Pataz province - the main production centre in Alto Marañon - is connected to the coast via the highway to Trujillo. The Otuzco-Quiruvilca-Huamachuco-Aricapampa-Buldibuyo-Tayabamba- Huacrachuco detour that crosses the coast and the highlands in the Pataz province, connects the different settlements lengthwise. Only the original 36 kms. of this road are hard-top, whereas the remaining 398.4 kms. are unpaved.

Because of the poor conditions of the wearing surface, a trip between Trujillo and Huamachuco, which should take a maximum of 5 hours, takes between 12 and 15 hours because of the appalling state of the road.

The province of Bolivar, despite the fact that it belongs to the department of La Libertad, is only joined to the province of Celendin in the department of Cajamarca, by a 126.6 km. dirt road which links that city with Balzas, in Celendin's coca area. The distance from the Balzas detour to Celendin is approximately 55 kms.

The city of Cajabamba is joined to the city of Cajamarca by a good, unpaved road.

The distance between Cajabamba-Trujillo via Cajamarca is 418.5 kms., of which 295 km. are hard-top and 123.5 km. are unpaved.

The Cajabamba-Trujillo stretch via Huamachuco, is 231 kms.long, of which 35 kms. are hard-top. The rest of the road is not recommendable for permanent transport, because of poor maintenance and its bad state.

In addition to the above structure, the towns are joined by a heterogeneous network of bridle paths that join the different settlements with main roads. Some of the regions are connected by clandestine airports which makes it possible to reach the coast in a short time and to carry out illegal trading (marketing of BCP).

This is the case in Ongon, Urpay, Taurija and the vecinity of Huamachuco, where a regular system of aerotaxis has been established, which links these areas with the Trujillo airport.

Transport costs directly affect the marketing of the region's export products. The main freights paid are shown in Table A.5.3.

The high cost of these freights limits the expansion of the farming activity, since it makes direct marketing difficult. Producers are forced to sell their products "on site", consequently obtaining less returns, because of their inferior negotiating powers compared to the suppliers who possess their own transport.

Table A.5.3
MAIN ROAD TRANSPORT COSTS: November 1990
ALTO MARAÑON

ROUTES			Thousands of Intis/M.T.
Cajabamba	-	Cajamarca	5000
Trujillo	-	Cajamarca	10000-12000
Cajabamba	-	Trujillo	15000
Tayabamba	-	Trujillo	80000-100000

Source: MACROCONSULT S.A. Surveys, 1990
Drawn up by: MACROCONSULT S.A.

A.6. NATURAL RESOURCES AND CONTAMINATION

A.6.1. Contamination from Agrochemicals

Insecticides, herbicides and fungicides which harm the environment, are used on coca. The most widely used products are GRAMOXONE (herbicide) THIODAN (insecticide) and BAYFOLAN (fertilizer). These products end up in the rivers and their tributaries or in the soils, thus affecting the flora, fauna and hydrobiological resources.

A.6.2. Contamination from the Processing of Basic Cocaine Paste

River contamination produced by the use of chemicals and other inputs that affect the ecology in the area can be appreciated, considering the requirements for the maceration stage in the preparation of basic cocaine paste, according to Marc Dourojeanni.

These are:

Kerosene	18 ts. x 115 kgs. of coca (10a)
Sulphuric Acid	10 lts. x 115 kgs.
Potassium Carbonate	5 kgs. x 115 kgs. (raw lime)
Carbide	1 kg. x 115 kgs.
Toilet Paper	5 kgs/ x 115 kgs.

This means that in order to process the 10,523,000 kgs. of coca produced during 1990 in Alto Marañon, the following have been used:

Kerosene	1.647,078 lts.
Sulphuric Acid	915,043 lts.
Pottasium Carbonate	457.522 kgs.
Carbide	91.504 kgs.
Toilet Paper	457,522 kgs.

This affects the river species as well as the population in the region.

B. CENTRAL HUALLAGA

B.1 INTRODUCTION

The area of this study corresponds to Central Huallaga and the regions of Tarapoto and Bajo Huallaga. The entire area is located in the department of San Martin. Cartographically, it is located between meridians 75 30'00" and 77 30'00" longitude west and between parallels 6 30'00" and 7 30'00" latitude south. It covers an area of approximately 34,900 Km2.

Politically, the area covered by this study consists of 46 districts belonging to the provinces of Mariscal Caceres, Huallaga, Bellavista, Picota, San Martin and Lamas.

Towards the south, the border with Alto Huallaga is determined by the Sion Canyon. A complex chain of valleys formed by river tributaries forms an important part of the region's wealth. The most important river valleys are: Huayabamba, Saposoa and Sisa. All of these are located on the left bank of the Huallaga river and are directly connected with the Marginal Highway. On the other hand, the Biabo, Ponasa and Pilluana river valleys are located on the right bank.

From a hydrographic point of view, the river Cumbaza in the Bajo Mayo sector is located in the northern part of this area, where Tarapoto, the main urban centre, is located. Close by is the Bajo Huallaga region, connected via the river, after passing through Pongo de Aguirre.

The predominant climate in these valleys is dry and warm, characteristic of lower areas such as Juanjui, Saposoa, Bellavista, Picota. Rainfall varies between 800 mm and 1000 mm per annum. Average temperatures are 26 C and altitudes vary between 300 and 400 m.a.s.l. The higher parts of the valleys are characterized by rainfall of between 1000 mm and 1800 mm., with temperatures varying between 24 C and 26.8 C, and altitudes exceeding 1000 m.a.s.l.

On the other hand, as far as economic matters are concerned, it should be pointed out that the State's presence has influenced the consolidation of Central Huallaga, first of all through the construction of the Olmos-Corral Quemado-Tarapoto highway, then the Tarapoto-Juanjui highway, and due to the presence of State institutions and companies such as the Agrarian Bank, ENCI, ECASA, as well as others of a private nature.

At the present time State presence is limited; the Departmental Corporation and the Special Central Huallaga and Bajo Mayo Project have come to a standstill.

The political situation in the area is very unstable, since for the last three years, two subversive groups are competing to obtain control of the region. This in turn is an important factor for the expansion or consolidation of drug-trafficking activities in the area.

Added to this political instability, farmers find themselves in a critical situation, overcome by their debts. All this causes much uncertainty in the region.

B.2. IDENTIFICATION AND QUANTIFICATION OF AREAS GROWING COCA AND LEGAL CROPS

In the Central Huallaga region, there are annual crops and permanent crops. Table B.2.1. identifies the main crops in the study area. In general, the region specializes in annual crops, mainly rice and hard yellow corn. Equally significant are beans, sorghum and cassava. As regards permanent crops, bananas, cocoa and coffee are important, besides coca, which is cultivated in every province.

Table B.2.1
IDENTIFICATION OF THE REGION'S MAIN CROPS
CENTRAL HUALLAGA

Province	Juanjui	Saposoa	Bellavista	Picoia	Tarapoto	Lamas 1/	Bajo Huallaga
Annual:							
Hard Yellow Corn	*	*	*	*	*	*	*
Rice	*	*	*	*	*	-.-	*
Grain Sorghum	*	-.-	*	*	*	-.-	-.-
Beans	*	*	*	*	*	*	*
Cassava	*	*	*	*	*	*	*
Cotton	*	*	-.-	*	-.-	-.-	-.-
Peanuts	*	*	-.-	*	*	*	-.-
Soya	*	-.-	*	*	*	-.-	-.-
Dark Tobacco	-.-	-.-	-.-	*	*	-.-	-.-
Virginia Tobacco	-.-	-.-	-.-	-.-	*	-.-	-.-
Permanent:							
Bananas	*	*	*	*	*	*	*
Cocoa	*	*	*	*	*	*	-.-
Citrus Fruits	*	*	*	*	*	-.-	-.-
Coffee	-.-	*	*	*	*	*	-.-
Coca	*	*	*	*	*	*	*

* Cultivated
-.- Not cultivated
1/ In Lamas only the Alto Sisa area has been considered
Source: Ministry of Agriculture Statistics. XIII DAU. San Martin
Ministry of Agriculture, Sectoral Statistics Bureau. Lima
Production by Provinces: INADE, APODESA
Evaluation Study, Natural Resources and Enviromental
Protection Plan of the Central Huallaga and Bajo Mayo Project, ONERN, 1984
Drawn up by: MACROCONSULT S.A.

B.2.1. Areas producing Coca

The coca production areas in the Central Huallaga region are exclusively illegal and predominate over legal crops. Coca- growing areas involve 38% (see graph B.1) of the total number of sown hectares in the region. Sown areas are shown in Table B.2.2., in accordance with the methodology used in this area.

The total area on which coca is cultivated, amounts to at least 45,000 has. and a maximum of 63,000 has. The existence of minimum and maximum figures is due to the strong increase in coca plantations during 1987, 1988 and 1989, during which time the proper follow-up and quantification instruments have not been available, therefore respective margins must be established.

At a provincial level, coca areas with the most coverage are Mariscal Caceres, Bellavista, Huallaga and Picota, in that order. 85% of the hectares on which coca is grown are concentrated in these four provinces. The remaining 15% are in the vecinity of the Central Huallaga, i.e. San Martin and Bajo Huallaga.

As regards areas and sub-basins, the following should be mentioned:

Huayabamba River

Coca growing areas are located along the lower slopes of the hills close to Pachiza, Huicungo, Alejandria, Providencia, Santa Rosa, Santa Barbara, Arica and Dos de Mayo. This influence continues upstream.

By the same token, there are coca-growing areas by the river Jelache and in areas surrounding the Pajaten and Aviseo rivers, tributaries of the Huayabamba river. Based on testimonies obtained in the area, it can be assumed that there are clandestine airports used to transport BCP.

Of the region under analysis, the sub-basin of the Huayabamba region has the most coca plantations, amounting to approximately 10,000 to 15,000 hectares. These crops are planted in rows at a distance of 1 metre, each row has a 30x30 cm pit that houses approximately three plants. The distance between plants in the same pit is 30 cm and between plants in the next pit 70 cm. The predominant characteristic in the area is the density, approximately 30,000 plants/Ha.

Huallaga River

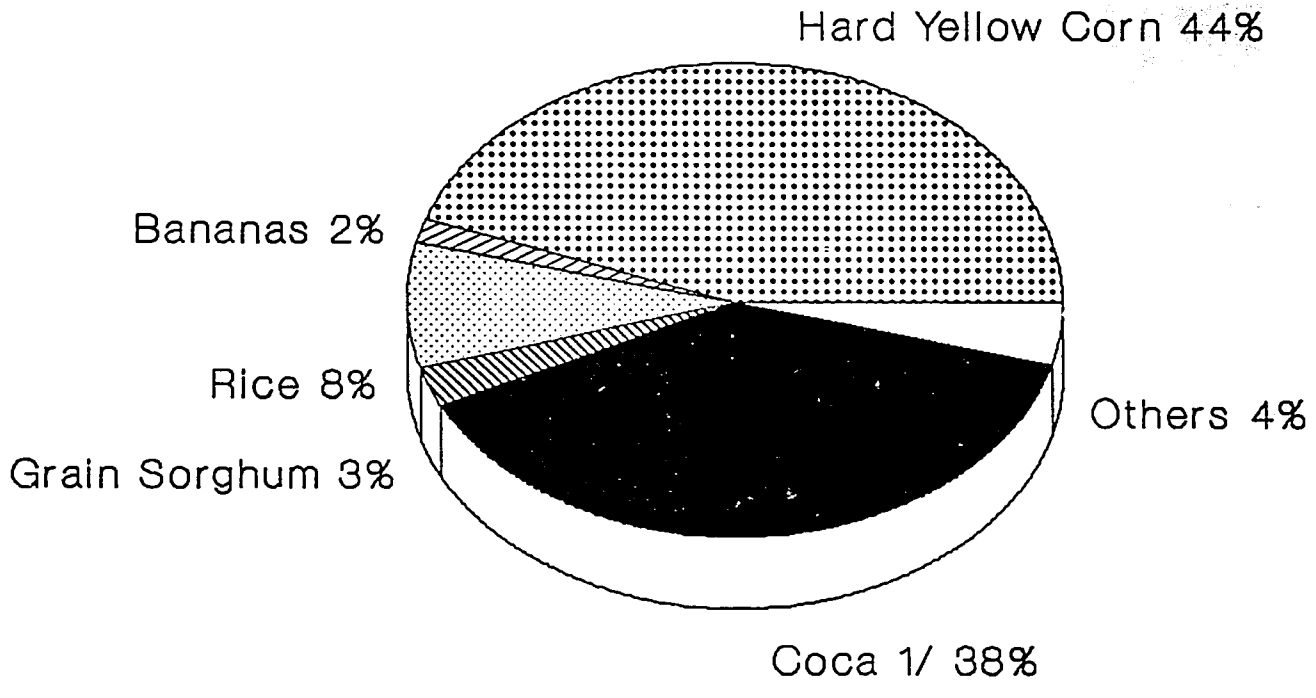
Coca areas are located along the marginal highway, at a distance of 2 to 4 km., downstream from Campanilla as far as the area neighbouring Juanjui. This area is flat and is influenced by

Table B.2.2
IDENTIFICATION AND ESTIMATES OF AREAS GROWING COCA
CENTRAL HUALLAGA
(hectares)

Provinces	RDC*	Place	Coverage Sub-basins	Hectares w. coca Minimun	Maximun
MARISCAL CACERES	JUANJUI			15,000	20,000
		- Pachiza - Huicungo - Alejandria - Santa Rosa - Arica - Dos de mayo	- Huayabamba river (Jelacho river, Pajatón river, Avisco river)	10,000	15,000
		- Campanilla - Juanjui - Pajarillo	- Huallaga river	5,000	5,000
HUALLAGA	SAPOSOA			8,000	12,000
		- Sacanche - El Eslabón - Piscoyacu - Saposoa - Pasarraya	- Saposoa river	8,000	12,000
BELLAVISTA	BELLAVISTA			10,000	16,000
		- Poruate - Consuelo - San Pablo	- Sisa river	5,000	8,000
		- Nuevo Lima - Dos Unidos - Dos de Mayo - Cuzco - Barranco - Molán	- Biabo river	5,000	8,000
LAMAS	BELLAVISTA				
		- Fausa Lamista - Santa Rosa - Agua Blanca - San José de Sisa - Shatoja - San Martín	- Higher banks of Sisa river.	1/	
PICOTA	PICOTA			5,000	6,000
		- Shamboyacu - Tingo de Ponasa	- Ponasa river	3,000	4,000
		- Pilluana - Mishquiyacu - Tres Unidos	- Mishquiyacu river	2,000	2,000
Sub-total Contral Huallaga				38,000	54,000
SAN MARTIN	TARAPOTO				
		- San Antonio - San Pedro - Morales - Tarapoto - Juan Guerra	- Cumbaza river	4,000	6,000
BAJO HUALLAGA 2/	BAJO HUALLAGA				
		- Sauco - Chazuta	- Huallaga river	3,000	3,000
TOTAL AREA OF STUDY				45,000	63,000

* Rural Development Centro
1/ Coca areas in this region are considered in the Sisa river sub-basin in Bellavista
2/ This area belongs to the province of San Martin
Source:
Evaluation Study of Natural Resources and Environmental Protection Plan of the Special Central Huallaga and Bajo Mayo Project, ONERN, 1984.
MACROCONSULT Survey, November 1990.
Drawn up by: MACROCONSULT S.A

Graph B.1
AREA UNDER CULTIVATION 1989
CENTRAL HUALLAGA



1/ Coca area corresponds to 1990

Source: INADE, APODESA, Min. Agriculture
MACROCONSULT S.A
Drawn up by: MACROCONSULT S.A.

the Alto Huallaga. As in the previous case, testimonies indicate the existence of clandestine airports.

Likewise, the existence of coca areas along the right bank of the Huallaga river has been confirmed, which area borders the river Biabo basin and the Pajarillo area. Based on testimonies obtained from the engineers contacted, it can be estimated that there are approximately 5,000 hectares of coca plantations, also using the system of cultivation in rows at 1 mt. distances and 30x30 cm. pits for three plants, on average.

Saposoa River

The coca area covers lands that are suitable for forestry; these are located along the river Saposoa, close to Sacanche, El Eslabon, Piscoyacu, Saposoa and Pasarraya, and continue upstream.

The areas under cultivation fluctuate between 8,000 and 12,000 hectares. The production system used is the same as the previous area.

The Saposoa river sub-basin is characterized by the fact that it communicates with the Huayabamba river area via small roads and coach roads, so that BCP can be marketed (testimony of farmers and BCP merchants).

Sisa River

Coca areas are located close to San Pablo, Fausa Lamista, Santa Rosa Barranquita, Agua Blanca, Pacasmayo, Sisa, Shatoja and San Martin; covering lands that are mainly suitable for forestry.

Based on testimonies obtained from engineers from the Rural Development Centre in Bellavista, it is estimated that there are between 5,000 and 8,000 hectares of coca, including the Alto Sisa area located in the province of Lamas, with the same productive features as the previous areas.

Biabo River

Coca areas are located close to Nuevo Lima, Dos de Mayo, Cuzco, Barranco, Nueva Esperanza, Trujillo, Molan.

From testimonies obtained from the RDC in Bellavista, there are between 5,000 and 8,000 hectares of coca, with the same productive features as above.

Ponasa River

Coca areas are found in the vecinity of Shamboyacu and Tingo de Ponasa, and are smaller than the areas located upstream from the Central Huallaga region. Cultivated areas fluctuate between approximately 3,000 and 4,000 hectares. The characteristic features of these plantations are that they are approximately three years old, are disease-free and use the dry-farming method of cultivation in rows, generally using three-plant pits, resulting in a density of 30,000 plants/ha.

Mishquiyacu River

The coca areas are located in the Piluana and Tres Unidos areas. According to testimonies obtained in the area, these cover approximately 2,000 hectares, located in valleys and on mountain slopes. The system of production is the same as for previously mentioned areas.

Cumbaza River

Coca areas are located around Tarapoto, San Antonio, Shapaja. From the testimonies obtained, most of the hilly surroundings of Tarapoto are covered with coca crops, with a coverage of between 4,000 and 6,000 hectares. The same cultivation technique is used as in previous cases.

According to testimonies obtained from engineers and farmers in the area, BCP is manufactured by the coca farmer, who markets the drug either "on site" or in Tarapoto. The manufacture of BCP is based on the day's harvest.

Bajo Huallaga

Coca areas are smaller than the areas described above. According to testimonies obtained, they have recently been planted and cover an area of approximately 3,000 has.

Coca areas are mainly located on lands that are suitable for pastures.

The system of production is similar to that of other areas. According to testimonies obtained from engineers and farmers in Tarapoto, BCP is manufactured by each farmer and then traded directly via Tarapoto and Yurimaguas.

B.2.2. Areas producing other crops.

In the Central Huallaga, Tarapoto and Bajo Huallaga region, there are 71,705 hectares on which legal crops are sown, representing 57.5% of the legally sown hectares in the department of San Martin.

Crops in this region use a large percentage of type A lands for tillage, characterized as slightly undulating flat land.

The most significant provinces in the area are Picota, Tarapoto and Bellavista, which cover 78% of the total area under study. The crops with the most coverage are annual crops such as hard yellow corn and rice (See Table B.2.3.).

Hard Yellow Corn

Hard yellow corn is the region's main crop, covering 51,934 has. It is mainly grown on rainfed farmland and receives a certain amount of phytosanitary care and culture work such as weeding. This has become specialized as a singlecrop farming product, although traditionally it was associated with other crops, which tendency persists in some family plots.

Rice

Rice is the second most important crop in the area. It covers a total of 9,893 has., concentrated mainly in Picota, Tarapoto, Bellavista and Bajo Huallaga. Rice crops are mainly grown under irrigation, preferably using pool cultivation techniques, although this is not always the case. Rice is grown mainly in areas classified as land suitable for tillage.

Sorghum, Beans and Others

Grain Sorghum covers an area of 3,183 has., distributed in Tarapoto, Bellavista and Picota. Beans cover 1502 has. and cassava 849 has. Both crops are grown in every province covered by this study; they are rainfed farming products and traditional techniques are used. The harvest supplies the local market and is used for self-consumption.

Permanent Crops

The most important among permanent crops are bananas, which are grown in every provinces, covering 1,966 has. Banana plantations are located close to the river, in low terraced lands, some of which are prone to flooding.

The remaining permanent crops (cocoa, citrus fruits and coffee) cover an area of 1,627 has., which comprises 1.3% of the area covered by this study. Dark tobacco and Virginia tobacco are aimed at the cigarette industry. Cocoa and coffee are grown mainly on land suitable for forestry.

Table B.2.3
AREA OF OTHER CROPS 1989
CENTRAL HUALLAGA
(hectares)

R.D.C	Juanjui	Saposoa	Bellavista	Picota	Tarapoto	Lamas 1/	Bajo Huallaga	Area of study (1)	San Martin Department (2)	% (1)/(2)
Annual:										
Hard Yellow Corn	2291	2750	13498	18384	9801	4500	710	51934	72942	71.2
Rice	81	79	1774	2558	3421	-.-	1980	9893	28939	34.19
Grain Sorghum	8	-.-	1082	559	1534	-.-	-.-	3183	3202	99.41
Beans	96	20	211	95	624	450	6	1502	3695	40.65
Cassava	134	140	153	97	95	100	130	849	1982	42.84
Cotton	89	110	-.-	110	-.-	-.-	-.-	309	3158	9.78
Peanuts	64	2	-.-	22	14	50	-.-	152	234	64.96
Soya beans	5	-.-	5	20	19	-.-	-.-	49	67	73.13
Dark Tobacco	-.-	-.-	-.-	12	119	-.-	-.-	131	131	100.00
Virginia Tobacco	-.-	-.-	-.-	-.-	110	-.-	-.-	110	110	100.00
Permanent:										
Bananas	208	360	549	163	446	130	110	1966	4690	41.92
Cocoa	842	7	47	34	54	10	-.-	994	1200	82.83
Citrus fruits	120	15	31	168	53	-.-	-.-	387		
Coffee	-.-	11	16	31	177	11	-.-	246	4406	5.58
Total other Crops	3938	3494	17366	22253	16467	5251	2936	71705	124756	57.48
Total/Province	3.2	2.8	13.9	17.8	13.2	4.2	2.4	57.5	100	

1/ Only the Alto Sisa area is considered

Source:
Statistics from the Ministry of Agriculture XIII D.A.U. San Martin
Ministry of Agriculture's Sectoral Statistics Bureau, Lima.
Production by Provinces, INADE, APODESA
Evaluation Study of Natural Resources and Enviromental Protection Plan for the Central Huallaga and Bajo Mayo Project, ONERN, 1984.
Drawn up by: MACROCONSULT S.A.

B.2.3. Potential Expansion of Coca

The potential expansion of coca in the Central Huallaga region has been estimated based on the difference between the potential of type C, P and F lands, depending on their capacity and the area presently used for coca, cocoa, citrus fruits and coffee, as well as pasture land.

Bearing in mind the strategic criteria, the areas located close to highways (at a distance of approximately 4 kilometres), rivers, communities surveyed in the last few years, and those used for the expansion of human settlements, housing developments and clandestine airports related to drug-trafficking activities, have not been considered as potential areas. In the Central Huallaga, native communities are practically non existent.

Based on a socio-political criteria, such as the proximity and presence of State entities (Peruvian Army and Police forces) which make it more difficult to grow coca freely, the areas under their influence have not been considered. This criteria has been used particularly in the Bajo Huallaga and San Martin areas, in which the potential coca expansion is limited by the State's presence, as opposed to the Central Huallaga areas, where there is a greater potential in view of its socio-political isolation.

Based on observations made in the area, the conclusion has been reached that the present coca areas are mostly located on type F land, previously pillaged. However in Tarapoto, coca areas are located on type C land, whereas in Bajo Huallaga they are located on land suitable for pastures. The total potential area for expansion is 282,523 has., of which 278,044 are forestry lands and 4,479 are suitable for permanent crops. See Table B.2.4.

The following can be mentioned with respect to provinces:

Mariscal Caceres Province

According to analyses carried out with ecological and strategic criteria, potential coca areas are those suitable for forestry. The potential of type C and P lands is minimal. The potential for expansion in this province is 105,466 has., mostly located in the Huayabamba sub-basin and on the east side of the Huallaga river, with the Biabo.

Huallaga Province

Coca expansion areas are on land suitable for forestry, located at a distance of over 4 kms. from urban areas. Type C lands have not been considered, as these are too far away from the Saposoa river. Neither these or type P lands have any potential. This province has a potential of 20,562 has., located in the higher part of the Saposoa river, as well as on the lower slopes of the hills bordering the Huayabamba and Sica Sica rivers.

Table B.2.4
POTENTIAL AREA FOR COCA EXPANSION
CENTRAL HUALLAGA
(hectares)

	Greater Capacity			Current Use of Land			Potential Expansion			TOTAL POTENTIAL
Provinces	C	P	F	C	P	F(5)	C	P	F	AREA
Mariscal Cáceres	1,150	–.–	121,308	120 (2) 842 (1)	–.–	15,000	1,030 (4)	–.–	105,466	105,466
Huallaga	500	–.–	28,580	15 (2) 18 (1)	–.–	8,000	485 (4)	–.–	20,562	20,562
Bellavista	2,600	45,434	51,814	31 (2) 63 (1)	45,434	10,000	2,569 (4)	0	41,751	41,751
Lamas 1/	4,500 (7)	–.–	39,900	21 (2)	–.–	(3)	4,479	–.–	39,900	44,379
Picota	200	6,091	31,430	168 (2) 65 (1)	6,091	5,000	32 (4)	0	26,365	26,365
Sub-total	8,950	51,525	273,032	1,343	51,525	38,000	4,479	0	234,044	238,523
San Martín	6,200	27,896	171,200	4,000 (2) 54 (2) 53 (2) 177 (2)	–.–	–.–	1,916 (4)	27,896 (6)	171,200 (6)	
Bajo Huallaga 2/	1,600	18,120	44,000	–.–	3,000	–.–	1,600 (4)	15,120 (6)	44,000	44,000
Total Area	16,750	97,541	488,232	5,627	54,525	38,000				
Potential Total							4,479	0	278,044	282,523

1/ Includes Alto Sisa
2/ This area belongs to the San Martín province
(1) Current use of permanent crops on forestry land
(2) Permanent crops on type C land
(3) This area have been considered in Bellavista
(4) Not considered,for strategic reasons
(5) Coca areas
(6) Not considered, for socio-political criteria
(7) Coca potential
Source: Statistics from the Ministry of Agriculture, XII D.A.U. San Martín
MACROCONSULT S.A Survey, November 1990. Special Central Huallaga and Bajo Mayo Project, ONERN, 1989.
Drawn up by: MACROCONSULT S.A

Bellavista Province

Type C and P lands have not been considered, due to their proximity to the Huallaga river and the Marginal highway and other roads. The same applies to the Biabo river sub-basin. The potential in this province is limited to 41,751 has. of forestry areas, located in the Biabo river basin and the San Pablo area.

Lamas Province

This area shows potential in the higher part of the Sisa river, bordering Bellavista, which belongs to this province. Although there are 9,900 has. of type C lands, only 4,500 are located far from urban centres and roads and can therefore be considered as potential coca areas. However, of these, 21 has. are being used for permanent crops (cocoa and coffee), which leaves 4,479 has. of type C land. Furthermore, the Alto Sisa has a great forestry potential equivalent to 39,900 has. In total, this province has a potential of 44,379 has. located on the slopes of the Sica Sica hills and the Ayu Mayo mountain range.

Picota Province

Coca expansion areas are on forestry lands located in the Ponaza and Mishquiyacu river sub-basins, of which a total of 26,365 has. are available. There is no potential as far as type C and P lands are concerned (suitable for permanent crops and pastures, respectively).

San Martin Province

Although this province has some great potential lands suitable for permanent crops, pastures and forestry, the possibility of these being used for coca plantations has been discarded, for strategic and sociopolitical reasons, i.e. their proximity to local authorities, army and police quarters.

Bajo Huallaga Area

In this area, potential lands for expansion are essentially 44,000 has. of forestry. Pasture lands are not potential coca areas, due to their proximity to State authorities.

B.2.4. Potential area for other crops

With respect to the potential area for other crops in Central Huallaga, table B.2.5. shows that the lands with a greater capacity for tillage amount to 151,593 has., those for permanent crops 17,650 has. (C) and pasture lands 97,541 has (P).

Not counting the current use of land, potential land suitable for tillage (A) is 81,515 has. This will help the expansion of areas currently sown with rice, corn, beans, cassava, bananas, sorghum, etc. Likewise, there is a potential of 13,032 has. of land suitable for permanent crops such as citrus fruits and other fruit trees, cocoa, coffee, anatto, etc. Most of these are located in the Sisa river sub-basin. This area also has a potential of 43,016 has. located in the lower part of the Huallaga river, for farming activities.

Table B.2.5
POTENTIAL EXPANSION FOR OTHER CROPS
CENTRAL HUALLAGA
(hectares)

Provinces	Greater Capacity			Current Use			Potential for Expansion		
	A	C	P	A	C	P	A	C	P
Mariscal Caceres	16025	1150	-.-	2976	120 (2 842 (1)	-.-	13049	1030	-.-
Huallaga	3409	500	-.-	3461	15 (2 18 (1)	-.-	(52)	485	-.-
Bellavista	36960	2600	45434	17272	31 (2 63 (1)	45434	19688	2569	-.-
Lamas 1/	13200	5400	-.-	5230	-.-	-.-	7970	5400	-.-
Picota	35501	200	6091	22020	168 (2 65 (1)	6091	13481	32	-.-
Sub-total	105095	9850	51525	50959	1322	51525	54136	9516	-.-
San Martin	30858	6200	27896	16183	4000 (2 53 (2) 231 (2)	-.-	14675	1916	27896
Bajo Huallaga 2/	15640	1600	18120	2936	3000 (3	-.-	12704	1600	15120
Total Area	151593	17650	97541	70078	8606	51525	81515	13032 (4	43016 (5)

1/ Includes Alto Sisa
2/ This area belongs to the San Martin province
(1) Permanent crops on forestry land
(2) Permanent crops on type C land
(3) Permanent crops on pasture land
(4) Does not include permanent crops on forestry or pasture land
(5) Does not include permanent crops on pasture land
Source:
Statistics from the Ministry of Agriculture, XIII D.A.U. San Martin
Production by Provinces, INADE, APODESA, 1990
Evaluation Study of Natural Resources and Enviromental Protection Plan of the Central Huallaga and Bajo Mayo Project, ONERN, 1984
Drawn up by: MACROCONSULT S.A.

B.3 PRODUCTIVE ASPECTS OF AREAS COVERED BY THE STUDY

B.3.1 Volume of Illegal Coca Production

The various volumes of coca in the area covered by this study appear in Table B.3.1. at a Rural Development Centre (RDC) and sub-basin level. It has been proved that in all areas in this region, between 70 and 80 "arrobas" (25lb. units) of coca per ha. are obtained, i.e. 0.805 and 0.920 MT per ha. from each harvest. To estimate the total volume of coca, the lowest yield has been considered, i.e. 0.805 MT/ha. Similarly, based on testimonies obtained, it has been assumed that the harvest takes three months, which is equivalent to four harvests per year.

Table B.3.1
VOLUME OF FRESH COCA LEAF PRODUCTION
CENTRAL HUALLAGA
(tons)

Provinces	Rural Development Centre - RDC	Sub-Basins	Hectares of Coca Minimum	Hectares of Coca Maximum	MT/HA	Harvest	Volume Minimum	Volume Maximum
M. Cáceres	JUANJUI	-Huayabamba river	10,000	15,000	0.805	4	32,200	48,300
		-Huallaga river	5,000	5,000	0.805	4	16,100	
Huallaga	SAPOSOA	-Saposoa river	8,000	12,000	0.805	4	25,760	38,640
Bellavista	BELLAVISTA	-Sisa river	5,000	8,000	0.805	4	16,100	25,760
		-Biabo river	5,000	8,000	0.805	4	16,100	25,760
Picota	PICOTA	-Ponasa river	3,000	4,000	0.805	4	9,660	12,880
		-Mishquiyacu river	2,000	2,000	0.805	4	6,440	
Sub-total Huallaga Central			38,000	54,000	0.805	4	122,360	173,880
San Martín	TARAPOTO	-Cumbaza river	4,000	6,000	0.805	4	12,880	19,320
	BAJO HUALLAGA	- Huallaga river	3,000	3,000	0.805	4	9,660	
Total area of study			45,000	63,000	0.805	4	144,900	202,860

Source: MACROCONSULT S.A. Survey, November 1990.
Drawn up by: MACROCONSULT S.A

For the purpose of this study, a total of 144,900 MT have been considered as a minimum and 202,860 MT as a maximum. The Central Huallaga area, not including San Martin province, concentrates 84.5% of the volume with a minimum of 122,360 MT and a maximum of 173,880 MT; the San Martin province, together with Tarapoto and Bajo Huallaga, have 15.5% with a 22,540 MT production.

B.3.2. Volumes of production of other crops and livestock

The most important legal crops in the area covered by this study are hard yellow corn, rice, sorghum, bananas, beans, cassava, soya, peanuts, cotton and tobacco, among the annual crops. Permanent crops are characterized as traditional, the most prominent being coffee, citrus fruits and cocoa.

Production volumes of each of the main crops in the study area are shown in Table B.3.2. Making a comparison between the volume produced in the study area and that of the department, we notice that hard yellow corn concentrates 71% of the departmental production, rice 36%, grain sorghum 99%, bananas 43%, beans 42%, cassava 44%. As far as the production of tobacco is concerned, the study covers 100% of the department.

As regards farming production, the Central Huallaga area shows a drop in the number of beef-cattle and pigs whereas the production of poultry and associated products has increased considerably. See table B.3.3.

B.3.3. Yields of coca and other crops in the region

Based on testimonies obtained from coca producers in Tarapoto, Bellavista and Juanjui, yield estimates are for fresh leaves (exposed to the sun for 2 hours), due to the fact that in this area they are used in that state as an input for the manufacture of BCP. There is a yield of between 70 and 80 'arrobas' (25 lb. units) per hectare, i.e. between 0.805 and 0.920MT/ha from each harvest, with a total yield of 3.02 MT/ha.per year for the four harvests. To compare the profits obtained by different crops, the volume of fresh leaves should be converted to dry leaves (33% correction factor), obtaining an annual yield of 1,070 MT for the four harvests.

For legal crops - which are important in the area covered by this study - an analysis has been made by each production area. Yields are shown in Table B.3.4.

We could mention that corn has a low average yield (2 MT/ha.) due to the fact that it is a rainfed crop that does not receive sufficient technical care. Rice has an average yield of 4 MT/ha. Two types of rice are mainly grown in the area: the rainfed crop with an average yield of 1.5 MT/ha. and the rice grown under irrigation with high technology, phytosanitary care and culture work. The conditions of the latter raise the region's average yield.

Table B.3.2
VOLUME OF PRODUCTION OF OTHER CROPS 1989
CENTRAL HUALLAGA
(tons)

Province	Juanjui	Saposoa	Bellavista	Picota	Tarapoto	Lamas 1/	Bajo Huallaga	Area of Study (1)	Department (2)	% (1)/(2)
Annual:										
Hard Yellow Corn	4978	5490	26956	36790	19590	8997	1380	104181	146329	71.2
Rice	275	378	8622	12754	14661	-.-	2970	39660	109729	36.1
Grain Sorghum	19	-.-	2280	1290	3154	-.-	-.-	6743	6796	99.2
Beans	77	16	163	73	495	359	5	1188	2864	41.5
Cassava	1960	2100	2295	1455	1428	1500	1950	12708	29122	43.6
Cotton	72	66	-.-	91	-.-	-.-	-.-	249	2526	9.8
Peanuts	64	2	-.-	22	14	50	-.-	152	229	66.4
Soya	5	-.-	7	22	19	-.-	-.-	53	70	75.7
Dark Tobacco	-.-	-.-	-.-	17	147	-.-	-.-	164	164	100.0
Virginia Tobacco	-.-	-.-	-.-	-.-	1210	-.-	-.-	1210	1210	100.0
Permanent:										
Bananas	2655	4380	6588	1730	5340	1560	1315	23568	55117	42.8
Cocoa	286	4	23	15	30	5	-.-	363	660	55
Citrus fruits	1140	150	300	1680	642	-.-	-.-	3912		
Coffee	-.-	7	10	19	115	7	-.-	158	2810	5.6
Total	11551	12613	47244	55958	46845	12478	7620	194309	357628	54.3

1/ The districts located in the Sisa Valley are considered
Source: Statistics from the Ministry of Agriculture, XIII D.A.U., San Martin
Ministry of Agriculture's Sectoral Statistics Bureau, Lima. Production by Provinces, INADE ,APODESA.
Drawn up by: MACROCONSULT S.A.

Table B.3.3
LIVESTOCK IN THE DEPARTMENT OF SAN MARTIN: 1985-1990
CENTRAL HUALLAGA

Breed-Product	1985/1986 Population	1985/1986 Production	1985/1986 MT	1989/1990 Population	1989/1990 Production	1989/1990 MT
Cattle-meat	110,000	19,800	2,574	68,667	12,360	1,607
Cattle-milk	15,000	1,500		1,907	1,238	2,228
Pigs	80,000	48,000	2,400	35,175	28,140	1,408
Poultry-meat	550,000	990,000	1,188	1,416,000	1,416,000	2,124
Poultry-eggs	165,000	41,250	743	209,585	146,700	2,007

Source:Development Plan for San Martin. XIII Departamental Agrarian Unit. san Martin.
Drawn up by: MACROCONSULT S.A.

Table 3.3.4
YIELD OF MAIN CROPS 1989
CENTRAL HUALLAGA
(kgs. per hectare)

Province	JUANJUI	SAPOSOA	BELLAVISTA	PICOTA	TARAPOTO	LAMAS 1/	BAJO HUALLAGA	AVERAGE
Annual:								
Hard Yellow Corn	2,173	1,996	1,997	2,001	1,999	1,999	1,944	2,006
Rice	3,395	4,785	4,860	4,986	4,286	-.-	1,500	4,009
Grain Sorghum	2,375	-.-	2,107	2,308	2,056	-.-	-.-	2,118
Beans	802	800	773	768	793	798	833	791
Cassava	14,776	15,000	15,000	15,000	15,032	15,000	15,000	14,968
Cotton	809	782	-.-	827	-.-	-.-	-.-	806
Peanuts	1,000	1,000	-.-	1,000	1,000	1,000	-.-	1,000
Soya	1,000	-.-	1,400	1,100	1,000	-.-	-.-	1,082
Dark Tobacco	-.-	-.-	-.-	1,417	1,235	-.-	-.-	1,252
Virginia Tobacco	-.-	-.-	-.-	-.-	11,000	-.-	-.-	11,000
Permanent:								
Bananas	12,764	12,167	12,000	10,613	11,973	12,000	11,955	11,988
Cocao	340	571	489	441	556	500	-.-	365
Citrus frutis	9,500	10,000	9,677	10,000	12,113	-.-	-.-	10,109
Coffee	-.-	636	625	613	650	636	-.-	642
Coca	3,220	3,220	3,220	3,220	3,220	3,220	3,220	3,220

1/ Considers the districts located in the Sisa Valley
Source: Statistics from the Ministry of Agriculture, XII DAU . San Martín. Ministery of Agiculture's Sectoral Statictics Bureau, Lima. Production by Provinces, INADE, APODESA. Evaluation Study of the Natural Resources and Enviromental Protection Plan. for the Central Huallaga and Bajo Mayo Project, ONERN, 1984
Drawn up by: MACROCONSULT S.A.

Other annual crops - beans, cassava, bananas, sorghum, cotton, soya, peanuts - and permanent crops - coffee, cocoa and citrus fruits - have low average yields, as they are grown in rainfed areas.

B.4 SOCIO-ECONOMIC FEATURES

B.4.1 Population: Structure and Growth

B.4.1.1. Demographic Aspects

A review of the information concerning the population and labour force in the Central Huallaga area, shows a long, continuous process of economic growth, which has sustained a change in productive roles as far as the domestic market is concerned, which became consolidated during the eighties.

During inter-census periods - 1966-72 and 1972-81, a dynamic growth of the total population in the region took place, that of the rural population being most significant, which responds to the increase in cultivated areas (See table B.4.1). This process of expanding the agricultural boundaries is expressed even better when annual growth rates of the Economically Active Rural Population for the same period are reviewed (see Table B.4.2). It has been confirmed that regional averages are above national averages.

Table B.4.1
GROWTH RATES FOR THE TOTAL AND RURAL POPULATION
1961-72 and 1972-81, BY PROVINCES
CENTRAL HUALLAGA

Provinces	Total Population		Rural Population	
	1961-72 %	1972-81 %	1961-72 %	1972-81 %
San Martín (1)	3.4	3.2	2.9	2.5
Huallaga	1.9	1.9	0.5	2.5
Mcal. Cáceres (2)	5.3	4.5	7.3	4.8
Country	2.9	2.6	0.5	0.9

(1) Includes Picota and Bellavista provinces
(2) Includes Tocache provinces

Source: Hector Maletta and Alejandro Bardales, Perú.
Provinces in Figures 1876-1981
Drawn up by: MACROCONSULT S.A

Table B.4.2.
GROWTH RATES FOR THE RURAL EAP
1961–72 and 1972–81, BY PROVINCES
CENTRAL HUALLAGA

Provinces	RURAL EAP	
	1961–72 %	1972–81 %
San Martin (1)	2.3	4.2
Huallaga	-0.8	5.3
Mcal. Cáceres (2)	8.4	5.4
Country	-0.5	2.3

(1) Includes Picota and Bellavista provinces
(2) Includes Tocache province

Source: Hectór Maletta and Alejandro Bardales, Perú:
The Provinces in Figures 1876–1981
Drawn up by: MACROCONSULT S.A.

B.4.1.2. Population Dynamics and Labour Force during the eighties

A change in the productive roles became consolidated during the 80s, when the region took on a rural character. As can be seen in table B.4.3., during 1981, the rural population's participation with respect to the total population in the area covered by the study, was greater than in the early seventies, in most of the provinces. This settlement process can be explained by the completion of the Olmos-Corral-Quemado-Tarapoto highway (1978), by the intervention of ENCI and ECASA - the State's trading companies - in the productive activity, and by the Special Central Huallaga-Bajo Mayo Project, which implemented integral programmes for land titles, road construction and road maintenance, agricultural machinery, credit assistance and irrigation infrastructure works.

The economic changes in the area are reflected by reduced forestry utilization, mainly rubber and lumber, and the transformation and specialized production of corn and rice. This new situation had an impact on both the social and the urban structure.

Socially, a differential, upgrading process began between income groups, as a result of the new investment and employment opportunities arising from the growing contact with the domestic market. Besides, trade and services have been strengthened in the region. Various merchants have established themselves in Tarapoto, taking advantage of the new role played by this province in the department's economy. By the same token, social mobility is expressed in the creation of the National University of San Martin, which offers technical careers connected with tropical farming.

Changes in the urban structure have been expressed, first of all, by the consolidation of Tarapoto as a city that presently fullfills the most complex urban duties, ranging from financial

Table B.4.3.
DISTRIBUTION OF THE POPULATION: 1972-1981
CENTRAL HUALLAGA

	1972			1981		
	Urban %	Rural %	Total pop.	Urban %	Rural %	Total pop.
Huallaga	51.38	48.62	26,767	48.75	51.25	31,580
Lamas	47.73	52.27	58,360	45.55	54.45	64,378
Mariscal Cáceres (1)	42.89	57.11	36,605	41.31	58.69	54,231
San Martín (2)	69.60	30.40	71,492	71.57	28.43	95,265
Study Area	52.90	47.10	48,306	51.79	48.21	61,364

(1) Includes the Tocache province
(2) Includes the Picota and Bellavista provinces
Source: Héctor Maletta and Alejandro Bardales, Perú: The Provinces in Figures 1876-1981.
Drawn up by: MACROCONSULT S.A.

services, storage, trade and services; secondly, by the drop in importance of such cities as Moyobamba, Lamas and Saposoa, which are not directly linked to the Marginal highway. Likewise, the provinces of Juanjui, Bellavista and Picota have maintained their urban responsibilities, both because of their proximity to the marginal highway and their new role as suppliers of food. The category of the latter two cities was raised to that of a province, thanks to the degree of organization of producer unions and because of the increased dynamics in the region.

As far as the growth of the population is concerned, it can be appreciated from INEI's estimates, that the annual growth rate is 2.12%, districts such as Juanjui, Bellavista and the province of San Martin being outstanding. Similarly, the greatest activity in the area is reflected by the increase in the density of the population in the area as a whole. This tendency can be appreciated in each of the districts in the different provinces in the region, which is proof of the dynamics generated by the coca boom. (See Table B.4.4.)

Table B.4.4
POPULATION, GROWTH RATES AND DENSITY: 1980- 1990
CENTRAL HUALLAGA

	Population		Annual Rate	Area (km2)	Density (pop/km2)	
	1980	1990	1980-1990		1980	1990
Total Study Area	173,505	213,949	2.12	35,370	4 91	6 05
MARISCAL CACERES	25,432	30,023	1 67	14,499	1.75	2 07
Campanilla	3,900	4,021	0 31	2,250	1 73	1 79
Pajarillo	2,972	3,249	0.90	244	12.18	13 31
Juanjui	12,130	15,117	2 23	335	36 19	45 10
Huicungo	3,777	4,544	1 87	9,830	0 38	0 46
Pachiza	2,653	3,092	1.54	1,840	1.44	1 68
HUALLAGA	14,600	15,300	0.47	2,781	5 25	5 50
Sacanche	1,983	2,556	2 57	543	3.65	4 70
El Estabón	1,345	1,354	0 07	123	10 96	11 03
Piscoyacu	1,677	1,692	0 09	185	9.07	9.15
Alto Saposoa	1,287	1,303	0.12	1,348	0 96	0 97
Saposoa	7,305	7,471	0.12	545	13 54	13 70
Tingo de Saposoa	923	930	0.08	37	24.75	24 94
BELLAVISTA	20,366	24,642	1.92	8,051	2.53	3 06
Bellavista	6,053	8,609	2.68	287	23 17	30 19
Huallaga	1,560	1,818	1.54	210	7 41	8 64
San Rafael	2,121	2,433	1 38	98	21 57	24 75
San Pablo	4,616	5,743	2 21	362	12 73	15 84
Alto Biabo	2,658	2,792	0 49	6,117	0 43	0 46
Bajo Biabo	2,758	3,187	1.46	975	2.83	3 27
PICOTA	19,699	22,717	1.44	2,171	9 07	10 46
Shambuyacu	1,382	1,563	1 24	416	3.32	3 76
Tingo de Ponasa	2,304	2,900	2 33	340	6 78	8 53
Tres Unidos	1,416	1,800	2.43	247	5 74	7 30
Pilluana	1,151	1,225	0 63	239	4 81	5 12
San Hilarión	1,271	1,800	3 54	97	13 16	18 04
San Cristobal	935	979	0.46	30	31 56	33 04
Caspisapa	1,150	1,209	0 50	81	14 12	14 85
Picota	4,375	4,501	0 29	219	20 00	20 59
Pucacaca	2,956	3,284	1 06	231	12 81	14 23
Buenos Aires	2,759	3,453	2 27	273	10.11	12 65
LAMAS	21,309	23,962	1 14	2,321	9 22	10 32
Santa Rosa	1,714	1,741	0.16	243	7 04	7 15
Agua Blanca	2,207	2,228	0 09	168	13 12	13 25
San José de Sisa	10,007	10,909	0 87	300	33 37	36 38
San Martin	2,437	3,019	2.16	563	4 33	5 37
Shatoja	1,175	1,265	0 74	24	48 96	52 71
Barranquita	3,849	4,800	2.23	1,023	3.76	4 69
SAN MARTIN	72,019	97,299	3 05	5,540	12 98	17 54
San Antonio	1,642	1,263	-2.59	93	17 65	13 58
Sauce	2,540	2,954	1 52	103	24 66	28 68
Morales	4,935	6,650	3 04	44	112 39	151 59
La Banda de Shilcay	6,605	9,997	4 23	269	24 58	37 21
Tarapoto	35,872	53,950	4 17	68	529 01	795 72
Juan Guerra	2,957	3,079	0 41	197	15 05	15 67
Alberto Leveau	1,072	1,174	0 91	268	3 99	4 37
Shapaja	1,746	1,771	0 14	270	6.46	6 55
Chazuta	5,486	6,315	1.47	966	5 68	6 57
Chipurana	2,016	1,240	-4 74	500	4 03	2 48
Papaplaya	2,752	2,184	-2 29	686	4 01	3 18
Huimbayoc	3,519	5,863	5 24	1,609	2 19	3 64
El Porvenir	877	815	-0.73	473	1.86	1.72

Source: Population projections by Calendar Years,by departaments, provinces, districts 1980-1990. Peru In Figures 1990. Cuanto S.A
Drawn up by: MACROCONSULT S.A

B.4.2 Economically Active Population

The annual growth rate of the total EAP for the area covered by this study, is 2.8% (See Table B.4.5). It should be noted that the 1.9% growth of the EAP in the farming sector is higher than the national total for that sector (1.5%), which proves the theory that there is a growth in the coca farming sector, compared to the relative flat growth of legal crops on a national scale. Finally, it must be emphasized that the increased growth of the total EAP with respect to the EAP in the farming sector, could reflect the urban growth generated by coca, demanding more services.

Table B.4.5
ECONOMICALLY ACTIVE POPULATION 1980-1989
CENTRAL HUALLAGA

	Total EAP		Farming EAP	
Province	1980	1989	1980	1989
Bellavista	6,621	8,568	4,673	5,599
Huallaga	4,746	5,472	3,350	3,576
Lamas	21,301	24,551	15,036	16,044
Mariscal Cáceres	8,267	10,465	5,836	6,839
Picota	6,404	7,931	4,520	5,183
San Martín	23,886	34,102	16,861	22,285
Total	71,225	91,089	50,276	59,526
Anual Rate (%)		2.8		1.9
National	5,586,500	7,424,900	2,223,400	2,550,700
Anual Rate (%)		3.2		1.5

Source: Evolution of the Peruvian Population during the 80s.
Special Bulletin No. 12, INEI.
Peru: Population Projections by Calendar Years by Departments, Provinces and Districts, 1980-1990. INEI
Drawn up by: MACROCONSULT S.A.

B.4.3. Labour Force Involved in Coca Cultivation

An analysis of the production costs of coca and other crops, permits an approach to be made of the behaviour of the rural labour market. As far as the demand for labour is concerned, 176 working days per yer are required to set up one hectare of coca. This requirement includes the first harvest, obtained after nine months. The following is required for the different stages: 90 working days to prepare the land, 4 for the seedlings, 42 for the transplants and 40 for harvesting.

208 working days are required to maintain one hectare of coca (including the four harvests: February, May, August and November). Each harvest requires 52 working days, distributed in 22 for culture work and 30 for the harvest itself (see table B.4.6).

Table B.4.6
LABOUR REQUIREMENTS: 1989
CENTRAL HUALLAGA
(day labourers per hectare)

Crop	J	F	M	A	M	J	J	A	S	O	N	D	TOTAL
Hard Yellow Corn	3	14	13	–	5	14	14	–	–	18	16	8	105
Rice	16	15	20	18	–	–	–	–	5	4	4	45	127
Grain Sorghum	12	–	20	20	–	–	–	–	–	–	–	13	65
Bananas	15	14	13	14	10	10	9	9	–	10	10	14	128
Common beans	27	–	–	–	–	–	–	–	8	8	21	43	107
Cocoa	7	7	–	–	–	10	10	–	–	7	7	7	55
Cassava	7	7	–	5	15	15	15	5	5	–	10	9	93
Cotton	6	10	5	–	–	–	6	5	5	–	–	35	72
Coffee	5	5	13	13	12	12	–	–	–	14	13	13	100
Peanuts	–	–	–	–	25	37	11	–	–	15	15	–	103
Dark Tobacco	18	31	21	23	22	21	8	8	8	–	–	10	170
Soya	–	–	20	19	–	13	12	–	–	–	–	–	64
Sub-total	116	103	125	112	89	132	85	27	31	76	96	197	1189
Coca	11	30	11	11	30	11	11	30	11	11	30	11	208
Total	127	133	136	123	119	143	96	57	42	87	126	208	1397

Source: Agrarian Bank's Basic Budgets, Tarapoto Branch, and Macroconsult S.A. Surveys, 1990.
Drawn up by: MACROCONSULT S.A.

According to the methodology followed to estimate the demand for labour (see methodological appendix) for the 45,000 hectares sown with coca, 9,360,000 day labourers per year are required, of which 495,000 are used during the months in which culture work is carried out (8) and 1,350,000 during each harvest month.

If it is considered that an individual works 22 days per month, then the aggregate monthly demand for labour can be obtained for coca. In this case, 22,500 people per month for culture work and 61,364 for harvest months.

Among legal crops, rice and yellow corn demand 127 and 105 day labourers per month/year respectively. Both concentrate 86.9% of the cultivated area, and only 19% of the labour demand for legal crops. The ten remaining crops - sorghum, bananas, beans, cocoa, cassava, etc. - concentrate 13.1% of the area and 81% of the demand for labour. It should also be pointed out that the legal crops that require the most day labourers per year, are those that cover small areas, such as dark tobacco and bananas (see Table B.4.6.).

Applying the same methodology for legal crops, the monthly demand for day labourers is, on average, 28,600 (See table B.4.7.), compared to 35,455 for coca.
The highest concentrated demand for day labourers for coca,can be seen on table B.4.8. During the months of January, February, April, May, August, September and November, the percentage participation of the coca demand is far superior to that of legal crops.

Finally, if a comparison is made between the demand for farming labour and the local supply expressed by the economically active population in the area covered by this study, it is evident that there are nine months during which the demand for labour is not satisfied by the local supply (See table B.4.9). In this case, we find seasonal labour markets, which are satisfied by population migrating from neighbouring areas that have other farming seasons. (See Graph B.2).

B.4.4. Potential Labour Force for Coca

The high potential for coca expansion in the Huallaga - 282,523 has.- is definitely an incentive to increase the cultivated area. However, such an expansion would require a massive migration of the population, or at least a partial one, due to labour being released from other crops. This is not impossible, in view of the current economic situation.

In fact, if the areas sown with hard yellow corn and rice had been reduced by 50%, this would have meant releasing about 44% of the daily labourers required by legal crops, which would have put more pressure on the demand for employment. With respect to corn, with a 50% decrease in the sown area, the demand for daily labourers would drop from 5,453,000 to

Table B.4.7
TOTAL DAY LABOURERS REQUIRED BY CROPS
CENTRAL HUALLAGA
(Total day labourers)

Crops	J	F	M	A	M	J	J	A	S	O	N	D	TOTAL	
Yellow Corn	155802	727076	675142	-.-	259670	727076	727076	-.-	-.-	934812	830944	415472	5453070	
Rice	158288	148395	197860	178074	-.-	-.-	-.-	-.-	49465	39572	39572	445185	1256411	
Grain Sorghum	38196	-.-	63660	63660	-.-	-.-	-.-	-.-	-.-	-.-	-.-	41379	206895	
Bananas	29490	27524	25558	27524	19660	19660	17694	17694	-.-	19660	19660	27524	251648	
Common beans	40554	-.-	-.-	-.-	-.-	-.-	-.-	-.-	12016	12016	31542	64586	160714	
Cocoa	6958	6958	-.-	-.-	-.-	9940	9940	-.-	-.-	6958	6958	6958	54670	
Cassava	5943	5943	-.-	4245	12735	12735	12735	4245	4245	-.-	8490	7641	78957	
Cotton	1854	3090	1545	-.-	-.-	-.-	1854	1545	1545	-.-	-.-	10815	22248	
Coffee	1230	1230	3198	3198	2952	2952	-.-	-.-	-.-	3444	3198	3198	24600	
Peanuts	-.-	-.-	-.-	-.-	3800	5624	1672	-.-	-.-	2280	2280	-.-	15656	
Dark Tobacco	2358	4061	2751	3013	2882	2751	1048	1048	1048	-.-	-.-	1310	22270	
Soya	-.-	-.-	980	931	-.-	637	538	-.-	-.-	-.-	-.-	-.-	3136	
Subtotal	440673	924277	970694	280645	301699	781375	772607	24532	68319	1018742	942644	1024068	7550275	
Coca	495000	1350000	495000	495000	1350000	495000	495000	1350000	495000	495000	1350000	495000	9360000	
Total with coca	935673	2274277	1465694	775645	1651699	1276375	1267607	1374532	563319	1513742	2292644	1519068	16910275	
Days Worked	22	22	22	22	22	22	22	22	22	22	22	22	264	
Demand	20031	42013	44122	12757	13714	35517	35119	1115	3105	46306	42847	46549	26600	1/
Coca Demand	22500	61364	22500	22500	61364	22500	22500	61364	22500	22500	61364	22500	35455	1/
Total Demand	42531	103377	66622	35257	75078	58017	57619	62479	25605	68806	104211	69049	64054	1/

1/ These figures reflect the average monthly demand
Source:
Statistics from the Ministry of Agriculture, XII D.A.U San Martin, 1989.
Agrarian Bank's Production Costs, 1990 and Macroconsult S.A. Surveys, 1990.

Drawn up by: MACROCONSULT S.A.

Table B.4.8
STRUCTURE OF DAILY LABOUR REQUIREMENTS:1989
CENTRAL HUALLAGA

Month	Coca %	Legal Crops %	Total Daily Labour
J	53	47	935,673
F	59	41	2,274,277
M	34	66	1,465,694
A	64	36	775,645
M	82	18	1,651,699
J	39	61	1,276,375
J	39	61	1,267,607
A	98	2	1,374,532
S	88	12	563,319
O	33	67	1,513,742
N	59	41	2,292,644
D	33	67	1,519,068
Total	55	45	16,910,275

Source:Agrarian Bank's Basic Budgets,1990
Macroconsult S.A Surveys,1990
Drawn up by: MACROCONSULT S.A

Table B.4.9
BALANCE OF LABOUR: 1989
(people required)

Month	Demand for Labour			Local	Balance
	Legal Crops	Coca	Total	Supply 1/	
J	20,031	22,500	42,531	46,139	3,608
F	42,013	61,364	103,377	46,139	(57,238)
M	44,122	22,500	66,622	46,139	(20,483)
A	12,757	22,500	35,257	46,139	10,882
M	13,714	61,364	75,078	46,139	(28,939)
J	35,517	22,500	58,017	46,139	(11,878)
J	35,119	22,500	57,619	46,139	(11,480)
A	1,115	61,364	62,479	46,139	(16,340)
S	3,105	22,500	25,605	46,139	20,534
O	46,306	22,500	68,806	46,139	(22,667)
N	42,847	61,364	104,211	46,139	(58,072)
D	46,549	22,500	69,049	46,139	(22,910)

1/ EAP age 15 and over.
Source:
Agrarian Bank's Basic Budgets,1990
Macroconsult S.A Surveys,1990
Drawn up by: MACROCONSULT S.A

2.726,535 and in the case of rice, the decrease would be from 1,256,411 daily labourers to 628,206. Together, 3,354,741 daily labourers would be available.

Relating these newly released labourers with the annual total required by the 45,000 hectares of coca, which amount to 9,360,000, we can conclude that the labour available represents 35% of the total required at present, i.e. an increase of another 16,000 has. of coca.

In the event there is only an increase in the economically active population age 15 and over, the tendency could lean towards a better balance between the demand for local labour and not necessarily to increase the cultivated areas, due to existing labour deficits. (See graph B.2).

In fact, the present demand for daily labourers shows a negative balance for nine (9) months. This deficit is greater in February (57,238) and November (58,072). The rural EAP (46,139 people) only satisfies the demand during January, April and September.

As it is known that the female EAP in the farming sector is underestimated, we can assume that the greater demand for seasonal labour in June, July and August could be covered locally. For the following months, the demand for labour would have to be satisfied by migrations from neighbouring departments, raising the daily labour figures for the months with the highest deficits.

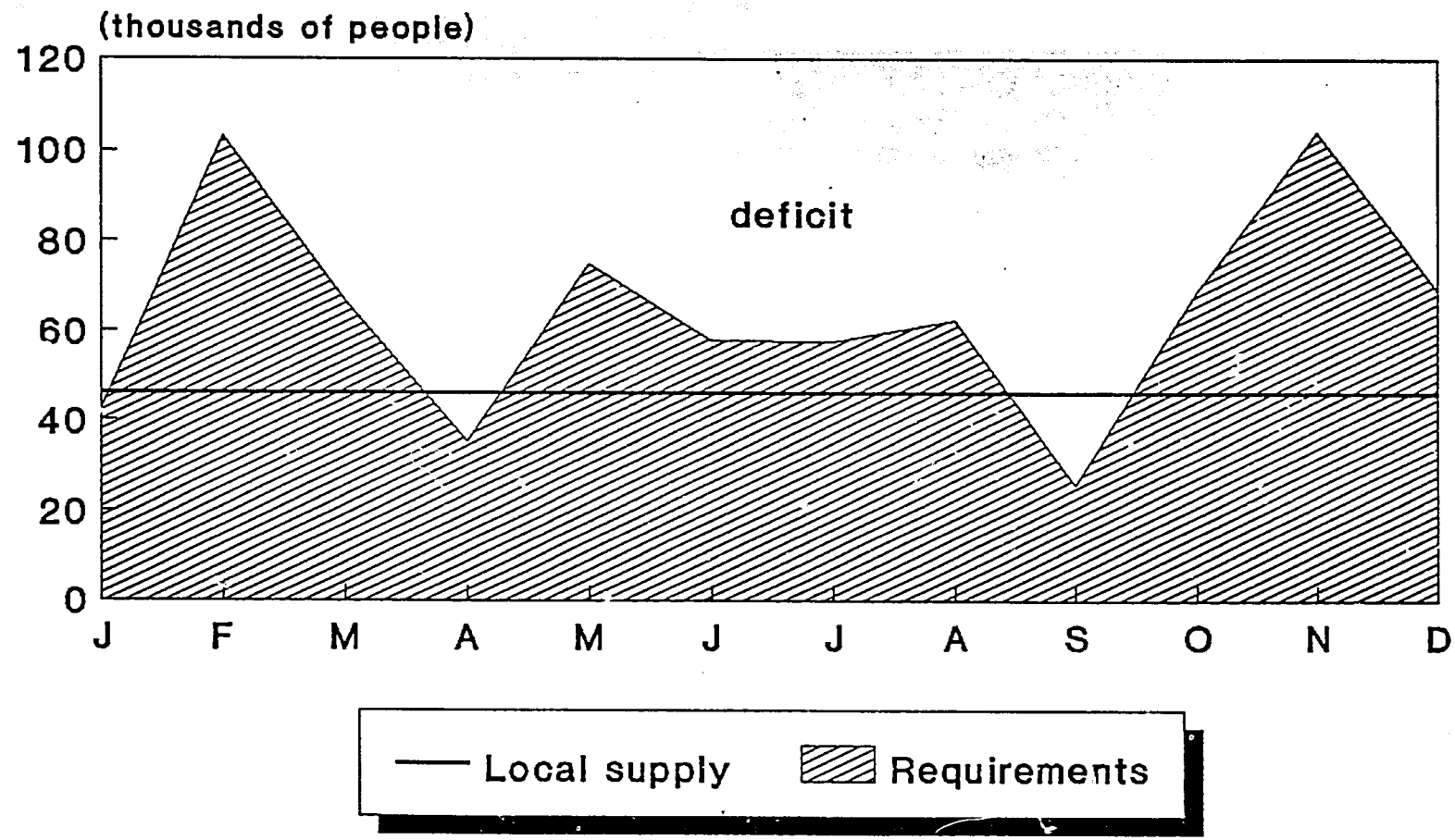
B.4.5 Producer Profile

Most farmers in the area are organized under the family business method, cultivating small and medium plots which barely cover their needs, as their accumulating power is very reduced and there is no way they can improve their situation in the long term.
On average, hard yellow corn producers handle 3 hectare plots, using a low level of technology for this rainfed crop. Although they have obtained certain advantages from the supply of seeds, in general they do not benefit from agrarian extension programmes. During the last decade, State intervention contributed to improving their position, as their products are assured a place on the domestic market.

Rice producers cultivate larger plots of between 4 and 6 has. They apply better sowing techniques, use irrigation and have the capacity to rent machinery. Their level of organization has enabled them to make contact with the National Rice Farming Committee and with ONA. Like corn, the expansion of rice fields is associated with the State's intervention in the marketing of this crop.

As a consequence of State participation, both producers can be described as dependent, without any action strategies. This could be harmful should the situation arise in which the Government is unable to fulfil its marketing role.

Graph B.2
BALANCE OF LABOUR: 1989
CENTRAL HUALLAGA



Source: INEI, MACROCONSULT S.A.
Drawn up by: MACROCONSULT S.A.

By the same token, it should be pointed out that producers in this area live alongside subversive movements, which conditions their investments to a certain extent, as these movements usually attack the highways on which these products are transported.

B.4.6. Services Rendered

The increase in trade and services in the main urban centres in the area covered by this study, is one of the most obvious consequences of illegal coca cultivation. In secondary towns such as Juanjui, Picota and Bellavista, the increase in services is obvious: supplies, farming inputs, storage services, transport and sale of farming machinery, as well as the sale of groceries, bars and restaurants, and recreation centres.

In Tarapoto, the region's main urban centre, the increase in the supply of services is even greater. There is an intensive commercial activity in this city, and a vigorous wholesale trade that supplies the Central Huallaga's commercial network, a responsibility that is shared with Rioja in the Alto Mayo, a city that is close to the coastal centres and is also at an advantage in view of the fact that it has an airport.

Both these cities, Tarapoto and Rioja, are considered as supply centres for the inputs required in the manufacture of basic cocaine paste for the coca expansion areas in the Huallaga and Alto Mayo, respectively.

According to the preparatory work for the future economic census carried out by the National Institute of Statistics and Informatics (1987) - using the door-to-door method in the country's main cities - of a total of 2,437 establishments, 172 belong to the manufacturing industry, 5 to electricity, 10 to construction and the remaining 2,253 to marketing and other activities. 86% of the jobs are concentrated in the latter (See Table B.4.10).

Table B.4.10
TARAPOTO ESTABLISHMENTS AND PEOPLE EMPLOYED BY FIELD OF ACTVITY

Fields of Activity	Establishments		Personnel Employed	
	#	%	#	%
Total	2,437	100.0	7,596	100.0
Manufacturing Industry	172	7.1	985	13.0
Electricity	5	0.2	76	1.0
Construction	10	0.4	36	0.5
Big and Small-Scale Trading	1,614	66.2	3,151	41.5
Transport and Storage	67	2.7	426	5.6
Financial Statements	76	3.1	531	7.0
Social Services	493	20.2	2,391	31.5

Source: INEI. Pre-census calculations, 1987
Drawn up by: MACROCUNSULT S.A.

The survey carried out by INEI also involved collective establishments (markets). Three of these are in Tarapoto and the other two in the district of Morales and La Banda del Shicayo, operating 1,198 additional jobs, altogether.

Because the informtion is fairly detailed, a study can be made of the distribution of the wholesale and retail establishments, transport and storage establishments, financial establishments, community services and manufacturing industries.

With respect to wholesale trading, there are 164 establishments that employ 700 people (see Table B.4.11). The main activity is the sale of food and beverages on a wholesale basis. There are 70 warehouses, whereas for textiles and clothing there are 12, all with a good variety of merchandise and large stocks. During periods in which there is a shortage of essential national goods for example, these commercial establishments supply the market with Brazilian products brought from Yurimaguas. Mining and chemical products are also important, as are machinery and industrial material.

Table B.4.11
WHOLESALE COMMERCIAL ESTABLISHMENTS IN TARAPOTO
BY SPECIFIC FIELDS OF ACTIVITY

Activity	Establishment	Personnel Employed
Agricultural Raw Materials	22	114
Mineral and Chemical Products	10	23
Oil and its by-products	1	2
Food and Beverages	70	232
Textiles and clothing	12	35
Timber and Materials	19	70
Medicine & Pharmaceutical products	2	31
Mills and Hardware	5	18
Machinery and industrial material	15	85
Motor Vehicles	7	88
Unspecified goods	1	2
Total	164	700

Source: INE Pre-census calculations, 1987
Drawn up by: MACROCONSULT S.A.

As regards retail trading, corner stores, bars & restaurants, and bazaars are prominent, employing 887, 471 and 317 people respectively (see Table B.4.12). This proves that there is an intensive daily movement of non-resident families. In the case of Tarapoto, as opposed to other places, there is no weekly-fair day, since regular trading takes place Monday through Saturday.

Table B.4.12
RETAIL COMMERCIAL ESTABLISHMENTS IN TARAPOTO
BY SPECIFIC FIELDS OF ACTIVITY
CENTRAL HUALLAGA

Specific Activity	Establishments	Personnel Employed
Food and Beverages	756	887
Clothing and shoes	184	317
Chemist shops	21	57
Book and Newspaper stores	26	53
Hardware stores	49	101
Furniture and Home accesories	66	155
Motor vehicles	35	95
Petrol stations	29	82
Sale of watches and jewellery	3	9
Restaurants and Bars	224	471
Hotels	30	177
Unclassified small businesses	27	47
Total	1,450	2,451

Source: INEI, Pre Census Calculations,1987
Drawn up by: MACROCONSULT S.A

As regards transport, Tarapoto is reached by a broad network of passenger and cargo transport, which employs two-ton pick-up trucks, providing services to Lamas in the north and Picota, Bellavista and Juanjui in the south.

In the transport and storage activity, 13 cargo transport establishments were identified, and 20 road transport agencies, 8 airlines and 7 warehouses, among the most important. (See Table B.4.13).

In the finance and insurance field, there are 12 prominent monetary institutions, of which 5 are banking establishments and 7 are foreign exchange agencies. Likewise, there are 22 legal consultants in the area, 13 accounting services, 11 technical and architectural services (designs and plans), 4 insurance establishments and 3 advertising agencies. (See Table B.4.14).

Table B.4.13
TRANSPORT AND STORAGE ESTABLISHMENTS IN TARAPOTO BY SPECIFIC FIELDS OF ACTIVITY

Activity	Establishment	Personnel Employed
Cargo Transport	13	32
Garages	3	3
Airlines	8	69
Airline-related services	1	96
Road-transport-related services	20	62
Warehouses	7	25
Communications	15	139
Total	67	426

Source: INEI. Pre-Census Calculations, 1987
Drawn up by: MACROCONSULT S.A

Table B.4.14
FINANCE & INSURANCE ESTABLISHMENTS AND RELATED ACTIVITIES IN TARAPOTO BY SPECIFIC FIELDS OF ACTIVITY

Activity	Establishments	Personnel Employed
Monetary Institutions	12	303
Insurance	4	10
Legal Services	22	37
Technical and Architectural Services	13	40
Accounting services	11	26
Advertising services	3	4
Company services	5	48
Other Establishments	6	63
Total	76	531

Source: INEI, Pre-Census Calculations, 1987
Drawn up by: MACROCONSULT S.A

As far as community and social services are concerned, 55 public education establishments are particularly relevant. These include schools, labour training centres, academies and institutes of further education; 67 medical services, basically consultation rooms; 105 vehicle repair workshops. In this respect, it should be pointed out that motorcycles have become the most widely used method of personal transport, both in the field and in the city. (See Table B.4.15).

Finally, as regards other services, it should be mentioned that there are 54 beauty salons, 46 electrical repair shops and 23 shoe repair shops.

With respect to the trading environment as such, certain characteristics should be mentioned. First of all, in these establishments one can frequently find both locally manufactured products and imported products. Electrical appliance stores offer a range of articles, from unknown Asian brands to well known makes.

Table B.4.15
COMMUNITY AND SOCIAL SERVICE ESTABLISHMENTS IN TARAPOTO
BY SPECIFIC FIELDS OF ACTIVITY

Activity	Establishments	Personnel Employed
Public Education	55	1,081
Medical services	67	663
Film Distribution	2	11
Radio and T.V Stations	5	35
Theatre Productions	2	17
Entertainments	17	38
Shoe Repairs	23	29
Electrical Appliance Repair Shops	46	70
Car and Motorbike Repair Shops	105	316
Watch and Jewellery Repair Shops	6	8
Beauty salons	54	71
Photographic studios	8	14
Other unspecified services	20	31
Unoccupied establishments	78	-
Unspecified Activities	2	2
Total	490	2,386

Source: INEI, Pre Census-Calculations, 1987
Drawn up by: MACROCONSULT S.A

The foreign currency exchange activity employs over 40 people on a regular basis. During banking hours, this figure rises to 60.

The fleet of vehicles that circulate in the city, as already mentioned, basically consists of motorcycles and pick-up trucks, which look new and in good condition. 250 cc. motorbikes are the most frequently used, as they obviously have good rural performance, as well as two-wheel-drive pick-up trucks with double cabins with a two-ton cargo capacity.

Merchants in Tarapoto have noticed a drop in sales this year, as a result of the inflationary process that occurred during the first six months; the situation in Colombia with respect to drug- trafficking; the delay in payments to rice and corn producers; and the stabilization measures taken by the new government in August.

Among industrial establishments, small properties are predominant, especially for carpentry, dressmaking and printing. The agroindustrial activity is incipient and concentrates on milk products and bread.

Finally, it should be mentioned that there is one establishment for the manufacture of aircraft which was visited during field work, which operates in the Tarapoto airport. This is rather unusual forn a city located in the country's interior. This workshop also offers maintenance services and reconstruction work for damaged aircraft.

B.5 PRODUCTION AND MARKETING DIAGNOSIS OF MAIN CROPS

Having identified the main crops in Central Huallaga and carried out field work, below we shall study the main problems affecting the two most significant legal crops in the region.

B.5.1. Production Problems

B.5.1.1. Seeds, inputs and forestry production

As far as corn is concerned, the supply of seeds is a service provided by the Regional Research Centre "El Porvenir", located in Tarapoto. This centre supplies the Cuban Yellow - Marginal 28 tropical variety. With respect to rice, seeds are supplied by the Departmental Committee of Rice Producers, an affiliate of the National Agrarian Organization (ONA), in coordination with ECASA. The varieties provided are San Martin 86 and Alto Mayo 88, which indicates that certified seeds are produced which have been adapted to the region.

With respect to seed requirements per hectare, hard yellow corn, under rainfed conditions and low technology, uses 25 Kg. at a unit price of I/.300,000 per kilo.

Rice, grown under irrigation with high technical levels, requires 80 Kg/ha.; the unit cost is I/.350,000 per kilo.

The use of inputs as phytosanitary products - herbicides and fertilizers that are necessary for the care of both crops and to obtain an increase in productivity - is as follows: as regards corn, because of the financial limitations and the low technological levels that predominate in the region, insecticides are mainly used, such as Aldrin at 5%, which helps to control the plagues that usually affect traditional crops. The poor technical level of the cornfields is a result of the limited use of fertilizers.

For rice, which is grown under irrigation and has a higher technical profile, the use of fertilizers and phytosanitary care is more generalized, thus yields of between 4 and 5 MT/Ha. are obtained. This yield is comparable to the average national yield of 5 MT.

As far as supplies are concerned, it is evident that the supply of fertilizers by ENCI is limited, particularly with respect to urea.

The limitations of State companies are covered as far as herbicides and fungicides are concerned. The products offered are fungicides such as Cupravit, Cobos, Kocide 101, Antracol and Hinosan; insecticides such as Parathion at 50%, Azodrin 600, Lacnate, Aldrin at 5%; and herbicides such as Gramoxone, Super and Roundup. As far as fertilizers are concerned, the supply is basically urea, leaving ENCI with a limited supply of fertilizers containing phosphate and potassium.

The Central Huallaga region shows a drop in its production of forestry resources. According to Agrarian Unit records, 296 cubic metres of sawn lumber were produced in 1989, compared to 3,891.9 cubic metres in 1985. As a result, the industry in Tarapoto has been reduced, from six sawmills in operation in 1985, to only two in 1989.

B.5.1.2. Credit

One of the most important productive factors is the farming credit granted by the Agrarian Bank. In 1989, the Central Huallaga area received 2.5% of the total amount disbursed nationwide. Although this percentage may not appear significant, an analysis on a provincial scale proves that in most of the provinces in this region, loans have been granted for over half of the cultivated hectares. In some cases, such as Tarapoto and Bajo Huallaga, credits have been obtained for a larger area than the number of hectares under cultivation. However, this broad coverage conceals the fact that in all provinces, credit is concentrated on certain crops (rice, hard yellow corn, and to a lesser degree, sorghum and bananas).

This characteristic is restrained within the State's logic of favouring the crops on the national programme. Furthermore, it should be emphasized that despite the fact that benefits were obtained from the BAP, more credits were granted than the area actually under cultivation. This difference would seem to indicate that the BAP is not very strict when it comes to monetary disbursements, or that there are some influential authorities who probably use their connections to obtain credits, which they subsequently assign to other crops (coca) or to other profitable activities. It would appear that these "alternative activities" obtained the benefits of the subsidized interest rates granted to the farming sector, which was considered a priority sector. Besides this subsidy, inflation caused the interest rate to become strongly negative. For 1989, the interest rate for sustenance loans registered negative levels of 12.5%.

In Juanjui, credits are obtained for corn, rice, banana and cocoa. In Saposoa for corn, rice, bananas and cassava. The same tendency is followed in Bellavista and Picota. In Tarapoto the demand for credit is greater compared to the other areas, because of its relative importance (see Tables B.5.1.1., B.5.1.2. - B.5.1.6.).

Finally, the Bajo Huallaga region obtains the least benefits as far as credits are concerned, and like other areas, credits are mainly granted for rice and corn.

B.5.1.3. Production Costs and Profitability

The low technical level that predominates in most crops, is reflected in their low input costs. Rice, on the other hand, has a higher technical level, therefore high costs for the inputs used. With respect to daily labour cost, these are similar to all other crops, except for rice which is cultivated at a higher technological level.

For coca, the cost of maintaining one hectare amounts to I/.190,000,000, which is similar to the average costs of other crops. The participation of the cost of labour in the total cost is 68.4%, and that of inputs, 31.6%.

Table B.5.2. shows a higher profitability for coca than for other crops. The price of a kilo of coca and its yield, correspond to the processed coca leaf, since in this region there is no trading of fresh coca leaves. In order to make a comparison with other study areas, a dry leaf/fresh leaf conversion index of 30% has been applied. The profitability of coca amounts to 203.6%, followed by coffee, with a profitability of 47.3%, bananas with 46.2% and cocoa with 32.9%.

Predominant crops in the region, such as corn and rice, show a profitability of 18.8% a 9.9% (high technological level) and 27.4% (low technological level). In this case, this is contradictory, since the rice cultivated at a high technological level is affected by the high cost of

Table B.5.1.1
AREAS FINANCED BY BAP CREDIT IN 1989 IN JUANJUI
CENTRAL HUALLAGA

	HECTARES FINANCED			
	(1)	(2)	% (2)/(1)	CREDIT INTIS
Hard Yellow Corn	2,291	2,938	128.2	1,515,222,000
Rice	81	144	177.2	232,270,000
Bananas	208	92	44.2	114,510,000
Cocoa	842	12	1.4	12,000,000
TOTAL	3,422	3,186	93.1	1,874,002,000

Source: BAP Loan Statistics
Drawn up by: MACROCONSULT S.A.

Table B.5.1.2
AREAS FINANCED BY BAP CREDIT IN 1989 IN SAPOSOA
CENTRAL HUALLAGA

	HECTARES	FINANCED	% (2)/(1)	CREDIT INTIS
Hard Yellow Corn	2,750	5,321	193.5	2,533,059,500
Rice	79	106	134.2	162,978,000
Bananas	360	87	24.2	44,050,000
Cassava	140	42	30	9,199,500
Cotton	110	17	15.5	2,710,000
TOTAL	3,439	5,573	162.1	2,751,997,000

Source: BAP Loan Statistics
Drawn up by: MACROCONSULT S.A.

Table B.5.1.3
AREAS FINANCED BY BAP CREDIT IN 1989 IN BELLAVISTA
CENTRAL HUALLAGA

	HECTARES (1)	FINANCE (2)	% (2)/(1)	CREDIT INTIS
Hard Yellow Corn	13,948	10,180	75.4	4,666,689,950
Rice	1,774	4,470	652.0	9,387,414,150
Bananas	549	371	67.6	159,541,000
Grain Sorghum	1,082	353	32.6	118,170,000
Cotton	-	215	-	93,350,000
Beans	211	6	2.8	1,000,000
Soya	5	5	100.0	1,850,000
TOTAL	17,119	15,600	91.1	14,428,015,100

Source: BAP Loan Statistics
Drawn up by: MACROCONSULT S.A.

Table B.5.1.4
AREAS FINANCED BY BAP CREDIT IN 1989 IN PICOTA
CENTRAL HUALLAGA

	HECTARES (1)	FINANCE (2)	% (2)/(1)	CREDIT INTIS
Hard Yellow Corn	18,384	10,376	56.4	7,307,786,108
Rice	2,558	2,501	97.8	4,448,718,350
Grain Sorghum	559	212	37.9	90,962,000
Cotton	110	14	12.7	1,090,000
Cassava	97	1	1.0	200,000
TOTAL	21,708	13,104	60.0	11,848,756,458

Source: BAP Loan Statistics
Drawn up by: MACROCONSULT S.A.

Table B.5.1.5
AREAS FINANCED BY BAP CREDIT IN 1989 IN TARAPOTO
CENTRAL HUALLAGA

	HECTARES FINANCED (1)	(2)	% (2)/(1)	CREDIT INTIS
Hard Yellow Corn	9,801	17,459	178.1	12,316,633,000
Rice	3,421	2,155	63.0	3,922,625,220
Grain Sorghum	1,534	1,055	68.8	732,104,000
Bananas	446	530	118.8	404,255,000
Cassava	95	57	60.0	21,275,000
Beans	624	41	6.6	9,720,000
Coffee	177	33	18.6	40,240,000
Cotton	-	18	-	3,900,000
Citrus Fruits	53	7	13.2	6,450,000
Soya	19	5	26.3	1,850,000
Cocoa	54	4	7.4	940,000
TOTAL	16,224	21,364	131.7	17,459,992,220

Source: BAP Loan Statistics
Drawn up by: MACROCONSULT S.A.

Table B.5.1.6
AREAS FINANCEDC BY BAP CREDIT IN 1989 IN BAJO HUALLAGA
CENTRAL HUALLAGA

	HECTARES FINANCE (1)	(2)	% (2)/(1)	CREDIT INTIS
Rice	1,908	2,671	134.9	936,449,250
Hard Yellow Corn	710	1,714	241.4	509,072,000
Bananas	110	55	50.0	12,950,000
Cassava	130	15	11.5	4,500,000
Beans	6	4	66.7	1,200,000
TOTAL	2,936	4,459	152.0	1,464,171,250

Source: BAP Loan Statistics
Drawn up by: MACROCONSULT S.A.

Table B.5.2
COSTS AND PROFITABILITY SUMMARY
CENTRAL HUALLAGA
(thousands of intis)

	COCA 3/		RICE		CORN	COCOA	COFFEE	SORGHUM	BANANAS 4/
	T2	T1	T2	T1	T2	T1	T2	T1	
Yield (kg/ha)	1,070	1,800	5,000	2,000	365	638	2,800	800	
Price	539	122	122	100	500	348	90	500	
GROSS INCOME	575,870	219,600	610,000	200,000	182,500	221,913	252,000	400,000	
Direct Cost	190,000	152,500	540,225	147,500	118,500	135,000	270,900	211,500	
- Labour	129,960	98,058	332,238	110,035	54,984	100,035	147,099	127,958	
- Inputs	60,040	545,443	207,987	37,465	63,516	34,965	123,801	83,543	
Indirect Cost	0	0	0	0	-.-	-.-	0	0	
Financial Cost 2/	0	19,910	14,904	20,780	18,825	15,696	30,141	62,121	
TOTAL COST 1/	190,000	172,410	55,129	168,280	137,325	150,696	301,041	273,621	
PROFITABILITY INDEX	203.6%	27.4%	9.9%	18.8%	32.9%	47.3%	-16.3%	46.2%	
BREAK-EVEN	178	96	111	84	376	236	108	342	

t1= High Technical Level
t2= Medium Technical Level
t3= Low Technical Level
1/ Annual cost per ha/year
2/ Interest rate to be deducted
3/ To calculate coca profitability, a frecsh leaf/dry leaf correction factor of 30% was applied.
4/ For bananas, the yield is calculated in bunches
Source: BAP Production Costs, Tingo María Branch, 1990
MACROCONSULT Survey, November, 1990
Drawn up by: MACROCONSULT S.A

inputs and the lack of more favourable prices, despite the fact that it has a better yield per hectare, thus reducing its relative profitability.

B.5.1.4. Technical Assistance

Although the old Regional Agroindustrial Research Centre "El Porvenir" still exists, under INIAA (National Agroindustrial Food Research Institute), its responsibility to guarantee the professional quality of its experimental programmes is not supported, due to the limited extension services provided by the Ministry of Agriculture, and the "liaison peasants" they employ. The idea of this method is to disseminate technological innovations by means of a horizontal expansion between producers, through a previously trained peasant. This chain of technical assistance does not work, in view of the fact that settlements are widespread and there is very little organization in production areas, as well as a low educational level among producers. Furthermore, the technical training offered does not take into consideration the problems that have arisen as a result of seasonal migration.

It should be pointed out that rice is not so affected by the above, as producers are organized through the Departmental Committee of Rice Producers.

B.5.2. Marketing Problems

Marketing has become specialized mainly in rice and hard yellow corn, and is reflected in the main towns within the area covered by this study.

B.5.2.1. Marketing flows

The centres where marketing flows originate are main towns at a provincial level, such as Tarapoto, Picota, Bellavista and Juanjui, as well as district towns located in the valleys across Central Huallaga.

Production is mainly aimed at coastal markets. In the case of hard yellow corn, the production is aimed at Chiclayo, Trujillo, Piura and Lima, where the main agroindustrial food complexes are located. In the case of rice, production is marketed for direct urban consumption.

As far as corn is concerned, ENCI's purchases have increased since 1989. However, during the last year, purchases have dropped throughout the department of San Martin. For 1989 (see table B.5.3), 37.9% of the total production was purchased.

As regards rice, ECASA's purchases have been considerably reduced over the last few years (see Table B.5.4).

Table B.5.3
PURCHASES OF CORN BY ENCI
IN THE DEPARTMENT OF SAN MARTIN
(1985–1990)

	Purchases MT (1)	Production San Martin (2)	% (1)/(2)
1985	24,000	117,000	20.50
1986	48,000	120,000	40.00
1987	54,000	133,000	40.60
1988	79,000	135,000	58.50
1989	50,000	132,000	37.90
1990 (1)	10,000	81,000	12.30

(1) Includes purchases until July 1990
Source: ENCI Headquarters
Drawn up by: MACRONSULT S.A.

Table B.5.4
PURCHASES OF PADDY RICE BY ECASA
IN THE DEPARTMENT OF SAN MARTIN
(1987–1989)

	Purchases M.T (1)	Production San Martín (2)	% (1)/(2)
1987	78,861	99,843	79.0
1988	85,347	122,844	69.5
1989	55,662	109,729	50.7

Source: ECASA and Departmental Agrarian Unit
Drawn up by: MACROCONSULT S.A.

B.5.2.2. Marketing Channels

The agents involved in the marketing process, are producers on the one hand and the State on the other, through its marketing companies.

For the case of yellow corn, participants are: the producer, ENCI and the agroindustrial complexes. For rice, the producer, ECASA within the study area, and the national marketing network outside the study area.

To begin a marketing circuit, an essential requirement is for producers to show State agents a production certificate.

The main difficulties faced by marketing agents are the lack of financial resources, which limits their purchasing capacity and in some cases they are unable to comply with their payments to producers. At the present time, as a result of restrictive fiscal policies, rice farmers in the area are suffering from a delay in their payments.

On the other hand, State companies have excess stocks of marketed products, stimulated by the undervalued rate of exchange.

B.5.2.3. Storage Infrastructure

In the study area, the storage capacity of State companies is insufficient for the production volume in the area. In the case of corn, ENCI can store a maximum of 16,500 M.T., equivalent to only 16% of the prodcution volume (see Table B.5.5).

If the previously mentioned problems of surplus stock are taken into consideration, then obviously the purchasing capacity of this company would be even lower.

As regards the milling infrastructure for rice, the storage capacity for paddy rice is 26,703 M.T. The study area only concentrates 25% of the storage capacity in the department. With respect to pounded rice, the storage capacity is a mere 5,160 M.T., representing 40% of the total storage capacity in the department (see Table B.5.6).

B.5.3. Road, river and air transport infrastructure

The road network, so essential for the proper flow of transport, is constantly deteriorating, therefore products become more expensive, with a limited flow. The network includes roads at a national, departmental and neighbourhood level.

On a national scale, the 886 Km. long Chiclayo-Olmos-Corral Quemado-Tarapoto-Juanjui road comprises the nation's No. 1 highway (the Panamerican highway), the No. 4 highway (Olmos-Corral Quemado-Chamaya) and the No. 5 highway (Marginal Jungle Highway). Only the route No. 1 stretch of this road is hard-top, the other two are unpaved and in a very bad state, due to lack of maintenance, therefore travelling time is doubled. Cargo is transported on 20 M.T. trucks, and the fleet requested in November 1990 for the Tarapoto-Chiclayo stretch was I/.800 million.

Table B.5.5
LOCATION AND CAPACITY OF ENCI'S STORAGE FACILITIES FOR RICE
CENTRAL HUALLAGA

Province	Location	Storage Capacity (MT)
Tarapoto	Tarapoto	3,000
Tarapoto	Chayuta	1,500
Picota	Picota	4,000
Picota	Puerto Rico	500
Bellavista	Bellavista	500
	San Pablo	1,000
	Sisa	500
Mariscal	Juanjuí	3,000
Cáceres	Huicungo	500
	Campanilla	500
Mariscal	Saposoa	1,000
Cáceres	Socanche	500
Study area		16,500
Departamental Total		23,400

Source: Departmental Agrarian Unit
Drawn up by: MACROCONSULT S.A.

Table B.5.6
RICE MILLING INFRAESTRUCTURE BY RURAL DEVELOPMENT CENTRES
CENTRAL HUALLAGA

RDC	Number Mills	Milling Capacity	Storage Capacity Paddy Rice	Pounded Rice
Juanjuí	1	1.2	217	118
Saposoa	1	1	200	120
Bellavista	5	7.6	5,297	950
Picota	3	4	5,481	705
Tarapoto	7	8.9	10,004	1,219
Bajo Huallaga	2	3.5	5,450	2,048
Total Study Area	19	26.2	26,703	5,160
Departamental Total	-.-	82.7	106,048	12,821

SOURCE: Departamental Agrarian Unit
Drawn up by: MACROCONSULT S.A.

It should be pointed out that the national network also includes route No. 8 which starts in Tarapoto and provides access to the port of Yurimaguas, which is outside the departmental boundaries in Bajo Huallaga, from where the supply of fuel is obtained. This road is 134 km. long and is also deteriorated.

Finally, it should be taken into consideration that the construction has been anticipated of Transversal Highway 10B, starting at the Juanjui bridge towards Trujillo. Only 11 kms. of the Huicungo-Abra Naranjillo stretch (going back over the Huallabamba river and its tributaries), have been built between the Santa Marta bridge on the marginal highway, and the district of Huicungo south west of Juanjui. The Naranjillo gorge is located at an altitude of 3,700 m.a.s.l. and would be connected to Colemar in the department of La Libertad. The length of this road is approximately 203 kms.

At a departmental level, we have roads 103 and 106, which connect the marginal highway with the towns of Saposoa and Choyuta respectively.
Route 103 starts in Tingo de Saposoa, nine kilometres south of Bellavista, connecting the towns of Sacanche, El Eslabon, Piscoyacu and Saposoa. It is 30 kms. long and crosses over the Saposoa river. Route 106 starts near the Colombia Bridge, south of Tarapoto, it is a surfaced road as far as Shapaja, and then unpaved as far as Chazuta, with a total length of 25 km.

At a neighbourhood level, routes 525, 538 and 515 are particularly important, as they connect outlying towns in the Ponaza, Biabo and Sisa river basins with the marginal highway. These areas specialize in rice and corn crops. However, these roads have not been properly maintained and transport is difficult.

Route 525 in the Ponaza valley, is a 43 km. long surfaced road in a very bad state. It starts on the right bank of the Huallaga river in Cedropampa, leading to Tingo de Ponaza and Huiñapo, a 31 km. surfaced road. From this point, the 12 km. stretch up the Shamboyacu valley is not surfaced. Route 538 in the Biabo valley, also starts on the right bank of the Huallaga river and starting at the Puerto Rico bridge, serves the towns of Nueva Lima and Cuzco. This road is a 37 km. surfaced road.

There are no bridges on these two roads to connect them with the Huallaga river, therefore rafts must be used.

Route 515 in the Sisa valley, unlike the others, starts on the left bank of the Huallaga river, i.e. from the marginal highway itself (route No. 5) and it is surfaced.

At a neighbourhood level, secondary routes 520 and 537 are also important. They start at the marginal highway and serve the Buenos Aires and Pucacaca settlements, respectively. In both cases they are 12 km. surfaced roads.

River transport is only important for the towns located away from the marginal highway in the Bajo Huallaga, starting at Chozuta at the end of highway 106. This means of transport permits trading in small riverside towns such as Huimbayoc, Navarro and Papa Playa, on the shores of the Huallaga river. It is used to transport products and is obviously restrictive when large volumes are involved. The cargo capacity of the vessels varies between one and two metric tons.

Air transport is covered by national commercial airlines. There are twelve weekly flights from Tarapoto to Lima. At a departmental level, there are daily flights carried out by 17 airlines providing aerotaxi services to Yurimaguas, Buenos Aires, Picota, Bellavista and Juanjui. An average of ten daily flights are made by aerotaxis, serving traders in the area. The cost for a one hour flight is US$300.

B.6 Natural Resources and Contamination

B.6.1 Contamination from Agro-chemicals and from the Manufacture of BCP

Coca production has caused changes in the environment, due to the intensive use of fertilizers, insecticides and fungicides. Moreover, these alterations have been aggravated by the indiscriminate use of chemical inputs, used in the manufacture of BCP.

The first stage of the manufacturing process of basic cocaine paste, known as the "maceration" stage, causes the highest degrees of contamination. This is due to the fact that the scrap from the inputs used in the "wells", is unloaded into the main rivers in the region. River contamination affects the ecosystem - it has a negative effect on the flora and fauna, and above all, it is harmful for the population who obtain their water resources from rivers.

Furthermore, it should be considered that the deforestation resulting from the digging of large "maceration wells", as well as centres for manufacturing and washing the basic cocaine paste, directly affects the balance of the area's ecology.

Assuming the total coca leaf production in the Central Huallaga (144,900,000 kg.) are aimed at the production of basic cocaine paste, the contamination potential in this area is high, since large quantities of very harmful inputs are evacuated.

From the ratios obtained by Marc Dourojeanni for the production of BCP, regarding the combination of the input volume per unit of coca leaves, it is evident that in the Central Huallaga area, in order to convert the entire production of fresh coca leaves in the study area, to basic

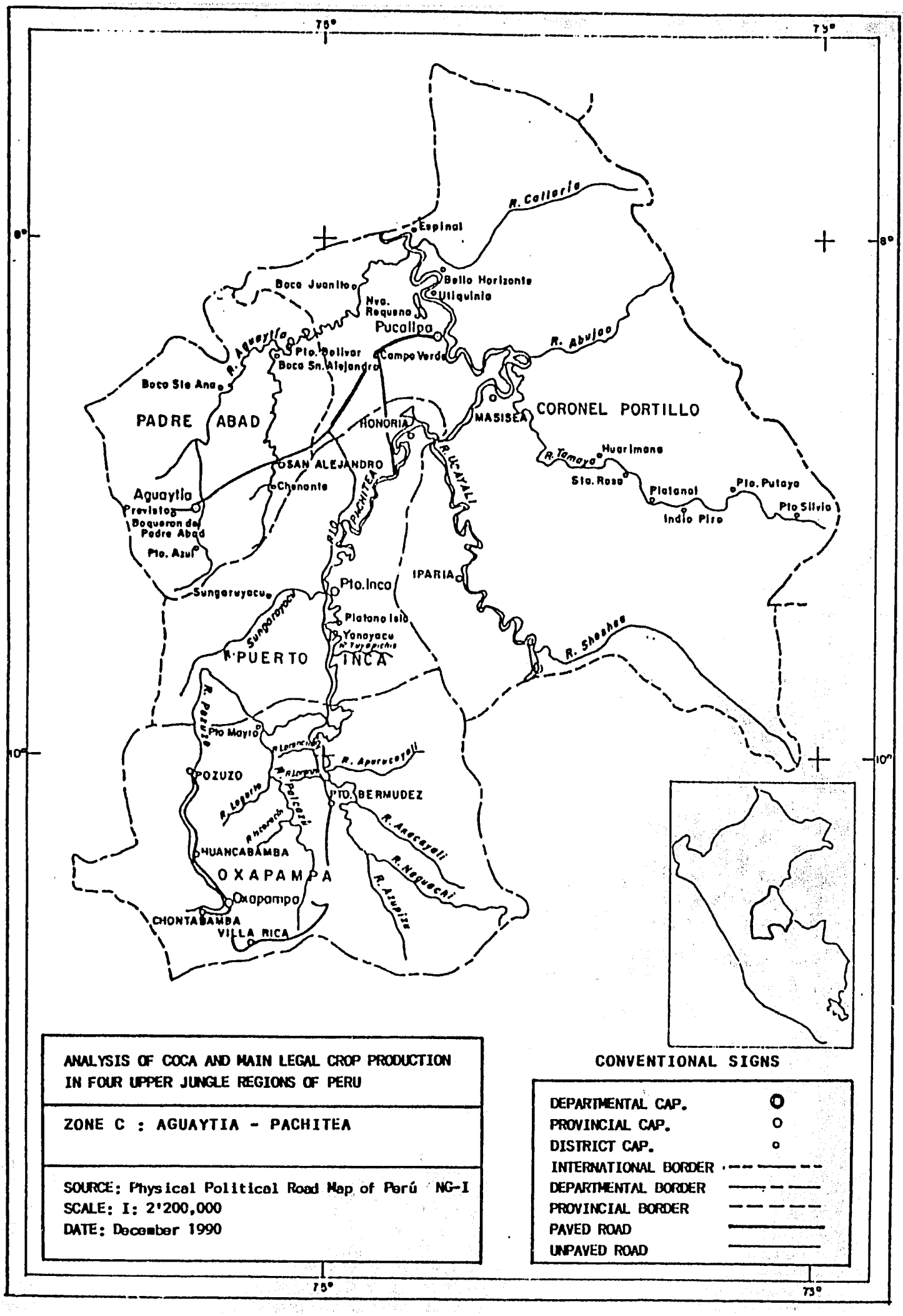
cocaine paste, the following quantities of inputs are required, assuming first of all that the dry/fresh leaf ratio is 25% (see field sample from La Convencion - Lares and Alto Marañon in the Methodological Annex):

Kerosene	22,680,000 lt.
Sulphuric Acid	12,600,000 lt.
Potassium Carbonate	6,300,000 Kg.
Carbide	1,260,000 Kg.
Toilet Paper	6,300,000 Kg.

These figures could be under-valued, since the processing of fresh leaves requires a greater volume of inputs (in Central Huallaga processing involves a two hour exposure to the sun).

The effects of the contamination have become evident by the existence of fish on the surface of the Cumbaza and Shicayo rivers, according to surveys carried out among the population in Tarapoto and Bellavista. Symptoms of contamination from toxic substances appear to be more alarming in the ravines formed by the Sisa and Biabo rivers.

The other stages involved in the manufacture of cocaine do not require large quantities of inputs, mainly acetone and toluol at a ratio of 1 lt. per kilo of basic cocaine paste, but these acids have a much higher contamination potential.



ANALYSIS OF COCA AND MAIN LEGAL CROP PRODUCTION IN FOUR UPPER JUNGLE REGIONS OF PERU

ZONE C : AGUAYTIA - PACHITEA

SOURCE: Physical Political Road Map of Perú NG-I
SCALE: I: 2'200,000
DATE: December 1990

CONVENTIONAL SIGNS

DEPARTMENTAL CAP.	◎
PROVINCIAL CAP.	○
DISTRICT CAP.	○
INTERNATIONAL BORDER	---—---
DEPARTMENTAL BORDER	——-——
PROVINCIAL BORDER	— — —
PAVED ROAD	———
UNPAVED ROAD	———

C. AGUAYTIA - PACHITEA

C.1 INTRODUCTION

The area covered by this study is located in the middle-eastern part of the country, between 545' and 1052' latitude south and 7030'and 7601' longitude west. It consists of 7,422,609 has. of foothills (mainly east of the eastern mountain range) and of Amazon plains, as well as clearly distinguishable intermediate sectors.

The most prominent geographical features are the eastern branch of the Andean mountain range and the Ucayali river, which represent the two extreme altitudes in the area, equivalent to approximately 5,000 m.a.s.l. and 150 m.a.s.l. respectively. Both these features are determining factors as far as the behaviour of the area's natural systems are concerned, as they involve the region in which rainfall is collected and distributed. Its characteristics are typical of jungle environments, with areas of higher jungle.

The area covered by this study comprises the provinces of Padre Abad and Coronel Portillo in the department of Ucayali; Puerto Inca province in the department of Huanuco and the Oxapampa province in the department of Pasco. Within the regionalization process taking place in the country, the former two provinces form part of the Ucayali region, whereas the others form part of the Andres Avelino Caceres region.

Hydrographically, the region is influenced by three important rivers: Ucayali, Aguaytia and Pachitea, and its tributaries, Sungaruyacu, Pichis, Palcazu and Tamaya being the main ones. Also located within the scope of this project are lagoons and "cochas"[1], of which Inuria, located on the right bank of the Ucayali river next to the Tamaya river, is the most important.

The most important towns are Pucallpa (capital of Coronel Portillo, with a population of almost 140,000 people), Oxapampa, Aguaytia, Iscozacin and Puerto Bermudez, with smaller populations.

As far as the climate is concerned, the areas covered by this study are hot and mild, with rainfall that varies between 3,000 and 7,000 mm/year. In Aguaytia for example, there is an average rainfall of 3,500 mm/year, however the rainfall recorded in Boqueron del Padre Abad reaches 6,000 mm/year, which is similar to the rainfall in Iscozacin in the Upper Jungle (Selva Alta), which has reached up to 7,020 mm/year.

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1 "Cochas": small ponds formed by depressions or old river beds.

The average temperature for the year varies between 24 and 28 C. The lowest averages are in the Selva Alta (Pichis and Palcazu) and part of Aguaytia-Boqueron de Padre Abad.

Natural resources vary depending on the ecosystem. For example Iscozacin, Puerto Bermudez and the headlands of the Aguaytia river are tropical rain forests pertaining to the Selva Alta, with an undulating physiography and mostly forestry soils. These soils tolerate heavy rainfall when they are wooded, and are rich in fauna, particularly protective soils.

Pachitea, Puerto Inca, Sungaruyacu, Von Humboldt, as well as Callaria, Irazola, Masisea and Iparia belong to the Selva Baja ecosystem, a flat physiographical area, or jungle plains, where predominant soils are slightly sloped, prone to flooding and with little rainfall.

The Aguaytia and Pachitea areas are rich in forestry species, numbering 2,500 species, of which between 10 and 15 species are used for the lumber industry, under the selective felling method. In the Palcazu valley, the clear-cutting strip method is being applied, taking advantage of the entire species (250 m3/ha.)

In Ucayali, there are about 5,975,000 has. of woods suitable for forestry production that belong to the State, which are in danger of being pillaged as a result of selective felling, which may subsequently be occupied by coca farmers.

The ecological impact of coca cultivation in the region, is mainly evident from the deforestation of wooded areas, soil erosion, contamination of rivers and their basins, and the extinction of species of flora and fauna as a result of deforestation.

On the other hand, the intensive work required in preparing the land for this crop - well-boring and weeding - leaves these lands uncovered, therefore heavy rainfall causes soil erosion. This is aggravated by the distance between plants (1m. x 0.40 m.) which does not give the soil proper protection.

The intensive use of chemical products to control the plagues and diseases to which coca crops are exposed, causes river contamination, thus affecting hydrobiological resources.

The economy is moved via two networks: the Pucallpa-Tingo Maria highway, which is the main route for the marketing of these products, including coca and basic cocaine paste. The migratory flow of the population between Pucallpa-Aguaytia-Tingo Maria is channelled through this road, reaching Lima via the Central Highway.

During the last few years, the migratory flow from the highlands, because of its proximity and climatic conditions, has been aimed at the Selva Alta (Puerto Bermudez, Iscozacin and Aguaytia), forcing native communities into the higher parts. Furthermore, territories alongside the Federico Basadre highway and the Marginal highway have been heavily popu-

lated, as well as the banks of the main rivers, where the livestock activity takes place, including landing strips for their transport to Lima.

The second great trading network joins Puerto Inca, Puerto Bermudez, Iscozacin, Villa Rica and La Merced, also reaching Lima through the Central Highway. This only serves to channel the marketing of farming products and is not connected with the marketing of coca or its by-products.

Transport of lumber is usually made from Aguaytia and Pachitea towards Pucallpa, then through Tingo Maria and Huanuco before it is finally transported to Lima.

Callaria, Masisea and Iparia channel their activities mainly to Pucallpa, but also to Contamana and Iquitos in the department of Loreto, where they market their products.

As far as institutional activities are concerned, in general terms it can be said that State activities are very limited. Moreover, main roads have become dangerous and insecure for both cargo and passengers, which adds an additional risk element as far as economic activities are concerned.

C.2. IDENTIFICATION AND QUANTIFICATION OF AREAS GROWING COCA AND OTHER CROPS.

In order to identify the cultivated areas in the region, it is important to define beforehand what the main crops are and where they are grown. These can be classified as annual crops: rice, cow peas, beans, corn and cassava; and permanent crops: anatto, cocoa, coffee, coca, oranges, pineapples and bananas (see Table C.2.1). Current distribution appears in graph C.1.

C.2.1 AREAS PRODUCING COCA

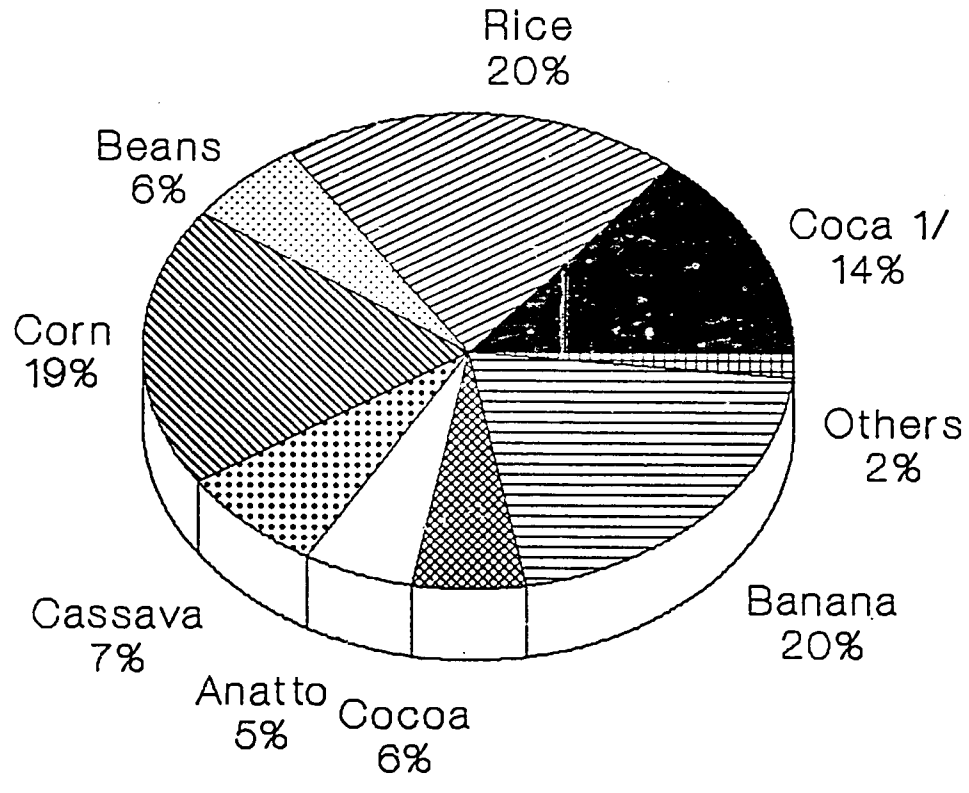
C.2.1.1. Legal Area

In Aguaytia-Pachitea, the cultivation of coca is illegal. This was established some 15 years ago, when police forces were ordered to repress this activity.

C.2.1.2. Illegal Area

Initially, most of the coca was grown at the bottom of the valleys, hidden among small rivers; in the headlands of the large river basins; on steep slopes that sometimes exceed 40 degrees; or at altitudes of up to 1,800 m.a.s.l.. Moreover, coca was also found near the highway and on river edges, though on a smaller scale.

Graph C.1
AREA UNDER CULTIVATION 1989
AGUAYTIA - PACHITEA



Source: INIIA, BAP, Minist. Agriculture
MACROCONSULT S.A.
Drawn up by: MACROCONSULT S.A.

1/ The coca area corresponds to 1990.

Table C.2.1
IDENTIFICATION OF THE REGION'S MAIN CROPS
AGUAYTIA – PACHITEA

CROP	CORONEL PORTILLO	AGUAYTIA	PUERTO INCA	OXAPAMPA
ANNUAL				
. Rice	*	*	*	*
. Cow peas	–.–	–.–	–.–	*
. Beans	*	*	*	*
. Corn	*	*	*	*
. Cassava	*	*	*	*
PERMANENT				
. Anatto	–.–	–.–	*	*
. Cocoa	*	*	*	–.–
. Coffee	–.–	–.–	–.–	*
. Coca	*	*	*	*
. Oranges	*	–.–	–.–	–.–
. Pineapples	*	–.–	–.–	–.–
. Bananas	*	*	*	*

* Cultivated
–.– Not cultivated
Source: INIAA Farming Production Statistics from the Ucayali Experimental Station, Ucayali, 1989
Ministry of Agriculture, Farming Statistics, 1989.
General Statistics Bureau
BAP: Crops pertaining to the 1989 season. Ucayali, Oxapampa and Puerto Inca
Drawn up by: MACROCONSULT S.A.

At the present time, coca crops are found on brittle forestry soils that are prone to erosion and therefore deteriorate rapidly. No properties can be acquired on this land, due to the Forestry Law.

Throughout the field work, it was discovered that peasants, and our informants in general, had no idea of what a hectare really is, which is why the area and the productivity per hectare are often over-estimated.

According to information obtained from State institutions at a departmental level and through interviews to experts on this subject, the estimated area for the Aguaytia basin was around

10,000 hectares. This figure was readjusted to 3,700 has. after the area was surveyed. Interviews were also made to people connected with this activity.

Table C.2.2
IDENTIFICATION AND ESTIMATES OF COCA GROWING AREAS
AGUAYTIA-PACHITEA
(hectares)

REGION OR BASIN	PROVINCE OR DEPARTMENT	REGION OR DISTRICTS	HECTARES
TOTAL			4370
AGUAYTIA (Ucayali)			3700
	PADRE ABAD (Ucayali)		2750
		Puerto Azul-Previsto Abra or Boqueron del Padre Abad	1250
		Chananta-Chambira-Chio San Alejandro-Boca Sta. Ana-Gradayacu-Headlands of Aguaytia river	1500
	CORONEL PORTILLO (Ucayali)		950
		Downstream on the Aguaytia-river-Boca San Alejandro-Pto.Bolivar-Boca Juanito-Curimana-Nueva Requena-Neshuya-Campo Verde	500
		Espinal-Bello Horizonte-Headlands of the Callaria river-Utiquinea	150
		Huarimann-Santa Rosa-Platanal-Indio Piro-Puerto Putaya-Puerto Silvia-Tamaya river (headlands)	300

(continues)

PACHITEA (Pasco and Huanuco)			670 =====
	OXAPAMPA (Pasco)		280 ----
		Pichis river–Pto.Bermúdez–Anacayali river	30
		Cajonari–Lorenzo–Lorencillo I–Lorencillo II	200
		Nuevo Peru–Agrochapi	40
		Palcazu river–Pto.Mayro–San Cristobal–Lagarto–Iscozacin	10
	PUERTO INCA (Huanuco)		390 ----
		Pozuzo river–Huancapumayo–Chaclla–Du Bois	240
		Sta.Isabel–Yanayacu–Plátano Isla–Sungaruyacu, behind the settlements, towards the hills	100
		Sungaruyacu–Sungarillo–San Antonio–Pata–Km 0 of the marginal highway close to forestry settlements	10
		Yuyapichis–Apurucayali–Puerto Inca	20
		Headlands of Sungaruyacu–towards San Alejandro	20

Source: National Geographic Institute (NGI). Maps 1 in 100,000. 1989
AID Project – Peruvian Government
IGN, maps 1 in 450,000
MACROCONSULT S.A. Survey, 1990
Drawn up by: MACROCONSULT S.A.

In the case of the Pachitea basin, after our research and comparing the information obtained from different sources, the estimated area is 670 has., the greater part being in the province of Puerto Inca (390 has.) and within this province, in Codo del Pozuzo.

Thus, the estimated illegal cultivated area in Aguaytia-Pachitea amounts to 4,370 has., of which 85% is concentrated in the Aguaytia area. This total area represents 14% of the total cultivated area in the region. It should be pointed out that this percentage is only exceeded by the rice, banana and corn plantations.

C.2.2. AREAS GROWING OTHER CROPS

C.2.2.1. Actual area of other crops

According to the studies carried out by ONERN (National Bureau for the Evaluation of Natural Resources), and the Special Pichis Palcazu Project (PEPP), The study area has approximately

Table C.2.3
AREA OF OTHER CROPS: 1989
(hectares)

	CORONEL PORTILLO	AGUAYTIA	PUERTO INCA	OXAPAMPA	TOTAL
ANNUAL					
. Rice	4,780	340	630	275	6,025
. Cow peas	- . -	- . -	- . -	30	30
. Beans	1,375	70	255	80	1,780
. Corn	4,225	545	690	400	5,860
. Cassava	1,380	300	400	145	2,225
Sub-total	11,760	1,255	1,975	930	15,920
PERMANENT					
. Anatto	- . -	- . -	1,200	450	1,650
. Cocoa	215	100	1,400	- . -	1,715
. Coffee	- . -	- . -	- . -	250	250
. Oranges	60	- . -	- . -	- . -	60
. Pineapples	145	- . -	- . -	- . -	145
. Bananas	2,830	1,450	1,470	455	6,205
. Pijuayo	- . -	- . -	- . -	45	45
Sub-total	3,250	1,550	4,070	1,200	10,070
TOTAL	15,010	2,805	6,045	2,130	25,990

Source: INIAA, Agroeconomic Research Department, Pucallpa
BAP, Basic Budgets, Schedules. Ucayali
Ministry of Agriculture, Natural Resources and Production Secretariat, Ucayali
Drawn up by: MACROCONSULT S.A.

245,700 hectares dedicated to the farming activity, of which (according to INIAA (National Institute of Farming and Agroindustrial Research), the Peruvian Agrarian Bank (BAP), the Ministry of Agriculture, and field surveys), only 25,990 has. (10.5% of the total) are used, for both annual and permanent crops. (See Table C.2.3).

Prominent among these crops are bananas, corn and rice, which together represent 69.6% (18,090 has.), followed by cassava. Rice and corn are aimed at supplying every region in the country, therefore their demand directly depends on the extra-regional market, whereas cassava and bananas are part of the staple diet of the local population, therefore their production is relatively constant. 61.2% (15,920 has.) is dedicated to the production of annual crops, and 38.7% (10,070 has.) to permanent crops.

Land distribution by crops is subject to their accessibility, which depends on the nature of the land, the state of the roads and the distance from marketing centres.

In general, crops handled with medium technology - beans and corn - are located in terraced sectors (prone to flooding, not prone to flooding, and boggy); rice and cow peas are grown in high, medium and low sectors, prone to flooding. Cassava is usually grown on terraces that are not prone to flooding. Low technology crops, traditional in this area, are located either on terraces or on mountains with slopes that sometimes exceed 30%.

Permanent crops with medium technology, such as anatto, coffee, "pijuayo" and pineapples, are located on medium and high terraces and on mountains with 25% slopes. Bananas are grown on medium and low terraces that are not prone to flooding.

As regards the distribution of land in the provinces involved in this study, the following analysis has been made (See Table C.2.3.).

Coronel Portillo (Pucallpa)
The area dedicated to farming production is estimated at 15,010 hectares, 78% of which correspond to annual crops (11,760 has.) and 22% to permanent crops (3,250 has.). In this province, the dominant land forms correspond to low terraces, prone and not prone to flooding, in which rice, corn, beans and peanuts are grown, the first two being the most prominent, with 57% of the area used.

As far as permanent crops are concerned, it can be appreciated that bananas are outstanding, with 18% (2,830 has.). There is a tendency at present for the area on which anatto, cocoa, "pijuayo", palmetto and oilypalm are grown, to increase substantially due to the intensive promotion carried out by INIAA and private companies.

Padre Abad (Aguaytia)
The productive area here is 2,805 hectares, of which 45% (1,255 has.) correspond to annual crops and 55% (1,550 has.) to permanent crops. Corn, rice and cassava are the most prominent, equivalent to 42% of the annual crops, whereas bananas are produced on over 50% of the total area.

Puerto Inca
The surface area dedicated to farming production is estimated at 6,045 hectares, 33% (1,975 has.) for annual crops and 67% (4,070 has.) for permanent crops. Among the annual crops, corn and rice represent 22%. The predominance of cocoa and anatto as permanent crops is due to the promotion carried out by the United Nations Development Programme since 1987.

Oxapampa
The analysis of the production area mainly refers to the Palcazu and Pichis valleys, estimated at 2,130 hectares. Annual crops take up 43.7% (930 has.), corn and cassava being the most prominent. Permanent crops take up 56.3% (1,200 has.), bananas, anatto and cocoa together representing 36.8% of the total. It should be emphasized that in this area, PEPP, through the Programme of Credit in Kind, carried out some important promotion work for cow peas, coffee (Coffee canephora var Robusta) and "pijuayo". Private companies have also had a certain amount of influence.

C.2.3. POTENTIAL EXPANSION OF COCA

Guidelines

In order to estimate the potential, consideration must be given to the ecological, strategic and socio-economic characteristics of coca cultivation in surrounding areas, to be obtained through field analyses, desk work and interviews.

a) Ecological features

In the areas referred to above, we found that coca is grown in areas that are classified as suitable for forestry (according to the land classification by capacity drawn up by ONERN - see Appendix 2). Of these, those with good drainage are chosen, obviously to prevent rotting of the coca plant's roots: medium and high terraces; steep slopes that are hard to reach; ravines; and dissected terraces, including slopes that exceed 40%, at altitudes ranging from 200 to 1,800 m.a.s.l.

Occupied areas have been grouped as follows: Natural Forests, Swamps, Tall Grass, Mountain Forests, High Perennial forests, Hillside Forests and medium terraces. These areas fulfil the temperature, humidity and rainfall requirements for the coca variety sown in Aguaytia and

Pachitea. This is the Erythroxylon plant of the Erythroxylon coca lam species, Erythroxylon coca coca variety.

Generally speaking, coca is usually found as a single crop in the area covered by the study, except in a few cases, when it is located under trees, near brushwood, or as a companion for a permanent crop.

According to experts, it is not technically recommendable to combine coca with other crops, as diseases could be transmitted. However, such details are considered secondary by coca producers.

b) Strategic features

The location of coca plantations is also related to transport facilities and "security". Coca farmers seek rapid means of communication such as roads, rivers and airports that are beyond police control.

As regards highways, these are located at a distance of 2 to 4 km., depending on the size of the plots on which settlers grow their crops. Since coca plantations are set up behind such areas, these can be expanded up to a maximum of 8 to 10 km. inland.

Coca can be found by large and medium rivers, close to a road or a port; two hours upstream or downstream by boat (5 to 10 km. due to the irregular course of the rivers); by small rivers, in catchment areas, often on river edges, and always in dissected terraces or streams. Generally there is a port, a small town or a landing strip nearby, at an average distance of about 5 km.

All these characteristics are avoided when special topographic conditions are available for the crop. In this case, ravines, small inter-Andean valleys, high terraces, dissected terraces and hillsides are all used.

Furthermore, besides "security" and transport facilities, there are other strategic parameters, such as connections with the centres that provide inputs. In turn, these will then generally purchase the product, which is why it is difficult to open a new area for cultivation. In the case being studied, Aguatia is connected with Alto Huallaga by the Federico Basadre highway (Pucallpa-Tingo Maria); the Puerto Inca, Puerto Bermudez, Iscozacin areas, and the entire Pachitea region, all link up to this highway.

Codo del Pozuso, can be reached through the Chacila to Huanuco area, or through Du Bois to the Marginal highway as far as Dantas and subsequently via the Federico Basadre road to Tingo Maria. This factor limits coca expansion.

c) Socio-economic features

Socio-economic features are varied, and involve accessibility to the area, the market, transport, the suply of labour and the presence of subversive movements and native communities.

Accessibility to the area - fuel expenses for vehicles, aircraft or boats - is always taken into account, due to the marketing system used; although the crops's profitability ratio would be 1 -10, the marketing of washed paste would exceed the 1-100 ratio.

The market also has an influence. During the problem which arose in Colombia, the coca economy dropped considerably. This was faced simply by delaying the harvest, in the hope that prices would improve.

An important factor is the cost of transport for the inputs required for processing. This cost increases constantly. Specialized personnel are required, who usually work at night.

The availability of labour is a key factor for the different sowing jobs (seedlings, felling, land clearance, stacking, burning,land preparation, welling, sowing, fertilizing, weeding, phytosanitary care, harvesting, preparation of "Eras"[2], drying).

However, it should be borne in mind that labour requirements depend on the production technology used. Availability of labour is directly related to the Economically Active Population (EAP) in the area, and labour requirements for legal crops.

Facilities for means of communication, transport, freight, hotel services, commercial banking and others, also affect the economy.

Among the factors of a social nature that are strongly linked to the coca activity, are the subversive movements that encourage its expansion. On the other hand, police control tends to limit this activity.

Lastly, the role played by native communities should be pointed out. Because of their organization, tradition and culture, they have rejected coca cultivation. In their territories, few coca plants can be found and when these exist, they are only for self-consumption ("chaccheo"[3]). This is why the areas where native communities live, such as Palcazu and Puerto Bermudez, are not considered as potential areas for expansion.

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2 "Eras": stony or cemented plots, or flat surfaces exposed to the sun.

3 "Chaccheo": traditional coca mastication (peasant customs).

Estimated Potential

For this estimate, the ecological and strategic parameters that could be quantified were taken into account, using the Geographic Information System (GIS). (Some data was computerized, whilst other data used had already been previously computerized). Likewise, areas occupied by native communites were also considered as part of the social parameter (Register of Native Communities in the department of Ucayali's Development Corporation).

We have obtained results from the GIS estimates, after making an estimate of the highways, rivers and main towns in the area.

90% of the territory occupied by Native Communities are soils suitable for forestry, therefore only this percentage has been taken into account for the analysis.

AGUAYTIA

Applying the ecological and strategic parameters to the Aguaytia case, there should be 482,460 has. available; however if the area occupied by native communities is deducted, then the potential area is equivalent to 370,523 has. This figure was obtained as a result of the analysis of the Padre Abad and Coronel Portillo areas.

In the Padre Abad province, after deducting the GIS figures, 378,900 has. would be available, though this includes the native communities. In this province there are five (5) Communities, three of which are located in the Padre Abad area and two in Irazola, covering 19,165 has. and 15,974 has. respectively. There is also an expansion of 23,965 (future title deeds for the land used by these communities), giving a total of 59,124 has. to be deducted, leaving 319,776 has. as a potential area for the expansion of coca crops.

In the case of Coronel Portillo, after the GIS analysis, there would be 103,500 has. available. It should be pointed out that the strategy for the districts of Masisea Iparia and Callaria is rather limited, because of their distance from the Operations Centre and the transient nature of the people. There is therefore no potential, more so if the territory occupied by native communities is borne in mind.

The area occupied by native communities in this province is distributed as follows:

Campo Verde	4,108 has.
Callaria	19,832 has.
Masisea-Iparia	90,171 has.

Thus, the potential for Coronel Portillo is represented solely by the Campo Verde area, totalling 50,747 has.

PACHITEA

In Pachitea, the expansion area is greater than in the Aguaytia area. If the GIS is applied, 823,500 has. would be available, but if the areas occupied by native communities are deducted, then the potential area amounts to 678,174 has.

At a provincial level, the analysis considers Oxapampa in the department of Pasco, and Puerto Inca in the department of Huanuco.

In Oxapampa province, 39 communities are concentrated in the district of Puerto Bermudez, occupying an estimated area of 60,000 has. This area is larger than the area obtained by deducting ecological and strategic parameters, therefore there is no potential for expansion. In Lorencillo, there are 14 communities occupying approximately 40,142 has., leaving 225,682 has. for possible expansion. In Puerto Mayro, two communities occupy 6,000 has., leaving a potential area of 8,976 has. It should be mentioned that there are no native communities in Nuevo Peru, since most of the population in that area are settlers, therefore the figures obtained from the GIS are maintained, amounting to 52,416 has. Thus, the total potential in Oxapampa is equivalent to 287,074 has.

In Puerto Inca province, there are few native community areas to be deducted, since these can only be found in the headlands of the Sungaruyacu river, in which the Sinchi Roca community live on an area of 18,000 has. In Codo del Pozuzo, the area occupied by the population with a Tyrolese background must also be deducted, since their social organization will not permit coca cultivation. This area is estimated at 40,000 has., representing 80% of Pozuzo.

The potential area for the Puerto Inca province is therefore 391,100 has.
Thus, the potential for the Aguaytia-Pachitea area, after deducting the quantifiable factors, is 1,048,697 has.

However,this potential for expansion is subject to factors that cannot be quantified, such as the nearby presence of police and army quarters, which could restrict the development of this potential, or the presence of subversive movements which could broaden the expansion possibilities.

Finally, in the Padre Abad province, certain specific factors could be mentioned, such as the presence of drug-trafficking and subversion, for example, which have developed as a result of the backward development. Both these phenomena have become key factors which could favour expansion.

The centres connected with drug-trafficking activities are specifically located in the headlands of the Aguaytia and Boqueron.

It should be mentioned that as far as the supply of inputs and technical assistance are concerned, Oxapampa and Puerto Inca are located at a long distance from the centre of operations (Huallaga).

C.2.4. POTENTIAL AREA FOR OTHER CROPS

According to studies recently carried out by ONERN in this area, depending on the soil capacity, the total area suitable for farming (A-C) is estimated at 271,690 has. The potential farming area at present covers 245,700 has., not counting the 25,990 has. currently being used for annual crops and permanent crops.

It should be noted that for Oxapampa, these figures mainly cover the Pichis and Palcazu areas, whereas in Puerto Inca, both banks of the river Pachitea are considered. This means that there is a difference of 17,914 and 50,588 has. respectively, with respect to the totals for both provinces (37,214 and 158,688 has. respectively).

Based on the agro-ecological requirements of the crops - available technology, the development of productive infrastructure and the socio-economic importance - the potential area is distributed as follows:

26.5% (65,100 has). are good for the production of annual crops, whereas the remaining 73.5% (180,600 has) is suitable for permanent crops.

Among the annual crops, cassava is a prominent crop because of its rustic nature and its adaptability to the ecological environment. Rice and cow peas are also suitable for production in the tropics. The latter is characterized by its precocity, its high protein content (18-20%), good yield, versatility (it can be used as a pulse, a vegetable, fodder, green fertilizer, soil coverage for permanent plantations, etc.) and its ability to grow where other legumes have difficulties. Corn and beans, which demand certain soil characteristics, cover a limited area. (They do not tolerate soils with a pH 5.5 content and an aluminium saturation that exceeds 20%).

Table C.2.4
POTENTIAL AREA FOR COCA EXPANSION
(Hectares)

BASIN POTENTIAL	PROVINCE AREA DEPARTMENT	AREAS OR DISTRICTS WITH CROPS	AREAS OR DISTRICTS FOR EXPANSION	POTENTIAL AREA FOR EXPANSION		
				AREA FROM GIS	AREA NATIVE COMMUNITY	TOTAL AREA RESULTING
TOTAL				1.305.900	257.203	1.048.697
AGUAYTIA				482.400	111.877	370.523
UCAYALI						
	PADRE ABAD			378.900	59.124	319.776
	UCAYALI	Padre Abad: Puerto Azul-Previsto-Agra or Boqueron del Padre Abad-Headlands of Aguaytia river	Padre Abad: Puerto Azul-Previsto-Agra o Boqueron-Santa Ana river-Boca Agua-Pintoyacu-Reifsnyder. Headlands of Aguaytia river	170.505	19.165	151.340
		Irazola: Chanantia-Chambira-Chio-San Alejandro-Boca Santa Ana-Gradayacu-river Aguaytia	Irazola: Chananto-Chambira-Chic-San Alejandro-Boca Santa Ana-Gradayacu-Aguaytia river-Puerto Bolivar-Zorrilos-Aguaytillo Tashuaillo-Neshuya-Curimana and Cruya	208.395	39.959	168.436
	CORONEL PORTILLO			103.500	52.753	50.747
	UCAYALI	CAMPO VERDE: Aguaytia river-downstream-Boca San Alejandro-Puerto Bolivar-Boca Juanito-Curinvana-Nueva Requena-Neshuya-Campo Verde	CAMPO VERDE: Aguaytia river-downstream-Boca San Alejandro-Puerto Bolivar-Boca Juanito-Curinvana-Nueva Requena-Neshuya-Campo Verde	54.855	4.108	50.747
		CALLARIA: Espinal-Bello Horizonte-Headlands of the Callaria-Utquinea	CALLARIA: Espinal-Bello Horizonte-Headlands of the Callaria-Utquinea-Utquinea-Nueva Requena-Cruya-Boca Juanito-Aguaytia-Puvana Macaray	15.525	13.832	--
		MASISEA-IPARIA: Huanman-Santa Rosa-Platanal-Indio Piro-Puerto Putaya-Puerto Livia-Tamaya river (headlands)	MASISEA-IPARIA: Huanman-Santa Rosa-Platanal-Indio Piro-Puerto Putaya-Puerto Livia-Tamaya river (headland)-Anua river-Yabura-San Gregorio	33.120	30.171	-.-

(continues)

PACHITEA		623,500	145,326	678,174
OXAPAMPA		374,400	87,326	287,074
PASCO				
	Pichis river–Puerto Bermudez–Anacayali river	41,184	60,000	-.-
	Cajanari–Lorenzo–Lorencillo I–Lorencillo II	265,624	40,142	225,662
	Nuevo Peru–Agrochapi	52,416	0	52,416
	Palcazu river–Puerto Mayro–San Cristobal–Lagarto–Iscozacin	14,976	6,000	8,976
PUERTO INCA		449,100	58,000	391,100
HUANUCO				
	Pozuzo river–Huarucumayo–Chacila–Du Bois	273,951	40,000	233,951
	Santa Isabel–Yanayacu–Platano Isla Sungaruyacu–behind the settlements, towards the hills	116,766	0	116,766
	Sungaruyacu–Sungarillo–San Antonio–Pata–Km 191 Marginal Highway–behind the forestry settlements	13,473	0	13,473
	Yuyapichis–Aguaicayali–Puerto Inca	22,455	0	22,455
	Headlands of the Sungaruyacu–towards San Alejandro	22,455	18,000	4,455

Source: CNERN, GIS Basic Documents
INIAA, GIS Basic Documents
Register of Native Communities. (Ministry of Agriculture–XIII Departmental Agrarian Unit, Ucayali)
Drawn up by: MACROCONSULT S.A.

Table C.2.5
POTENTIAL AREA FOR CURRENT CROPS
AGUAYTIA - PACHITEA
(hectares)

CROP	CORONEL PORTILLO	AGUAYTIA	PUERTO INCA	OXAPAMPA	TOTAL
ANNUAL					
. Rice	5,000	200	4,000	500	9,700
. Cow Peas	3,000	400	3,000	1,000	7,400
. Beans	1,000	100	1,000	500	2,600
. Corn	1,000	300	2,000	500	3,800
. Peanuts	1,000	100	500	500	2,100
. Cassava	15,000	1,000	15,000	5,000	36,000
. Other*	2,000	200	1,000	300	3,500
Sub-total	28,000	2,300	26,500	8,300	65,100
PERMANENT					
. Anatto	10,000	1,500	15,000	3,000	29,500
. Arazá 1/	5,000	500	5,000	1,000	11,500
. Cocoa	5,000	500	5,000	500	11,000
. Coffee	-.-	500	1,500	1,000	3,000
. Carambola	3,000	400	1,500	500	5,400
. Citrus Fruits	3,000	500	3,000	500	7,000
. Oily Palm	5,000	-.-	5,000	-.-	10,000
. Pijuayo Palmetto 1/	10,000	4,000	25,000	1,500	40,500
. Pepper	5,000	-.-	3,000	300	8,300
. Pineapples	5,000	1,000	2,000	500	8,500
. Bananas	10,000	500	6,000	1,000	17,500
. Other ** 1/	16,400	1,200	9,600	1,200	28,400
Sub-total	77,400	10,600	81,600	11,000	180,600
TOTAL	105,400	12,900	108,100	19,300	245,700

* Pituca, dale dale, soya
** Ginger, Peruvian saffron, cashew nuts
1/ The potential refers only to the fact that ecologic conditions are suitable. However, it should be considered that this a fairly new crop in this area.
Source: Soil Capacity, ONERN 1979
Drawn up by: MACROCONSULT S.A.

Permanent crops, pertaining to a stable agrosystem, resemble forests and are therefore more suitable to the jungle area being studied. The most prominent of these are anatto and "pijuayo" (Guilielma gasipaes) for palmetto, which together represent a potential production of over 28.5% of the total area. Because they are native species, their productive capacity is assured. Other important crops are bananas, arazá[4], cocoa and oily palm[5], in that order, which are of great agroindustrial and economic importance, both for the region and for the country.

Permanent crops are the best alternative for farming production with a sustained development, as they provide an income for farmers throughout the year and generate important employment opportunities, as well as stability for producers.

C.3 PRODUCTIVE ASPECTS OF AREAS COVERED BY THE STUDY

C.3.1. VOLUMES OF COCA PRODUCTION

C.3.1.1. Legal Volume

In the Pachitea-Aguaytia area, no legal crops are grown.

C.3.1.2 Illegal Volume

The volume has been calculated based on the information obtained in the region:

In the Padre Abad region, the cultivation technology is high and the average production obtained is up to 2,000 kg. of dry leaves per hectare, which can be appreciated by the volume marketed by producers. Experts in the area as well as local peasants, all agree with this information. The crops are sown in rows separated by 1 m., with a distance of between 0.40m. and 0.50 m. between each plant. Plantations in this area are about 15 years old.

Descending towards the San Alejandro region, there is a drop in both the average and in technology, with yields of up to 1,200 kg. of dry leaves per hectare. It should be pointed out that there is no information concerning processed fresh leaves.

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4 "Arazá": Eugenia stipitata. Native fruit. 1.5 to 2.5 m. high bush, with a succulent fruit formed by a 150 to 200 gr. round berry. Good for human comsumption, because of its high vitamin C content.

5 "Oily Palm": Elaeis guineensis. Tropical rain forest plant, 6 to 12 m. high, large parasol-type leaves with a 4 to 6 m. crown. Its fruits grows in bunches. Each weighs 100 gr., and each bunch weighs approximately 13 to 14 kg. Used for the oil industry, due to its high content of non saturated acid fats.

Table C.3.1
PRODUCTION VOLUME OF DRY COCA LEAVES
AGUAYTIA - PACHITEA
(tons)

BASIN	PROVINCE / DEPARTMENT	AREAS OR DISTRICTS	HECTARES	YIELD TOTAL MT/HA/YR	TOTAL PRODUCTION
TOTAL:			4370		5622
AGUAYTIA			3700		5155
	P. ABAD		2750	1.60	4300
	UCAYALI				
		Puerto Azul-Previsto Abra-Boqueron P.Abad	1250	2	2500
		Chananta-Chambira -Chio-S.Alejandro -Boca Sta Ana-Grada- yacu-Headlands of the Aguaytia river	1500	1.2	1800
	C. PORTILLO		950	0.90	855
	UCAYALI				
		Aguaytia river, down- stream-mouth of S.Alejan- dro-Pto.Bolivar-mouth of Juanito-Curimana- Nueva Requena-Neshu ya-Campo Verde	500	0.9	450
		Espinal-Bello Hori- zonte-Headlands of the Callaria river-Utiqui- nia	150	0.9	135
		Huarimana-Sta.Rosa Platanal-Indio Piro Pto.Putaya-Pto.Sivia R.Tamaya (headlands)	300	0.9	270

(continues)

PACHITEA			670		467
	OXAPAMPA				---
			280	0.58	152
	PASCO		---		---
		Pichis river-Pto.Bermud Anacayali river	30	0.5	15
		Cajonari-Lorenzo-Lorencillo I - Lorencillo II	200	0.5	100
		Nuevo Peru-Agrochapi	40	0.8	32
		Palcazu river-Pto.Mayro S.Cristobal-Lagarto-Iscozacin	10	0.5	5
	PUERTO INCA				
			390	0.60	315
	HUANUCO		---		---
		Pozuzo river-Huampu-mayo-Chaclla-Du Bois	240	1	240
		Sta.Isabel-Yanayacu-Platano Isla-Sungaru-yacu Behind the settlements towards the hills	100	0.5	50
		Sungaruyacu-Sungarillo S.Antonio-Pata-Km 0 Marginal Highway (forestry settlements)	10	0.5	5
		Yuyapichis-Apurucayali Pto.Inca	20	0.5	10
		Headlands of the Sungar yacu towards S.Alejandro	20	0.5	10

Source: MACROCONSULT S.A. Surveys, 1990
Drawn up by: MACROCONSULT S.A.

In order to caculate the average in the remaining areas, reports and visits to the participants in this activity were resorted to, in Sungaruyacu and Santa Isabel. These areas in the Pachitea region have a limited production, due to their low level of technology and because the crops are fairly recent.

In Aguaytia, the number of plants per hectare varies between 2,500 and 3,000 plants, whereas in Pachitea, these vary between 600 and 1,000 plants. These coca growing areas are generally not properly quantified, since as previously mentioned, local peasants usually over-estimate the size of the area.

It is estimated that the dry leaf production in the Aguaytia and Pachitea area, amounts to 5,622 MT. This area is operated from Huallaga, which is the centre of operations, being connected to the highway, the rivers and the population. This is the population that migrates from the Huallaga area to Pachitea, to satisfy the labour demand.

C.3.2 Total Production Volume of other Crops and Livestock

According to previously mentioned sources, the total production volume is estimated at 116,497 tons, 42% of which correspond to annual crops (48,300 MT), despite the fact that these have the largest surface area under cultivation (61%), and 58% (68,097 MT) to permanent crops because of higher yields (see Table C.3.2). Among the former, the most prominent is cassava with 22%, followed by rice and corn. Of the latter, bananas, with a production equivalent to 54% of the total, followed by anatto and pineapples. Below is a description of production in the provinces:

Coronel Portillo (Pucallpa)

The total production volume is calculated at 66,380 tons, 51% (33,469 MT) of which are annual crops and 49% (32,911 MT) are permanent crops. As regards production by crops, cassava (annual crop) represents 24% of the total and bananas (permanent crop), 46% of the total. Production is mainly aimed at the local market.

Aguaytia

This province has a production of 19,757 tons, 24% of which are annual crops (4,820 MT) and 76% are permanent crops (14,937 MT). Cassava and bananas are also prominent here, with 16% and 75% of the total, respectively. Production is mostly aimed at self- consumption, and the small surplus is for the local market.

Table C.3.2
TOTAL PRODUCTION VOLUME OF OTHER CROPS: 1989
AGUAYTIA - PACHITEA
(tons)

CROP	CORONEL PORTILLO	AGUAYTIA	PUERTO INCA	OXAPAMPA	TOTAL
ANNUAL					
. Rice	9,130	642	1,493	110	11,375
. Cow peas	-.-	-.-	-.-	21	21
. Beans	1,265	47	235	130	1,677
. Corn	6,845	936	1,417	1,001	10,199
. Cassava	16,229	3,195	4,318	1,386	25,128
Sub-total	33,469	4,820	7,463	2,648	48,400
PERMANENT					
. Anatto	-.-	-.-	1,440	240	1,680
. Cocoa	136	64	708	-.-	908
. Coffee	-.-	-.-	-.-	100	100
. Oranges	583	-.-	-.-	-.-	583
. Pineapples	1,373	-.-	-.-	-.-	1,373
. Bananas	30,819	14,873	13,975	3,786	63,453
Sub-total	32,911	14,937	16,123	4,126	68,097
TOTAL	66,380	19,757	23,586	6,774	116,497

Source: INIAA, Ucayali Farming Production Statistics
Ucayali Experimental Station, 1989
Ministry of Agriculture, Farming Statistics, 1989.
General Statistics Bureau
BAP, Crops Involved in the 1989 Season: Ucayali, Oxapampa and Puerto Inca
MACROCONSULT S.A. Surveys, 1990
Drawn up by: MACROCONSULT S.A.

Puerto Inca

Farming production amounts to 23,586 tons, of which 32% (7,463 MT) are annual crops and 16% (16,123 MT) are permanent crops. Besides cassava and bananas, anatto and cocoa are also prominent, due to their production volumes. Most of the production goes to the Pucallpa market, due to the fact that it is close and relatively accessible by road and by river. Some of the production, particularly cocoa, also goes to Tingo Maria.

Oxapampa

The production volume amounts to 6,774 tons, 39% of which (2,648 MT) are annual crops and 61% (4,126 MT) are permanent crops. Again cassava and bananas are prominent, with 20% and 56% of the total, respectively. Most food production is self - consumed, whereas coffee and anatto are aimed at the markets in La Merced and San Ramon.

- Livestock

Aguaytia

The livestock activity in this area is mainly concentrated around Pucallpa, as can be appreciated in Table C.3.3. This mainly consists of cattle and pigs - cattle raising being greater. 750 heads of cattle are slaughtered per month, which is equivalent to about 105 MT of meat, and 450 pigs, equivalent to about 24 MT of meat. With this volume, Pucallpa's internal supply of meat is assured.

Table C.3.3
LIVESTOCK: 1989
AGUAYTIA - PACHITEA
(heads of cattle)

AREA	LIVESTOCK		TOTAL	FOWL		TOTAL
	Beef-Cattle	Pigs		Meat	Eggs	
AGUAYTIA						
Pucallpa (Callaría)	52,664	28,092	80,756	90,500	45,000	135,500
Aguaytía	4,836	1,900	6,736	-.-	-.-	-.-
TOTAL	57,500	29,992	87,492	90,500	45,000	135,500

Source: Ministry of Agriculture, Farming Statistics, 1989
General Statistics Bureau, Pucallpa
Drawn up by: MACROCONSULT S.A.

There are about 50 chicken farms in the Pucallpa area, breeding 90,500 birds for meat and 45,000 birds for egg-laying.

Pachitea

Separate information is available at a provincial level in this area, for 1981, 1988 and 1990 in the case of cattle. Table C.3.4. shows that, with the exception of Pozuzo - where the region's largest production takes place - the cattle raising in the other provinces dropped between 1981 and 1990. This can be explained by the subversive activity, which represents a high risk and reduces profit margins.

Table C.3.4
LIVESTOCK: 1981-1990
AGUAYTIA - PACHITEA
(heads of cattle)

AREA	1981	1988	1990
PACHITEA			
Oxapampa and Huancabamba	7,300	10,200	7,000
Pozuzo and Codo del Pozuzo	22,000	23,000	25,000
Villa Rica and Cacazú	7,200	9,000	7,000
Palcazú	14,000	18,000	10,000
Pichis	7,000	8,000	6,000
Puerto Inca	8,000	10,000	8,000
TOTAL	65,500	78,200	63,000

Source: Ministry of Agriculture. Farming Statistics for several years. Statistics Bureau
Drawn up by: MACROCONSULT S.A.

For the Palcazú valley, there is also information available regarding sheep, pigs and horses, amounting to 3,000, 5,000 and 800 heads, respectively.

C.3.3. Yield of coca and other crops

In general, the yield is poor, due to the low level of technology and the intensive use of labour; the limited use of fertilizers; deficient infrastructure for production, transport, marketing and industry; and the lack of integral programmes for production with sustained yields.

On average, the highest yields are obtained by cassava, with 12.8 tons/hectare, followed by bananas, oranges and pineapples (see Table C.3.5). Yields for rice and corn are very low compared to the national average of 5 and 3 MT/ha. Yields for the other areas comprised in this study are as follows:

Coronel Portillo (Pucallpa)

Prominent yields are for the same crops, led by cassava and bananas, with 11.76 and 10.89 MT/ha. respectively.

Aguaytia, Puerto Inca and Oxapampa.

Yields for annual crops are greater in Puerto Inca, however these are still low. Again, cassava and bananas are prominent.

Table C.3.5
YIELD OF MAIN CROPS IN THE STUDY AREA, 1989
AGUAYTIA – PACHITEA
(kilos per hectare)

CROP	CORONEL PORTILLO	AGUAYTIA	PUERTO INCA	OXAPAMPA	AVERAGE
ANNUAL					
. Rice	1,910	1,890	2,370	1,470	1,910
. Cow peas	–.–	–.–	–.–	700	700
. Beans	920	680	920	1,530	1,013
. Corn	1,620	1,720	2,040	1,520	1,725
. Cassava	11,760	16,650	10,800	12,000	12,803
PERMANENT					
. Anatto	–.–	–.–	1,200	1,000	1,100
. Cocoa	630	630	510	–.–	590
. Coffee	–.–	–.–	–.–	400	400
. Oranges	9,710	–.–	–.–	–.–	9,710
. Pineapples	9,470	–.–	–.–	–.–	9,470
. Bananas	10,890	10,260	9,510	8,320	9,745

Source: INIAA, Ucayali Farming Production Statistics
Ucayali Experimental Station, 1989
Ministry of Agriculture, Farming Statistics, 1989.
General Statistics Bureau
BAP, Crops involved in the 1989 Season: Ucayali,
Oxapampa and Puerto Inca
MACROCONSULT S.A. Surveys, 1990
Drawn up by: MACROCONSULT S.A.

As for companion crops, Table C.3.6 shown that rice has yields of 5, 4 and 2 MT/ha, corresponding to t1, t2 and t3, respectively; cow peas, beans, corn and cassava with t2, t3 and t2(A) or t3(A) for companion crops, bananas with t2 and t3 and coca with t1 and t3 (2 and 0.8 MT/ha). Yields for cassava vary between 12.5 and 25 MT/ha and for bananas between 12.5 and 16 MT/ha. Few farmers use highly developed scientific technology, therefore on average, productivity is not high.

Table C.3.6
YIELD BY LEVEL OF TECHNOLOGY
AGUAYTIA – PACHITEA
(kilos per hectare)

CROP	YIELD								
	T1	T2	T3	2(C) o T3(C)					
RICE	5,000	4,000	2,000	–.–					
COW PEAS	–.–	800	500	600	Cow peas +	3,000	Corn		
BEANS	–.–	800	400	400	Beans +	2,000	Corn		
CORN	–.–	4,000	1,800	3,000	Corn +	500	Cow peas		
CASSAVA	–.–	25,000	12,500	12,500	Cassava +	500	Cow peas		
ANATTO	–.–	2,500	1,000	2,500	Anatto +	10,000	Cassava	500	Cow peas
COCOA	–.–	1,000	500	1,000	Cocoa +	10,000	Bananas +	500	Cow peas
COFFEE	–.–	–.–	400	400	Coffee +	10,000	Bananas		
ORANGES	–.–	–.–	9,700	–.–					
PINEAPPLES	–.–	–.–	9,400	–.–					
BANANAS	–.–	–.–	16,000	12,500	Bananas +	10,000	Cassava	400	Cow peas
COCA	–.–	2,000	–.–	800					

T1 : High Technology Level
T2 : Medium Technology Level
T3 : Low Technology Level

T2(C) : Average companion Technology
T3(C) : Low companion Technology

Source: INIAA, Ucayali Farming Produccion Statistics
Ucayali Experimental Station 1989
Ministry of Agriculture, Farming Statistics, 1989.
General Statistics Bureau
BAP, Crops involved in the 1989 Season: Ucayali, Oxapampa and Puerto Inca
MACROCONSULT S.A.,Surveys 1990
Drawn up by: MACROCONSULT S.A.

C.4. SOCIO-ECONOMIC FEATURES OF THE AREA COVERED BY THIS STUDY.

The Aguaytia-Pachitea region is Pucallpa's expansion area. During the last decade, special projects were started up to dynamize the area, basing its growth on the exploitation of its forestry resources.

The explosive growth in this region has also led to a rapid increase in the population, particularly in the districts of Yuyapichis, Puerto Inca and Padre Abad, with rates of 7.7%, 6.9% and 3.2% respectively.

From a farming aspect, it fulfils the role of food supplier, since the only product with an export surplus is anatto, whereas the remaining products are consumed within the region. Only a small percentage of the crops have an extra-regional destination.

C.4.1 Population: Structure and Growth

The importance acquired by forestry exploitation, has become evident by the significant participation of the rural population in the area, specifically in the provinces of Pachitea[6] and Oxapampa. (See table C.4.1). This tendency was maintained, with slight variations, until the early eighties, according to data obtained during the last census.

The importance of agriculture and the coca boom have contributed to strengthen this tendency.

The growth experienced over the last ten years in the districts pertaining to the Aguaytia and Pachitea area, can be appreciated in Table C.4.2. The Yuyapichis and Puerto Inca districts, pertaining to the Puerto Inca province, as well as the Palcazu district, which belongs to the Oxapampa province, have the highest accumulated annual growth rates.

As regards the former, this can be explained by the construction of the Sungaruyacu-Santa Isabel highway (Marginal highway network), which resulted in the towns moving to the edge of the highway - prior to that they had been on the river edge -.

As far as Palcazu is concerned, it should be borne in mind that the region was boosted by the assistance provided by the Special Pichis Palcazu Project and intensive forestry utilization. The population density varies depending on whether the region is urban or rural, a town or a native community. It should be emphasized that this area has the lowest demographic density in the country, in view of its large expanse of land.

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6 "Pachitea": a province in the deparment of Huanuco. In 1981, date of the last census, it comprised most of the area which now comprises Puerto Inca, created in 1984. In other parts of the text, mention is made of the Pachitea region, similar to Aguaytia, comprised of the provinces of Puerto Inca (department of Huanuco) and Oxapampa (department of Pasco). This way they could take more advantage of this road network as well as the good quality land for farming and livestock.

Table C.4.1
DISTRIBUTION OF THE POPULATION: 1972-1981
AGUAYTIA - PACHITEA

	1972			1981		
	Urban %	Rural %	Total (inhab.)	Urban %	Rural %	Total (inhab.)
Pasco	57.8	42.2	176,580	59.8	40.2	221,219
Oxapampa	16.8	83.2	39,794	17.7	82.3	49,857
Ucayali	50.5	49.5	156,457	58.0	42.0	200,085
Coronel Portillo 1/	56.2	43.8	120,501	64.7	35.3	162,726
Huánuco	26.6	73.4	414,468	29.7	70.3	481,924
Pachitea 2/	11.9	88.1	37,187	10.2	89.8	41,930

1/ Includes Padre Abad province
2/ Includes Puerto Inca province

Source: "Peru: the provinces in figures 1876-1981", Vol.1 Population and Migration, AMIDEP publishers. Universidad del Pacífico.
Drawn up by: MACROCONSULT S.A.

Table C.4.2
POPULATION, GROWTH RATE AND DENSITY: 1980-1990
AGUAYTIA - PACHITEA

STUDY AREAS	1980	1990	ACCUMULATED ANNUAL GROWTH RATE 1980-1990	EXTENSION (Km2)	DENSITY (Pob/km2) 1980	1990
AGUAYTIA - PACHITEA	48,361	69,554	3.70			
CORONEL PORTILLO	8,701	10,574	1.97	36,616	0.24	0.29
Campoverde	8,701	10,574	1.97	3,519	2.45	2.98
PADRE ABAD	11,240	14,087	2.28	8,823	1.27	1.60
Padre Abad	6,659	9,124	3.20	4,664	1.43	1.96
Irazola	4,581	4,963	0.80	4,159	1.10	1.19
PUERTO INCA	11,219	18,481	5.12	9,914	1.13	1.86
Puerto Inca	4,126	8,026	6.88	2,071	1.99	3.88
Honoria	1,952	2,615	2.97	798	2.45	3.28
Tournavista	3,861	5,150	2.92	2,043	1.89	2.52
Yuyapichis	1,280	2,690	7.71	1,673	0.77	1.61
OXAPAMPA	17,201	26,412	4.38	18,674	0.92	1.41
Palcazú	4,581	9,161	7.18	2,886	1.59	3.17
Puerto Bermúdez	12,620	17,251	3.18	10,988	1.15	1.57

Source: INEI Peru, Population Projections by Calendar Years by Departments, Provinces and Districts 1980-1990.
Perú: Compendium of Statistics, 1989-1990
Drawn up by: MACROCONSULT S.A.

Special attention should be given to the population in native communities (referred to as "Native Community Nations"), as they are a limiting factor for the expansion of coca. Their customs, religion and organization make no allowances for illegal activities.

These "Nations" are distributed as follows:

Oxapampa:		
	Puerto Bermudez	Ashaninka
	Iscozacin	Amuesha
Pachitea:		
	Puerto Inca	Ashaninka
	Callaría	Shipibo-Conibo
	Campo Verde	Ashaninka-Shipibo-Conibo

As far as the Economically Active Population is concerned, the EAP over 15 years of age has grown at a substantially higher rate than the national rate, which is basically explained by the migration resulting from the forestry activity (see Table C.4.3).

It is worth adding that although the EAP dedicated to farming shows a lower growth rate than the total EAP, in nominal terms it has experienced the highest growth, together with the EAP dedicated to services. This is also linked to coca cultivation and drug trafficking.

Table C.4.3
ECONOMICALLY ACTIVE POPULATION: 1980-1989
AGUAYTIA - PACHITEA

	Total		Farming	
Province:	1980	1989	1980	1989
Coronel Portillo	52,705	73,595	27,528	33,460
Padre Abad	4,071	5,246	2,126	2,385
Oxapampa	15,240	21,690	7,632	9,411
Puerto Inca	4,156	6,936	2,842	4,358
Total	76,172	107,467	40,128	49,614
Annual Rate (%)		3.5		2.1
National	5,586,500	7,205,500	2,223,400	2,550,700
Annual Rate (%)		2.6		1.4

Source: INEI Peru, Population Projections by Calendar Years by Departaments, Provinces and Districts, 1980-1990
Evolution of the Peruvian Population during the 80's.
Special Bulletin N°12
Drawn up by: MACROCONSULT S.A.

C.4.2. Labour Force Involved in Coca

The labour force required for the production of one hectare of coca, is 208 daily labourers (see table C.4.4.), considering four harvests per year, during the months of February, May,

August and November. In view of the existence of 4,370 hectares of coca, the total number of daily labourers required is 908,960 (see Table C.4.5). Annual labour requirements for coca cultivation represent 38% of the total. However, it should be pointed out that during August and November, this percentage rises to 72 and 57% respectively. (See Table C.4.6.)

Supposing that one person carries out a day's work, the average number of labourers required during the year is 3,443, working 264 days per year. However, during harvest months, when the demand for labour increases, the number of people involved is close to 6,000. During the months when culture work is carried out, there is a demand for 2,185 labourers (see Table C.4.5).

Table C.4.4
LABOUR REQUIREMENTS: 1989
AGUAYTIA - PACHITEA
(daily labourers per hectare)

CROP	J	F	M	A	M	J	J	A	S	O	N	D	TOTAL
Corn	-.-	-.-	-.-	-.-	-.-	30	10	-.-	18	-.-	-.-	-.-	58
Rice	8	-.-	27	-.-	-.-	30	-.-	-.-	-.-	5	10	-.-	80
Beans	-.-	-.-	-.-	-.-	22	10	10	21	-.-	-.-	-.-	-.-	63
Bananas	-.-	-.-	-.-	-.-	-.-	8	-.-	-.-	-.-	10	-.-	-.-	18
Cassava	-.-	-.-	-.-	22	30	21	-.-	6	3	-.-	-.-	-.-	82
Anatto	-.-	-.-	-.-	14	-.-	6	-.-	-.-	4	34	23	-.-	81
Cocoa	-.-	-.-	7	18	13	-.-	-.-	-.-	13	4	-.-	-.-	55
SUB-TOTA	8	0	34	54	65	105	20	27	38	53	33	0	438
Coca	11	30	11	11	30	11	11	30	11	11	30	11	208
TOTAL	19	30	45	65	95	116	31	57	49	64	63	11	646

Source: MACROCONSULT S.A. Surveys, 1990. ENACO
Agrarian Bank's Basic Budgets, 1990
Drawn up by: MACROCONSULT S.A.

With respect to other crops, anatto, cassava and rice have the highest demand for labourers per hectare, however harvests of the latter two crops require the largest labour force. Thus, legal crops during March require 7,940 workers, and during the months of April, September and October, between 6,500 and 7,000 workers. However, the highest demand is in June.

Table C.4.5
TOTAL DAILY LABOURERS REQUIRED BY CROPS
AGUAYTIA – PACHITEA
(total daily labourers)

CROP	J	F	M	A	M	J	J	A	S	O	N	D	TOTAL
Corn	–.–	–.–	–.–	–.–	–.–	177,265	58,600	–.–	105,480	–.–	–.–	–.–	341,345
Rice	48,200	–.–	162,675	–.–	–.–	180,750	–.–	–.–	–.–	30,125	61,455	–.–	483,205
Beans	–.–	–.–	–.–	39,605	17,800	17,800	37,380	37,380	–.–	–.–	–.–	–.–	149,965
Bananas	–.–	–.–	–.–	–.–	–.–	49,640	–.–	–.–	–.–	62,050	–.–	–.–	111,690
Cassava	–.–	–.–	–.–	48,950	66,750	46,725	–.–	13,350	6,675	–.–	–.–	–.–	182,450
Anatto	–.–	–.–	–.–	23,100	–.–	9,900	–.–	–.–	6,600	56,100	37,950	–.–	133,650
Cocoa	–.–	–.–	12,005	30,870	22,295	–.–	–.–	–.–	22,295	6,860	–.–	–.–	94,325
SUB–TOTAL (a)	48,200	–.–	174,680	142,525	106,845	482,080	95,980	50,730	141,050	155,135	99,405	–.–	1,496,630
Coca (b)	48,070	131,100	48,070	48,070	131,100	48,070	48,070	131,100	48,070	48,070	131,100	48,070	908,960
TOTAL (c)	96,270	131,100	222,750	190,595	237,945	530,150	144,050	181,830	189,120	203,205	230,505	48,070	2,405,590
DAYS WORKED (d)	22	22	22	22	22	22	22	22	22	22	22	22	264
MONTHLY DEMAND (a/d)	2,191	–.–	7,940	6,478	4,857	21,913	4,363	2,306	6,411	7,052	4,518	–.–	5,669
COCA DEMAND (b/d)	2,185	5,959	2,185	2,185	5,959	2,185	2,185	5,959	2,185	2,185	5,959	2,185	3,443
TOTAL DEMAND (c/d)	4,376	5,959	10,125	8,663	10,816	24,098	6,548	8,265	8,596	9,237	10,478	2,185	9,112

Source: MACROCONSULT S.A., Surveys, 1990. ENACO, Agrarian Bank's Basic Budgets
Drawn up by: MACROCONSULT S.A.

Despite this fact, it can be seen in Table C.4.7. that there is no labour deficit, although it should be borne in mind that the local supply also includes the workers involved in the lumber industry. (See Graph C.2).

Table C.4.6
STRUCTURE OF LABOUR REQUIREMENTS: 1989
AGUAYTIA - PACHITEA

	Legal Crops (%)	Coca (%)	Total Labourers
J	0.50	0.50	96,270
F	-.-	-.-	131,100
M	0.78	0.22	222,750
A	0.75	0.25	190,595
M	0.45	0.55	237,945
J	0.91	0.09	530,150
J	0.67	0.33	144,050
A	0.28	0.72	181,830
S	0.75	0.25	189,120
O	0.76	0.24	203,205
N	0.43	0.57	230,505
D	-.-	-.-	48,070
TOTAL	0.62	0.38	2,405,590

Source: MACROCONSULT S.A., Surveys 1990, ENACO, Agrarian Bank's Basic Budgets
Drawn up by: MACROCONSULT S.A.

Peak months, when there is the most demand (May and June) involve land preparation, permanent crop nurseries and harvesting, both for permanent crops and for annual crops. In November, the demand increases because of the setting up of permanent crops and deferred corn and rice harvests.

C.4.3. Potential Labour

The strong coca potential in this region could be considerably restricted by the forestry activity, which is also highly profitable and in which the population is fairly skilled. The possible use of potential land for coca could depend more on the reduction of the forestry activity, whereby labour would be released, than on the lower production of other crops.

However, in the latter case, if the marketing system deteriorates and therefore the production of hard yellow corn and rice were to drop by 50%, 412,275 labourers would be released,

Table C.4.7
BALANCE OF LABOUR: 1989
AGUAYTIA - PACHITEA
(people required)

MONTH	LABOUR DEMAND Legal Crops	Coca	Total	LOCAL SUPPLY 1	BALANCE
J	2,191	2,185	4,376	47,660	43,284
F	-.-	5,959	5,959	47,660	41,701
M	7,940	2,185	10,125	47,660	37,535
A	6,478	2,185	8,663	47,660	38,997
M	4,857	5,959	10,816	47,660	36,844
J	21,913	2,185	24,098	47,660	23,562
J	4,363	2,185	6,548	47,660	41,112
A	2,306	5,959	8,265	47,660	39,395
S	6,411	2,185	8,596	47,660	39,064
O	7,052	2,185	9,237	47,660	38,423
N	4,518	5,959	10,477	47,660	37,183
D	-.-	2,185	2,185	47,660	45,475

1/ EAP age 15 and over

Source: INEI, MACROCONSULT S.A. Surveys, 1990
Agrarian Bank's Basic Budgets
Drawn up by: MACROCONSULT S.A.

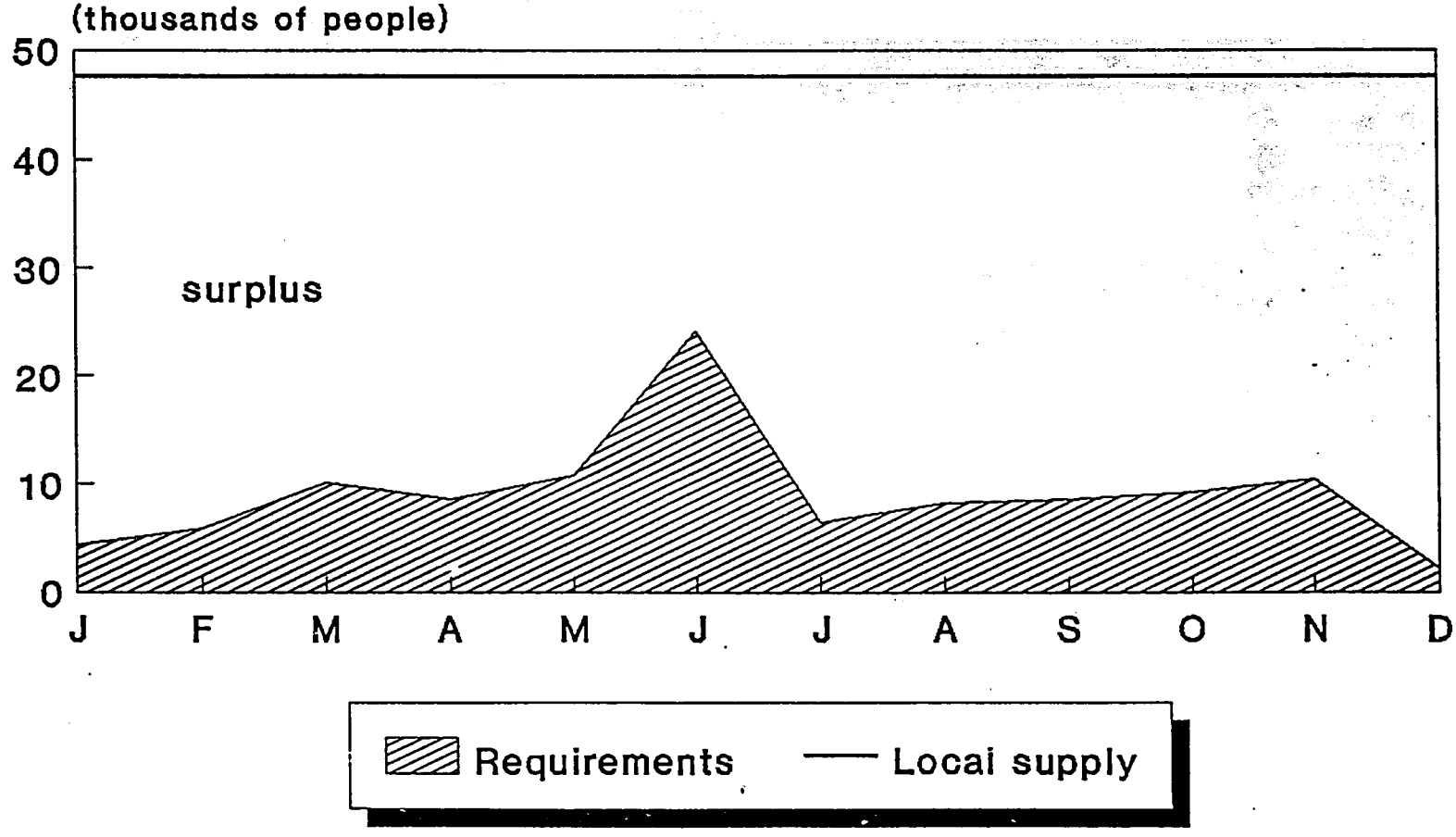
making them available for coca. With that many daily labourers, an increase of up to 1,982 hectares would occur, which is equivalent to 45% of those estimated for 1989, yet this is only equivalent to 0.2% of the potential area. Another consequence would be the reduction by half of the areas sown with corn and rice.

On the other hand, if we consider that all the local supply of surplus labour is available - based on the average annual requirements for the region's crops - the number of new hectares would amount to 48,926.

If an increase in the EAP aged 15 and over involved in farming is considered and moreover, supposing that the nineties will experience the same growth rate as the last decade (2.1%), the EAP in the year 2,000 would be 58,669 farm labourers, for the districts involved. If an estimate is made at the level of all the provinces involved, the figure would rise to 61,074.

Graph C.2

BALANCE OF LABOUR: 1989
AGUAYTIA - PACHITEA



Source: INEI, MACROCONSULT S.A.
Drawn up by: MACROCONSULT S.A.

Therefore, in order to reach the crops expansion potential, besides the growth in the EAP, a substantial migration would have to take place from depressed areas, with producers of dry coca leaves moving from other areas (as a result of the lack of control in the study area), or because of the above mentioned reduction in the forestry activity.

C.4.4. Labour force for other crops in the region

In the Aguaytia and Pachitea regions, the labour force involved (with the exception of coca) is 1,496,630 daily labourers for the 25,990 cultivated hectares (see Table C.4.5). The greatest demand for labour, per crop, is for rice, corn, cassava and anatto, representing 82% of the total.
In general, the average local labour force consists of five people - two adults and three youths - per estate.

C.5 DIAGNOSIS OF THE PRODUCTION AND MARKETING OF MAIN CROPS IN THE AREAS COVERED BY THIS STUDY

5.1 Production Problems

5.1.1. General Aspects

In order to analyse production problems, detailed information is available for Padre Abad (Aguaytia) and Puerto Inca (Huanuco), obtained from the recent survey carried out by MACROCONSULT.

Padre Abad (Aguaytia)
Farmers in this area - par excellence - cultivate either one or two crops: rice, corn and cassava are used for land preparation. Production for self-consumption (food and seeds) mainly involves rice, corn and beans (25%) and "inguiri" bananas (15%). Anatto[7], pineapples, sugarcane and cashew nuts[8], have not been widely disseminated, since they are only produced in family plots. However, they have a great potential for expansion, for which they need suitable dissemination programmes and assistance.

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7 "Anatto": Bixa orellana. Bush with abundant folliage and branches, with large leaves. It produces a round dehiscent fruit (opens out when ripe), with divisions inside it. Its seeds are stained with a red substance called bixine. This is used in the cosmetics industry, dyes and colouring agents.

8 "Cashew nuts": Anacardium giganteum : 5m. high fruit tree. Produces a fruit with a meaty stalk used for food for humans cattle, and has a nut with a high agroindustrial potential.

Land preparation work at every technical level, is carried out in a rudimentary fashion, since there is a lack of service for farming machinery - a common problem faced by all farmers.

- Seeds and Technical Assistance

Producers face all kinds of problems. For example, there is no guraranteed supply of seeds for rice, corn or beans; sowing is carried out without seed selection, distances are inadequate and there is no control over plagues and/or diseases. This applies to bananas, since the purchase of vegetative seeds does not guarantee a suitable phytosanitary control to prevent the much- feared Panama disease, or black "sigatoka", which are fairly common to this crop.

The lack of a nursery in the area to sell cocoa and anatto seeds or seedlings, limits the development of local farmers' production. Sporadically, these resort to the Universidad Agraria de la Selva (Tingo Maria) to obtain these goods.

Furthermore, irregular State presence as far as purchases are concerned - through ENCI (National Input Marketing Company) - mainly of rice and corn, constantly leads to harvests being sold to intermediaries, who pay lower prices. In the worst of cases, harvests are lost. The very bad state of the roads, due to lack of maintenance and the weather, adds to the problem.

As regards technical assistance, there is no programme to assist farmers at the present time. It should be mentioned that in the past, international aid had been provided - through the Special Alto Huallaga Programme (PEAH) and the National Agrarian University in the Jungle. This was withdrawn as a result of terrorist activities.

- Possibilities for the development of agroindustry

For the time being, there is no agroindustry whatsoever in the region, except for the manufacture of cassava starch, on a small scale. An improved technology as well as dissemination, applied to the manufacture of banana flour and the processing of hard yellow corn, could be an alternative solution for the loss of harvests caused by constant road blocks or the unfortunate State participation in the gathering and purchasing of rice and corn.

Puerto Inca (Huanuco)

In this area, producers face various problems, many of them common to those mentioned for Padre Abad.

Producers cultivate a variety of crops, mostly combining cocoa, anatto and pastures, since the land in this region is particularly suitable for those crops. Production for self- consumption, as in Padre Abad, involves rice, corn and beans (25%) and "inguiri" bananas - the most common variety - (15%).

Crops with the most potential are cashew nuts, pineapples, sugar cane and Peruvian saffron; these, as in Padre Abad, are only grown on family plots.

Among the main problems to be faced by producers, is the lack of servicing for farming machinery, as well as the irregular nature of official marketing organizations, which often results in harvests being lost.

- Seeds and technical assistance

There is no supply of certified seeds for rice and corn. The volume offered by the United Nations Development Programme (UNDP) does not cover the demand, and the cassava stakes or banana branches used for shade when setting up crops, are obtained from the farmers' own plots.

As far as anatto and cocoa are concerned, producers obtain assistance from the UNDP, which enables them to manage their own nurseries and use improved seeds.

- Possibilities for the development of agroindustry

For the time being, there is no agroindustry whatsoever in the area, except the manufacture of cassava starch on a small scale. There is a certain amount of technology for processing cocoa, using fermentation, and for anatto (decapsulators and blowers). A plant to extract bixine (an anatto by-product) could be a significant investment option.

5.1.2. Forestry Exploitation

The forestry activity is very well developed in this region, particularly in Pachitea. This activity is mainly based on the exploitation of freely available forests.

Freely Available Forests

Article 11 of the Forestry and Fauna Law, defines Freely Available Forests as being those that are suitable for a permanent production of timber, other forestry products and wild fauna. Authorization is required for this purpose.

These Forests are being exploited by small, medium and large logging companies, dedicated solely to this activity.

To regenerate forestry resources, loggers pay a "Reforestation Royalty", administered by the Reforestation Committee in Pucallpa.

In the Pachitea region, freely available forests are located in the Palcazú area (68,807 has.) and in Puerto Bermudez (55,000 has.) where production is high, and 186,000 has. for limited logging.

Logging costs vary depending on the system and the forest involved.

Community Forest

Logging is carried out with community labour, mostly using an axe or a chain saw. Costs cannot be estimated.

Forests for Settlers' Self-consumption

This type of logging takes place in farming and livestock areas. An average of between 120 and 150 m3 of timber is obtained. As in the previous case, costs cannot be estimated.

C.5.1.2.1 Utilization

In Coronel Portillo and Pachitea, forestry utilization is carried out under the traditional, selective felling system. An average of 10 to 15 m3 of commercial timber is obtained, as opposed to the amount obtained in Aguaytia and Padre Abad - an average of 3 to 5 m3 per hectare.

We have a summary of the logging contracts awarded in Aguaytia- Coronel Portillo, which shows that a large number of small contracts were awarded (from 1,000 to 5,000 hectares) and only a few that exceed 10,000 hectares.

The most outstanding species because of their commercial value, are cedar, mahogany, ishpingo, tornillo, copaiba, cumala, catahua, marupa, cético, ulcumano and others.

Lumbermen use tractors to obtain 80% of the wood. Until 1982, 180 forestry tractors were available, of different makes and sizes.

As regards native communities, forestry is also vitally important to them, representing a source of additional income to their precarious economy.

Small-Scale Industrial Lumbermen

Generally these small-scale lumbermen are equipped by large informal creditors (70%), the Agrarian Bank (20%) and sometimes, with their own resources (10%).

These lumbermen carry out clear-felling and logging activities at a cost of approximately US$1.50, employing two people, using either an axe and/or a chain saw. The cost involved in opening roads is US$4.65 per m3 and the cost of transport is equivalent to US$52 per m3.

Medium-scale Industrial Lumbermen

At this level, planning is involved, and costs vary depending on the transport system used. Transport by trucks is slightly higher (mainly because of the cost of personnel. See tables C.5.1 and C.5.2).

C.5.1.3. Forestry Industry

In the Aguaytia-Pachitea region, the timber industry is very well developed.

Table C.5.1
COST LOGGING BY TRUCK
AGUAYTIA – PACHITEA
(US$ per m3)

ACTIVITIES	COST OF PERSONNEL	COST OF EQUIPMENT		TOTAL
		Possessio Costs	Operation Costs	
Pre-Logging	0.23	0.29	0.06	0.58
Clear-Felling	0.31	0.06	0.23	0.6
Sawlogging/Hauling	1.08	9.9	3.1	14.08
Transport from Forest	3.67	5.04	2.69	11.4
General Expenses	0.24	0.69	0.27	1.2
TOTAL COST	5.53	15.98	6.35	27.86

Source: "Structure of Logging and Transport Costs for logs in Selva Baja". FAO, Working Document No.6, Peru
Drawn up by: MACROCONSULT S.A.

Table C.5.2
COST OF LOGGING BY RAFT
AGUAYTIA – PACHITEA
(US$ per m3)

ACTIVITIES	COST OF PERSONNEL	COST OF EQUIPMEN		TOTAL
		Possesion Costs	Operation Costs	
Pre-Logging	0.23	0.29	0.06	0.58
Clear-Felling	0.31	0.06	0.23	0.6
Sawlogging/Hauling	1.08	9.9	3.1	14.08
Transport by raft	1.15	2.79	2	5.94
Buoying	0.4	0.02	0.06	0.48
Transport from the port	1.66	1.77	0.28	3.71
General Expenses	0.23	0.7	0.27	1.2
TOTAL COST	5.06	15.53	6	26.59

Source: "Structure of Logging and Transport Costs for Logs in Selva Baja". FAO, Working Document No.6, Peru
Drawn up by: MACROCONSULT S.A.

In Coronel Portillo, there are 46 sawmills, 5 plywood mills, 1 pole factory, 11 crate manufacturing firms and 25 small-scale sawmills. In 1988, 344,000 m3 of uncut timber were consumed, distributed as follows: 158,397 m3 of sawn-wood, 16,365 m3 of plywood and 3,982 m3 of other timber, making a total of 178,744 m3, which were traded outside the region.

In Pachitea, specifically in Palcazú, the Yanesha Forestry Cooperative is applying the clear-cutting system in segments, with an integral utilization of the forest for sawed lumber, poles, charcoal and firewood.

In Puerto Inca and Von Humboldt, there are no large or medium- scale industries and anv lumber produced goes to Pucallpa.

C.5.1.4. Fauna

The fauna in this region is closely related to the forests and as these are being reduced, a process of extinction has begun.

Hunted species can be seen on Table C.5.3.

Forest destruction has a direct effect on fauna, which is closely related to life in these forests, leading to a process of extinction of the species in this region. On the other hand, it should be pointed out that in the area covered by this study, the rural population hunt wild fauna for their food, with the added potential of marketing fur and hides.

Table C.5.3
SPECIES OF WILD FAUNA USED FOR FOOD
AGUAYTIA-PACHITEA

COMMON NAME	SCIENTIFIC NAME
Red Deer	Mazama americana
Sajino	Tayassu tajacu
Huangana	Tayassu pecari
Sachavaca	Tapirus tenetris
Majaz or picuru	Aguoti paca
Añuje	Dasyprocta sp.
Ronsoco	Hidrochaeris sp.
Carachupa	Dasypus novecinctus
Paujiles	Mitu sp.
Jungle pigeons	Culumbigallina
Wild turkey	Penelope sp.
Pucacunga	Nothocrax sp.

Source: Gran Geografía del Perú.
Mejia Baca publisher. Vol III.
Drawn up by: MACROCONSULT S.A.

C.5.1.5. Other Products

Other traditional products are scarcely marketed. CENFOR Pucallpa had a production of 6,750 kg. of rubber in 1983, which dropped to 2,700 kg. in 1986.

C.5.2. Profitability of other crops vs. coca

The profitability analysis was based on the region's main crops. Information in this respect for 1990, can be supplied by the Agrarian Bank and by the producers themselves.

Of the eight crops in the region that were analysed (anatto, rice, cocoa, cow peas, beans, corn, bananas and cassava), most of these show negative profitability indices, particularly those that use high levels of technology.

Table C.5.4. shows that coca is more profitable, both at high and low technological levels. (79.7.% and 46.8% respectively). In view of the fact that the participation of labour in direct costs is greater than for other crops, and because of the proximity to the Alto Huallaga, daily wages earned by labourers are up to triple the amount. (The highest wages are paid in Aguaytia, equivalent to I/.3,000,000/day, compared to I/.2,000,000/day in Pucallpa, I/.1,850,000 in Puerto Inca and I/.1,750,000 in Palcazú and Pichis). These costs do not include food, transport or housing, which are also paid by the producer. The average wages for other crops vary between I/.1,500,000 and I/.2,000,000 (including food).

The proximity to the Alto Huallaga and coca utilization, have a direct influence on labour. This situation alters the entire economic activity in the area.

After coca, the most profitable crop is the banana. It should be mentioned that this crop is an important part of the local staple diet and is also used to feed pigs.

Beans are next in importance, however this crop is preferably sown on river edges, becoming highly risky during periods of heavy rainfall and high water. Cassava is one of the main crops in this region. Medium technology is used for this crop, which has a profitability rate of about 25%, due to its greater yield (approximately 25.000 kg/ha). Nevertheless, this is a low index when compared to coca.

As regards cocoa and anatto, these crops have recently been implemented, supported by the UNDP, which guarantees the producers' selling price. Being recent crops, profitability rates are still low, however they could have a lot of potential over the years, providing the marketing infrastructure is suitable and prices are stable and acceptable in the international market.

As far as cocoa is concerned, the Naranjillo de Tingo Maria Cooperative in the Aguaytia region, is also involved in purchasing this product, setting similar prices to those established by the UNDP; likewise, in the Puerto Inca area,the Central Committee of Farming Producers in Puerto Inca fulfils a similar role.

The results of this negative profitability index, leads to the conclusion that most of the crops are priced below the accounting level; together with marketing problems, producers who work with other crops encounter great difficulties.

This is aggravated by the fact that although the price of coca is low at this time of the year, it is still higher than the price of beans and cocoa, which are the legal crops in most demand.

Table C.5.4
PROFITABILITY OF COCA VS. OTHER CROPS, 1993 1/
(thousands of Intis)

	COCA **		RICE		COWPEA	BEANS	CORN		CASSAVA		ANATTO *			COCOA **	BANANAS **
	T1	T3	T1	T2	T2	T2	T1	T3	T2	T3	T2	T3	T2	T3	T2
- Yield	2500	400	5000	4000	[illegible]	500	4000	1000	20000	10600	500	500	500	800	3000
- Price per kg	1100	1300	100	100	400	750	70	[illegible]	40	47	100	100	400	400	50
GROSS PRODUCTION VALUE	2,640,000	1,065,000	500,000	400,000	200,000	300,000	300,000	102,000	1,000,000	500,000	60,000	20,000	210,000	84,000	410,000
TOTAL PRODUCTION COST 2/	1,469,330	719,187	641,639	525,401	232,005	270,019	651,973	312,809	503,062	525,604	515,384	347,308	312,609	101,868	289,151
Direct Cost	571,000	497,100	330,000	300,444	120,380	177,005	504,000	193,560	301,100	201,400	201,100	77,480	172,170	80,270	128,580
- Labour	81.0%	92.9%	31.1%	40.0%	68.9%	77.0%	26.4%	58.6%	61.6%	72.6%	77.0%	80.1%	50.1%	76.3%	42.4%
- Inputs	19.0%	7.1%	68.9%	59.0%	31.1%	23.0%	73.6%	41.4%	38.4%	28.4%	22.9%	19.9%	49.9%	23.7%	57.6%
Indirect Cost	473,930	181,287	64,291	20,591	76,008	64,584	20,377	54,550	116,457	83,794	147,929	28,940	66,831	17,563	37,541
Financial Cost			60,368	52,309	23,637	14,219	47,135	29,003	39,115	61,500	46,215	34,775	35,367	5,533	15,025
Marketing Cost	80,400	40,800	67,000	58,000	20,000	20,000	72,000	56,000	218,000	159,500	24,000	16,500	31,800	13,000	128,000
NET INCOME	1,171,118	345,810	(141,639)	(125,401)	57,005	30,481	(171,970)	(153,808)	196,938	(25,604)	(455,384)	(31,308)	(100,609)	(17,908)	110,849
PROFITABILITY INDEX	79.7%	48.1%	-22.1%	-20.8%	11.9%	30.0%	-20.3%	-48.2%	24.8%	-4.9%	-88.4%	-91.4%	-32.3%	-17.6%	38.2%
ACCOUNTING PRICES	734	809	103	109	383	246	133	174	22	42	204	1188	551	810	35

* Corresponds to the crop's 3rd year (sustenance)
** Corresponds to the crop's 3rd year (sustenance)
*** Corresponds to the crop's [illegible] year [illegible]
1/ Circle and custom. Rate of exchange [illegible]
2/ Cost per hectare

T1: Nivel Tecnológico Alto
T2: Nivel Tecnológico Medio
T3: Nivel Tecnológico Tradicional

Source: MACROCONSULT S.A. Survey 1993
Agrarian Bank Bulletin 1993
Drawn up by: MACROCONSULT S.A.

Under present conditions - high production costs, deficient infrastructure for transport, marketing and processing - it is obvious that it is very difficult to compete with coca. Coca has the advantages of sophisticated technology, financial resources and an assured market with good prices.

This situation partly serves to explain why producers scarcely use high technology for other crops (greater investment risks).

C.5.3. Credits

In Padre Abad, it is difficult to obtain financing for the majority of the crops. Except for the banana production - centred on the "isla" variety - there is no informal credit market. Furthermore, because of marketing problems, there is discrimination in favour of rice and corn.

There is no informal credit market in Puerto Inca.

Of the credit statistics available for the Aguaytia and Pachitea region for 1989, those corresponding to Oxapampa and Puerto Bermudez have been chosen for this analysis. Information is also available for Pucallpa, however the information centred in that bank covers other areas that are not covered by this study. In the case of the Aguaytia province, the amounts available are recorded at an aggregate level, therefore it is difficult to discover the specific destination of each credit.

It is worth mentioning that the sustenance loans granted by the Peruvian Agrarian Bank for food crops have no restrictions, whereas long-term capitalization loans are restricted.

In the case of Oxapampa, farming credits represent 92.5% of the total. Loans were obtained mainly for coffee (23.8% of all farming credits), followed by potatoes (14.3%, cassava (12.9%), bananas (6.9%) and hard yellow corn (4.3%). (See Table C.5.5).

With respect to the total of 9,386 hectares for which loans were obtained from the Agrarian Bank, these are distributed as follows: 480 for coffee, 161 for potatoes, 512 for cassava, 240 for bananas and 206 for yellow corn.

It is obvious that credits in this area are concentrated on the main permanent crops - coffee and cassava - which together account for 36% of the amount assigned to farming.

In Puerto Bermudez, farming credits represent 99.8% of the total. This amount is distributed as follows: 43.7% for cassava, 36.7% for bananas, 4% for rice, 2.8% for anatto and 2.3% for yellow corn.

Table C.5.5
FARMING CREDITS, 1989
AGUAYTIA - PACHITEA
(thousands of Intis)

	AMOUNT	(%) 1/
OXAPAMPA		
Mixed Farming Credit	928,536.5	
Crop Farming Credit	858,601.5	92.5%
Coffee	204,583.5	23.8%
Cassava	111,099.0	12.9%
Bananas	59,319.0	6.9%
Yellow Corn	36,752.0	4.3%
Potatoes	122,690.0	14.3%
PUERTO BERMUDEZ		
Mixed Farming Credit	1,583,010.0	
Crop Farming Credit	1,579,090.0	99.8%
Cassava	690,660.0	43.7%
Bananas	579,580.0	36.7%
Rice	63,400.0	4.0%
Anatto	44,400.0	2.8%
Yellow Corn	36,470.0	2.3%

1/ with respect to the farming credit
Source: Banco Agrario del Perú (BAP)
Drawn up by: MACROCONSULT S.A.

Of the total number of hectares for which the Agrarian Bank has granted loans for these crops (3,807), 1,040 were for cassava, 844 for bananas, 70 for rice, 243 for anatto and 131 for hard yellow corn. In this case, credits are concentrated on cassava and bananas, which are also permanent crops in this region.

C.5.4. Marketing Problems

As far as rice and corn are concerned, marketing is mainly carried out through State entities - ENCI and ECASA (Rice Marketing Company). However, the irregular presence of these entities has often resulted in producers having to sell their products to intermediaries, obtaining

lower prices than on the market. As previously mentioned, this situation is aggravated during periods of heavy rainfall, as roads become blocked, preventing transport.

As regards export products such as cocoa and anatto, in Padre Abad, Aguaytia province, there is no export supply of farming products, and the small production of anatto has no assured market. Farming production is completely dispersed and producers have no effective organizations to support them at marketing time.
Nevertheless, cocoa and anatto in Puerto Inca are marketed through the Naranjillo de Tingo Maria Cooperative and the Puerto Inca Committee of Farming Producers, which also supports the remaining products. For the time being, the only direct export product is anatto, with a potential volume of 1,000 MT per year. Cocoa production on the other hand, is indirectly exported through the Naranjillo de Tingo Maria Cooperative.

As regards storage infrastructure, there is only one State-owned warehouse in Padre Abad (Aguaytia), built of fine material, with a 400 m.t. capacity; it is estimated that this building will have a useful life of 20 years.

In Pucallpa there are 5 warehouses, of which one belongs to the private sector, owned by TRAESMA (Special Maritime Transport) with a storage capacity of 10 MT. The other warehouses are:
Aguaytia with a 0.5 MT capacity; Callaría-Pucallpa, 2 MT; Nueva Requena, 0.5 MT; and one warehouse belonging to ECASA, with a 0.5 MT capacity. All these are State-owned. (See table C.5.6).

In Puerto Inca there are 10 storage centres, of which nine have a 300 MT capacity each, and one has a capacity for 1,000 MT. In Pachitea there is one private storage centre, belonging to the Pachitea Agroindustrial Cooperative, with a 3 MT capacity. (See table C.5.6).

All these warehouses are currently in use and in good condition.

C.5.5. Product distribution aspects

Padre Abad (Aguaytia)

The main means of communication in this region is of the Federico-Basadre highway. The marginal highway is another alternative. The former, despite its poor state, is operative, whereas the second is mostly impassable. Neighbouring roads are few in number and very short and are also in a bad state. During periods of heavy rainfall, neighbouring roads as well as main roads become impassable.

Table C.5.6
CROP GATHERING CENTRES
AGUAYTIA - PACHITEA
(tons)

NAME	CAPACITY	OWNER
PUCALLPA		
Aguaytía	0.5	State
Callaría-Pucallpa	2.0	"
Nueva Requena	0.5	"
Ecasa	0.5	"
Traesma	10.0	Special Maritime Transport
PADRE ABAD		
Padre Abad	0.4	State
PACHITEA:		
Pachitea	3.0	Agroindustrial Farming Coop.
PUERTO INCA:		
Navidad	0.3	Central Committee of Producers
3 de Octubre	0.3	"
Nuevo Miraflores	0.3	"
Nuevo Trujillo	0.3	"
Bello Horizonte	0.3	"
Monterrico	0.3	"
Las Palmas	0.3	"
Yuyapichis	0.3	"
Shebonya	0.3	"
Puerto Inca	1.0	Corde Huanuco (transfered to the Committee)

Source: MACROCONSULT S.A. Survey, 1990
Drawn up by: MACROCONSULT S.A.

The Aguaytia and San Alejandro rivers are the main means of transport for banana and cocoa harvests, from the farming areas to Aguaytia and San Alejandro, where these products are stored.

Transport is carried out on small boats with a maximum capacity of 400 kg., a 10 m. length and 1 m.beam, and a 0.90 m. depth of hold.

Overland freight paid to transport products from Aguaytia to Lima is the same as that paid between Pucallpa and Lima - I/.6,000,000 on trucks with a 20 MT capacity. Such trucks can transport up to 120,000 units of "Isla" bananas (the MTC have not established any freights).

In order to transport their harvests to storage centres, farmers must pay river or overland freights, depending on their location. The cost of transport between San Alejandro or Aguaytia and Tingo Maria, is I/.20,000/kg.

Puerto Inca

The main means of communication is the marginal highway - the San Alejandro - Pto. Bermudez stretch. There is also the Tournavista road, but there are no neighbouring roads. The Pachitea and Sungaroyacu rivers serve for river transport. All the roads are in a bad state. Whist they are operative at present, this situation will change during the rainy season.

There is no fixed freight established by the MTC. In practice, overland freight is I/.40,000/kg from Puerto Inca to Pucallpa, on 10 MT trucks. River transport is I/.150,000/kg, on 10 MT boats.

Farmers pay I/.5,000/Kg. to transport their products to the storage centres, to which amount river freight is usually added.

Overland freight from Puerto Inca to Tingo Maria is I/.60,000/kg. on 3 MT trucks, whereas the cost of transport between Pucallpa and Lima is I/.6,000,000 on 20 MT trucks.

C.6 NATURAL RESOURCES AND CONTAMINATION

C.6.1 Contamination from agro-chemicals

Coca crops obviously compete with weeds, and are attacked by plagues and diseases, which farmers combat with herbicides, insecticides or fungicides that are harmful to the environment.

Products used in this region are Tamaron 660 SL., Cupravit, Gramoxone, Malezil, Malation. Radicle and foliage fertilizers are also applied. All these substances reach the soils, causing contamination.

C.6.2. Contamination from the processing of basic cocaine paste

The worst type of contamination is caused by the inputs used in the manufacture of basic cocaine paste, in the so-called maceration "wells", as the region's rivers are the final destination of these products. The most threatened area at present is the Aguaytia basin. This also affects the region's eco-system, endangering the lives of the settlers who have no access to running water and therefore must obtain their water supplies from the river.

According to Marc Dourojeanni, the manufacture of basic cocaine paste requires the following products for the maceration stage:

Kerosene	18 lts x 115 kgs. of leaves (10 a)
Sulphuric acid	10 lt x 115 kg
Pottassium Carbonate	5 kg x 115 kg (raw lime)
Carbide	1 kg x 115 kg
Toilet Paper	5 kg x 115 kg

Therefore, in order to process 5,622,000 kg. of coca leaves in Aguaytia-Pachitea, the following products have been used:

Kerosene	879,965 litres
Sulphuric acid	488,870 litres
Potassium carbonate	244,435 kg.
Carbide	48,887 kg.
Toilet Paper	244,435 kg

In view of the fact that kerosene reduces oxygen supplies, it severely affects the biology of the species, flora and fauna and particularly plankton; however, other substances are even more dangerous.

In addition, acetone and toluol are also used in the subsequent washing and pressing process in proportions of one litre of each of these elements for every kilo of basic cocaine paste produced.

D. LA CONVENCION - LARES

D.1 INTRODUCTION

This study covers the provinces of La Convencion and Calca in the department of Cuzco located between parallels 11 and 13 30' latitude south and meridians 72 and 74 latitude west.

La Convencion and Lares covers 3'972,500 hectares of wild geography, heterogeneous physiography and a variety of climatic conditions suitable for a broad range of crops. It has three geographic regions: the Amazon Plain (Llano Amazónico) or Low Jungle (Selva Baja), the Jungle Outskirts (Ceja de Selva) or Upper Jungle (Selva Alta) and the Highlands (Sierra). Potential resources in this area have not been fully evaluated, and a mere 23% of the potential farmland is under cultivation.

The predominating climate is sub-tropical, rainy with a dry winter. Average temperatures vary between 19 and 25 degrees centigrade, whereas the average annual rainfall varies between 989.5 and 2,200 millimetres.

The study covers the districts of Echarate, Huayopata, Santa Ana, Santa Teresa, Vilcabamba, Occobamba and Maranura in La Convencion (87%), Lares and Yanatile in the Calca (13%).

The hydrographic network consists of the upper, medium and lower basins of the Urubamba river, forming part of the Amazon hydrographic system. Its source, as the Vilcanota river, is 4,320 m.a.s.l. in Abra de la Raya, becoming the Urubamba river at its confluence with the Yanatile river. Continuing its South-East to North-East course across Pongo de Mainique, it joins the Tambo river and becomes the Ucayali. A number of gorges are formed along its course, where it is joined by its tributaries.

Table D.1.1 shows that 198,900 hectares are suitable for tillage; 148,720 hectares for permanent crops; 24,180 hectares for pastures; 486,250 hectares for forestry areas and 3'114,450 hectares for protected woods.

The land suitable for tillage is of medium agrological quality, mainly located in alluvial areas not prone to flooding, within an ecological environment of varying climate conditions. The gound level is typically riparian - smooth, 2.4% slopes and varying degrees of undulating slopes of up to 20%. It is good farmland, mostly located in Huayopata, Maranura, Quillabamba, Cirialo, Koribeni and the area surrounding Pongo de Mainique.

The land suitable for permanent crops is of medium agrological quality, because of its slopes and soil conditions. It is located in the upper and lower jungle, with varying ecological conditions. Its plain and sometimes undulating topography reaches 30% slopes on the hillsides,

Table D.1.1
LAND CLASSIFICATION
LA CONVENCION – LARES
(hectares)

Land suitable for:	Hectares:
Tillage	198,900
Permanent crops	148,720
Pastures	24,180
Forestry	486,250
Protected woods	3,114,450
Total	3,972,500

Source: CODEVA Project, 1990
Drawn up by: MACROCONSULT S.A.

where there is a risk of erosion because the soil is poor, with low natural fertility levels. This is typical of the land between the Urubamba and Mishahua rivers. This is part of the area assigned for tillage, together with the banks of the Yanatile river and part of the Yavero, Tincupinea, Timpia, Camisea and Cashiriari rivers.

Land suitable for pastures is of medium agrological quality, also limited by the quality of the soil. Climate conditions are suitable for farming, although topographic features do vary. The plain surfaces with free drainage are the most favourable pasturelands. These are found between the Picha and Pagoreni rivers basins as well as in the Vilcabamba area.

Land suitable for forestry is located in the low jungle area, with varying climate conditions and topographic features that range from plain to smooth land, rising in varying degrees. The slopes are exclusively used for forestry, whereas the smooth areas are for permanent crops. These are located between the Camisea, Paquiria, Urubamba rivers and between the Huapaya, Pagoreni, Picha and Alto Urubamba rivers.

Protected areas are those that are considered unsuitable for farming or forestry purposes in view of their strong deficiencies. However, they are of great value for the development of mining activities, sources of energy, recreation, tourism or fishing - they could also become national parks. They are located between the Urubamba, Apurimac and Madre de Dios rivers.

The State plays a limited role in this area, therefore there are few investments. Only small budgets are available for the service and infrastructure sector, making it impossible to provide

adequate education, health, water, sewage and electricity services. Moreover, there is no road maintenance to lower transport costs.

Institutionally, the study area belongs to the Inca region. This has caused budgetary problems, as the Regional Public entities that do not want to be decentralized are in conflict, therefore no funds are assigned for investments purposes. The fact that Empresa Nacional de la Coca (ENACO S.A.), encouraged by the Coca Producers' Federation, objects to forming part of this region is proof of this fact. Unless the necessary steps are taken, La Convencion - Lares will become an autonomous area, at the mercy of the coca activity.

The only access to this is by the hard surface road connecting Cuzco and Quillabamba, and a local road that leads to Pongo de Mainique.

There is also a railroad between Quillabamba and Cuzco providing transport for both passengers and freight.

The bad state of the roads and consequent higher transport costs, discourage farmers from working deferred lands, therefore larger productions of permanent crops are not obtained. Many crops show negative profitability levels, considering extra-regional export costs.

As far as the region's natural resources are concerned, no protection measures are taken causing serious ecological harm. On the other hand the lumber potential in the lower Urubamba is still considerable, since its utilization has been limited by the lack of roads. However, necessary measures must be taken to protect these valuable resources, in view fo the progress made on the road into the forest.

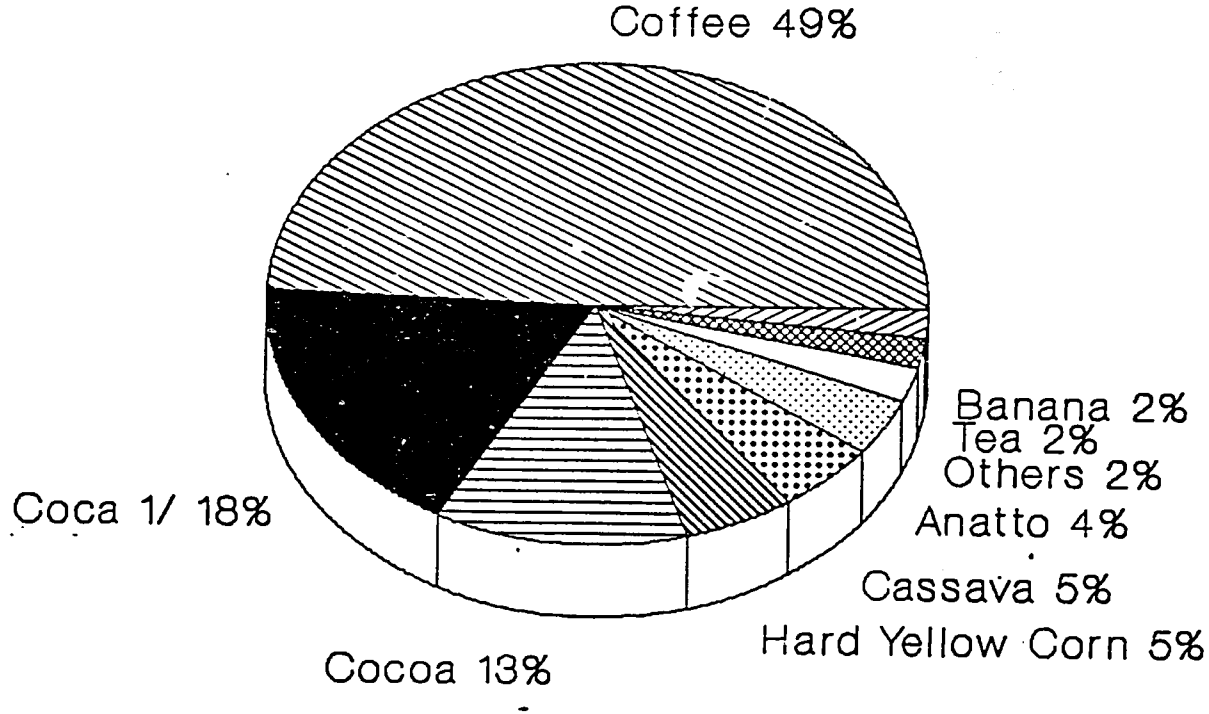
D.2 IDENTIFICATION AND QUANTIFICATION OF AREAS GROWING COCA AND LEGAL CROPS.

D.2.1 Identification of main crops

Economically, La Convencion valley relies on farming. The main crops are coffee, coca and cocoa (see graph D.1) which take up 80% of the cultivated area in the region. There are, however, other less important crops as far as the cultivated area is concerned (hard yellow corn, cassava, anatto, tea and bananas) which are, nevertheless, a fairly important part of the staple diet of local settlers.

Table D.2.1 details the region's main crop areas. Huayopata is the only district where tea is grown, whereas cocoa can be found in all districts except Huayopata and Santa Teresa. Potatoes are a minor crop as far as volume is concerned and are only grown in two districts.

Graph D.1
AREA UNDER CULTIVATION 1989
LA CONVENCION - LARES



Source: Proyecto CODEVA,
MACROCONSULT S.A.
Drawn up by: MACROCONSULT S.A.

1/ The coca area corresponds to 1990.

Table D.2.1
IDENTIFICATION OF THE REGION'S MAIN CROPS
LA CONVENCION – LARES

Crops	Santa Ana	Echarate	Huayopata	Occobamba	Vilcabamba	Santa Teresa	Maranura	Quellouno	Lares-Yanatile
Permanent:									
Coca	*	*	*	*	*	*	*	*	*
Coffee	*	*	*	*	*	*	*	*	*
Cacao	*	*	-.-	*	*	-.-	*	*	*
Anatto	*	*	*	*	*	*	*	*	*
Citrus fruits	*	*	*	*	*	*	*	*	*
Bananas	*	*	*	-.-	*	*	*	*	*
Tea	-.-	*	-.-	-.-	-.-	-.-	-.-	-.-	-.-
Annual:									
Beans	*	*	*	*	*	*	*	*	*
Cassava	*	*	*	*	*	*	*	*	*
Potatoes	-.-	-.-	-.-	-.-	*	*	-.-	-.-	-.-
Hard yellow cor	*	*	*	*	*	*	*	*	*

Source: CODEVA Project, 1990
Drawn up by: MACROCONSULT S.A.

* = sown
-.- = not sown

The most important permanent crops are coffee, cocoa, tea, coca, anatto, banana and citrus fruits; among the annual crops the most prominent are paw-paws, cassava, hard yellow corn, beans and rice.

Table D.2.2
AREA OF OTHER CROPS IN THE
LA CONVENCION - LARES PROVINCE
(hectares)

	1985	1986	1987	1988	1989	1989/85 %
La Convencion:						
Coffee	20,140	22,190	24,810	27,348	30,229	50.1
Cacao	3,656	3,873	4,523	6,135	8,863	142.4
Anatto	1,256	1,268	1,560	2,036	2,391	90.4
Hard yellow corn	3,120	2,814	3,236	3,085	3,072	-1.5
Cassava	2,914	3,037	2,810	3,210	3,009	3.3
Citrus fruits	600	593	590	595	599	-0.2
Tea	4,300	3,800	2,500	2,014	1,455	-66.2
Beans	280	314	375	380	432	54.3
Bananas	610	605	736	928	1,302	113.4
Total	36,876	38,494	41,140	45,731	51,352	39.3
General Total 1/	45,589	48,720	53,613	56,821	78,446	72.1
Calca:						
Coffee	3,357	3,583	4,185	4,812	5,616	67.3
Cacao	150	150	160	210	270	80.0
Anatto	350	345	380	405	460	31.4
Hard yellow corn	824	793	814	485	800	-2.9
Cassava	510	620	605	583	532	4.3
Citrus fruits	200	190	195	190	200	0.0
Tea	300	300	280	270	250	-16.7
Beans	31	38	54	62	80	158.1
Bananas	63	67	89	115	128	103.2
Total	5,785	6,086	6,762	7,132	8,336	44.1
General Total 1/	7,028	7,335	7,214	8,132	9,448	34.4

Source: CODEVA Project, 1990
Drawn up by: MACROCONSULT S.A.
1/ Includes other crops.

D.2.2 Areas Producing Coca Leaves

Table D.2.3 shows the areas where coca leaves are grown. These areas are strategically placed close to colonized areas.

Coca plantations are older in the areas close to Quillabamba, Maranura and Echarate, from where they have started to expand, with the opening of new roads and new colonies.

D.2.2.1 Legal area

In 1978, ENACO registered coca leaf producers of all coca areas in the country. The total hectares registered in La Convencion-Lares were 7,877.3 (table D.2.3). These "legal" hectares represent 60% of the total hectares estimated for this region.

Table D.2.3
COCA AREA REGISTERED BY ENACO IN 1978
LA CONVENCION - LARES
(hectares)

Province: La Convencion Districts:	Registered Hectares
Santa Ana	1,506.0
Echarate	1,547.8
Huayopata	326.7
Occobamba	562.3
Vilcabamba	241.8
San a Teresa	499.8
Maranura	1,273.3
Total	5,957.7
Province: Calca Districts:	
Calca	471.0
Lares	1,102.0
Yanatile	346.6
Total	1,919.6
TOTAL	7,877.3

Source: ENACO S.A.
Drawn up by: MACROCONSULT S.A.

Santa Ana, Echarate, Maranura and Lares districts are the largest legal coca production centres (table D.2.3).

However, ENACO subsequently opened new storage centres in Kiteni, Santa Maria, San Lorenzo and Putucusi, in order to supply storage and reduce transport costs for legal producers. ENACO's decision to open these centres was based on a survey carried out in the area (1988), dispite the fact that they were located in coca expansion areas.

D.2.2.2 Illegal Area

Estimates of the coca areas in La Convencion - Lares, (Table D.2.4) were based on information obtained by ENACO for 1988. Deferred lands were added to the above to obtain a better idea of the real area involved. New coca expansion areas were also added - these were identified through surveys and visits to Kiteni, Calca, Lares and Yanatile (see Methodological Appendix).

For La Convencion - Lares a total of 13,177 hectares of coca are estimated, including both legal and illegal crops.

D.2.3 Areas Producing other crops

The non-coca farming production in La Convencion valley is mainly concentrated in the traditional area, i.e. in the Maranura, Santa Teresa, Echarate and Huayopata districts, especially close to the railroad between Quillabamba and Cuzco and the roads along the Urubamba and Yanatile rivers.

Table D 2.2 shows the area used for legal crops in both La Convencion and Calca provinces. In both cases coffee is the most important crop showing an increase of 50% and 67% respectively of the area sown during the 1985-89 period.

In the case of coffee it should be mentioned that there was a regular foreign market with profitable prices. However, prospects for coffee are uncertain. Cocoa and anatto do not have a sure market, although they are supported by the CODEVA Project (La Convencion - Lares Development Agreement) through the supply of plants and seeds.

Coffee, cocoa, anatto, bananas and beans proved to be crops under expansion, cocoa experiencing the highest increase in La Convencion and beans in Calca province. On the other hand, due to the disruptions suffered by the tea producer cooperatives, this product suffered a steady drop (66 %) between 1985 and 1989.

Table D.2.4
IDENTIFICATION AND QUANTIFICATION AREAS GROWING COCA
LA CONVENCION - LARES
(hectares)

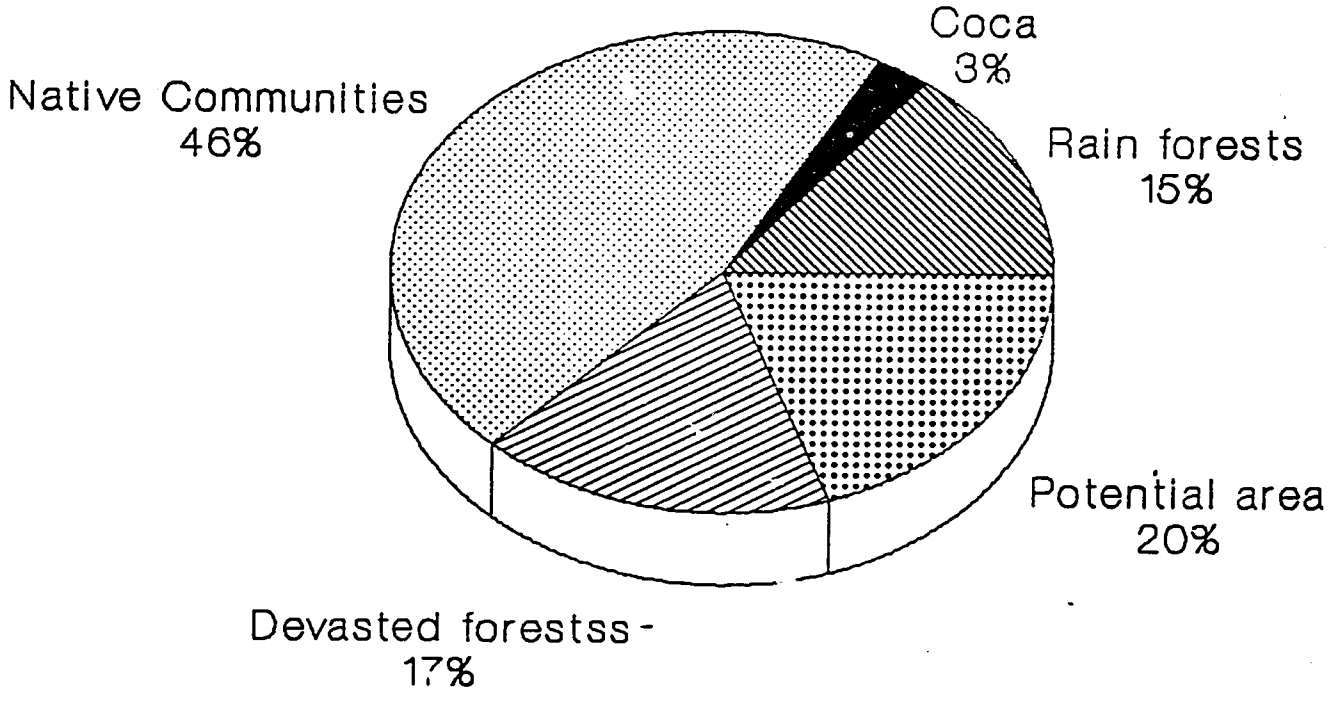
		1988 Declared Legal Has.	1988 Declared Legal Has. plus fallow areas	1990 Current coca Has.
Province: La Convencion				
Districts:				
	Santa Ana	1,440	1,800	1,800
	Echarate	1,980	2,475	2,475
	Huayopata	380	475	475
	Occobamba	604	755	755
	Vilcabamba	242	303	303
	Santa Teresa	450	562	562
	Maranura	1,108	1,385	1,385
	Kiteni	864	1,080	2,500
	Total	7,068	8,835	10,255
Province: Calca				
Districts:				
	Calca	392	490	580
	Lares	858	1,073	1,322
	Yanatile	624	780	960
	Total	1,874	2,343	2,862
TOTAL		8,942	11,178	13,117

Source: ENACO S.A,MACROCONSULT S.A. Surveys 1990.
Drawn up by: MACROCONSULT S.A.

D.2.4 Potential area for coca

Potential coca expansion areas are those considered suitable for greater utilization, such as forestry land. Areas where the soil does not comply with the minimum ecological conditions for coca - rain forests - were deducted from the total, as were the areas occupied by native communities and deforestation areas (see graph D.2).

Graph D.2
POTENTIAL AREA FOR EXPANSION
LA CONVENCION - LARES



1/ Percentage over total lands suitable for forestry.

Source: Proyecto CODEVA, MACROCONSULT
Drawn up by: MACROCONSULT S.A.

Table D.2.5
AREA OF OTHER CROPS
LA CONVENCION - LARES
(hectares)

Products	1980 (a)	1985 (b)	1989 (c)	1985-80 (b)/(a)	1989-85 (c)/(b)
Coffee	24,734	23,497	35,845	-5.0	52.6
Cacao	7,300	3,806	9,133	-47.9	140.0
Anatto	1,171	1,606	2,851	37.1	77.5
Hard yellow corn	384	3,944	3,872	927.1	-1.8
Cassava	3,321	3,424	3,541	3.1	3.4
Citrus fruits	776	800	799	3.1	-0.1
Tea	4,637	4,600	1,455	-0.8	-68.4
Beans	314	311	512	-1.0	64.6
Bananas	817	673	1,430	-17.6	112.5
Rice	128	800	400	525.0	-50.0
TOTAL	43582	43461	59838	-0.3	37.7

Source: CODEVA Project, 1990.
Drawn up by: MACROCONSULT S.A.

Table D.2.6
POTENTIAL EXPANSION AREA OF COCA
LA CONVENCION - LARES
(hectares)

Land suitable for forestry	486,250
Deducting	
-Rain forests	(71,000)
-Land occupied by native communities	(221,535)
-Devastated forests	(85,000)
-Land currently growing coca	(13,117)
Total potential area	95,598

Source: MACROCONSULT S.A. Surveys, 1990.

The total amount of land suitable for coca expansion is 108,715 hectares (table D.2.6), which includes 13,117 hectares on which coca is currently grown. The area likely to be expanded is 95,598 hectares (see methodological Appendix).

The area currently dedicated to growing coca (13.117 hectares) represents only 14% of the estimated potential.

The area which currently offers the best "facilities" for coca expansion is the Pongo de Mainique region. This zone is a new centre of attraction due to the road under construction. The

land is suitable for forestry and strategically well situated for coca. Furthermore, the maceration centres in Kiteni and Yanatile ensure that producers receive a higher price for each "arroba" (25 lb. unit) of coca leaves. ENACO currently pays I/. 5'000,000 for each "arroba" whereas the illegally marketed coca is sold at approximately I/.6'300,000. In Kiteni and Yanatile. each "arroba" is sold for up to I/.7'500,000.

D.2.5 Potential area for other crops

The potential farming area for expansion in La Convencion - Lares was estimated at 347,620 hectares (table D.2.7). These estimates include areas suitable for annual crops (198,900 hectares) and those suitable for permanent crops (148,720 hectares).

Permanent crops are currently undergoing an expansion process, encouraged by the producers themselves and, to a certain extent, by the activities carried out by the CODEVA Project.

As far as annual crops are concerned, it is traditional in the valley to produce food crops for local consumption as well as for neighbouring Andean markets.

Table D.2.7
POTENTIAL EXPANSION OF OTHER CROPS
LA CONVENCION - LARES
(hectares)

Land suitable for:	Hectares:
Tillage	198,900
Permanent crops	148,720
Total potencial surface	347,620

Source: CODEVA Project, 1990
Drawn up by: MACROCONSULT S.A.

Annual Crops

Cassava

This is the main food for the jungle dwellers, and had high yields (11.000 kg/ha.) in 1989. It adapts to different types of soils.

Rice

Rice is sown exclusively in rainfed areas, however, it could be changed to the flooding system (taking advantage of the many streams and gorges), which would substantially increase its productivity and profitability.

Rice followed a downward trend between 1985 and 1989. until the sown area was reduced by half. However, if the new system was applied, new areas could be opened. The yield projected for 1989 is of 1,500 kg/ha.

Hard Yellow Corn

It is expected that this crop will maintain its cultivated area, due to the opening up of new agricultural lands by the road, even though it may decrease in traditional areas due to increasing permanent crops. The yield projected for 1989 is of 2,000 kg/ha.

Permanent Crops:

Coffee

Coffee showed a slight drop during the 1980 to 1985 period with respect to the area under cultivation, as a result of the damages caused by the "Niño" phenomenon.

However, it is evident (table D.2.5) that this tendency was reverted during the 1985 - 1989 period, with an expansion of 11,111 ha. This increase in the coffee sector can be explained by the international coffee price and, in part, through the help granted by the CODEVA project, to control the "broca" and rust which were destroying coffee plants, supplying different improved coffee plants and providing technical assistance.

However, being a product heavily dependent on international quotations, it has suffered price drops, mainly as a result of the dissolution of the International Coffee Agreement.

Cocoa

This is the crop with the strongest increase during the last four years. It is expected that this tendency will continue because of the development activities carried out in the settlements close to Pongo de Mainique, where due to favourable soil conditions, expansion is possible. Furthermore, it is expected to cover the growing installed capacity of the transformation industry, which supplies the domestic and foreign markets with finished products. Cocoa plantations in this valley are found in both type A and type B soils, suitable for tillage (annual) and permanent crops.

Tea

As mentioned above, tea plantations have been affected by the fact that cooperatives are facing serious financial problems and thus reducing the area used for this product. Tea storage

centres were no longer able to buy all the area's production due to the lack of financial resources, therefore farmers in the Huayopata district were forced to replace this product with coca.

However, new agents recently appeared to buy the region's tea production. The area has a modern infrastructure operating at idle capacity, therefore conditions are favourable, both for expansion and for the land originally used for tea plantations.

Anatto

This is purely an export crop promoted by the CODEVA project. Its expansion between 1985 - 1989 was 1,680 hectares (77.5%). However, many of the anatto plantations have currently been abandoned, as it is impossible to place this product on foreign markets, which have suffered a setback, prices having decreased considerably.

Bananas

Bananas are part of the staple diet of the jungle population. Besides, this crop also provides shade for young coca plants. It is expected that the number of hectares used for this crop will increase due to the newly established colonies and the expansion of coca leaf plantations.

Fruit Trees

Fruit trees, especially mangos and citrus fruits, grow well in the valley. Fruit can only be stored for a short term, therefore the expansion of this product should progress alongside agroindustry.

Regarding the performance of this crop, it should be mentioned that although citrus fruit trees have covered the same area since 1985, activities carried out by CODEVA (e.g. the nurseries set up for the sale of seedlings) should result in an increase of the area dedicated to these crops.

In this valley plantations of other species known to be adaptable to similar environments with better market diversification, must be promoted. For example the oil palm (Elias genensis), in demand on the domestic market as fat for human consumption; paw-paws for human and animal food, and the coconut tree for human use and for the cosmetic industry.

D.3 PRODUCTIVE ASPECTS OF AREAS COVERED BY THE STUDY

D.3.1 Volume of Coca Leaf Production

Table D.3.1 shows the production of dry coca leaves, registered in 1978 by ENACO. This production is legal because it is subject to Law 22095.

As far as production aspects are concerned, Decree-Law 22095 stipulates the following:

a) It prohibits new coca leaf plantations, including the renewal and hilling of existing areas.

b) It determines that land not directly worked by its owners shall be affected and expropriated by the General Agrarian Reform Bureau.

c) It establishes that production on land over 10 hectares should be eradicated or replaced within 2 years, and properties of 5 to 10 hectares within 3 years. These deadlines expired in 1980 and 1981 respectively.

d) Its first paragraph establishes that all coca producers are obliged to register at ENACO within a period of 90 days.

According to this decree, the existing production registered in 1978 was given a legal status. However, it should be mentioned that this was not an official land register, but a voluntary declaration made by coca leaf producers. The production recorded by ENACO in 1978 should therefore only be considered as a reference, since many producers declared smaller areas than were actually being cultivated.

Most coca leaf producers declared smaller areas, as they felt that if they declared the real area of their plantations, they would be subject to higher taxation.

The purpose of this law was to supress illegal drug trafficking. Chapter IV grants ENACO the monopoly for the domestic and foreign marketing of coca leaves. This provision acknowledges the international position concerning the need to suppress drug- trafficking, as well as the social problem generated by illegal marketing. Its final objective was to proprose the progressive eradication of the coca crop, except for the areas in which coca is grown for industrialization and medical-scientific purposes.

At this point, it should be mentioned that today, coca is the only crop purchased by the State in the region, paying 100% of its value, in cash. Thus, it has become the most profitable "legal" crop, since its sale is assured.

On the other hand, it should be pointed out that as a consequence of the liberalization shown by ENACO since 1985, in order to acquire a higher production of coca leaves, purchases were made without taking into consideration whether or not the production was registered. Thus, the intensification of coca plantations was encouraged and these were expanded to new areas, violating legal provisions.

Therefore, since 1986 new storage centres were set up in unregistered places, with a production that was not registered in 1978, such as Palma Real, Kiteni, Santa Maria, San Lorenzo and Putucusi.

This policy followed by ENACO S.A. caused organizations in the different coca valleys to present estimates of coca areas in 1988, committing themselves to certain delivery volumes, so that new storage centres could be set up to enable the State-owned enterprise to purchase the production, and in order to reduce transport costs which were quite considerable, because of the bad state of the roads. This information was taken as a starting point to calculate the coca area and tonnage in 1990 (see chapter D.2).

In 1978 the declared area was 7,877.3 hectares with an annual volume of 5,434.8 metric tons (table D.3.1).

Table D.3.1
PRODUCTION VOLUME OF DRY COCA LEAVES
LA CONVENCION - LARES

Province: La Convencion Districts:	1978 Hectares Registered	Tons	1990 Hectares	Tons
Santa Ana	1,506.0	1,039.3	1,800	1,242
Echarate	1,547.8	1,068.0	2,475	1,708
Huayopata	326.7	225.4	475	328
Occobamba	562.3	387.9	755	521
Vilcabamba	241.8	166.8	303	209
Santa Teresa	499.8	344.8	562	388
Maranura	1,273.3	878.6	1,385	956
Kiteni	-.-	-.-	2,500	1,725
Total	5,957.7	4,110.8	10,255	7,076
Province: Calca Districts:				
Calca	471,0	325	580	400
Lares	1,102.0	760	1,322	912
Yanatile	346.6	239	960	662
Total	1,919.6	1,324.0	2,862	1,975
TOTAL	7,877.3	5,434.8	13,117	9,050

Source: ENACO S.A., MACROCONSULT S.A Surveys. 1990
Drawn up by: MACROCONSULT S.A. * Average yield = 60 arrobas/ha. (690 kg./ha.)

In 1990, it was estimated that an area of 13,117 hectares was most likely used for legal and illegal coca. Using an average yield of 60 "arrobas" (25 lb. units) per hectare, the estimated

coca production was 9,050 tons. The total amount was considered, since it is impossible to clearly distinguish between legal and illegal hectares.

At this point it should be emphasized that the volume marketed by ENACO represents approximately 70% of the registered volume, thus proving that 30% of the volume produced is smuggled, either for mastication or maceration purposes. This figure is calculated by taking the average tonnage marketed by ENACO (3,730) and comparing it with the corresponding volume of the registered hectares (5,434), as shown in tables D.3.1 and D.3.2; i.e. only the "legal" hectares would be considered.

Table D.3.2
PURCHASE OF DRY COCA LEAVES BY ENACO S.A.
LA CONVENCION - LARES
(kilograms)

	1985	1986	1987	1988	1989	Average 1985-1989
Main storage centres:						
Quillabamba	2,248,682	2,191,406	2,064,583	2,282,533	1,782,120	2,113,865
La Quebrada	466,209	608,141	867,154	560,844	442,430	588,956
Quellouno	424,257	347,998	437,362	324,548	357,260	378,285
Colca	259,965	175,170	114,938	110,470	94,300	150,969
Santa Maria	18,123	289,519	314,189	316,220	290,000	245,610
Palma Real	0	0	123,138	138,000	240,000	100,228
Maranura	0	0	0	0	350,000	70,000
Occobamba	0	0	0	71,607	120,000	38,321
Putucusi	0	0	0	0	94,000	18,800
San Lorenzo 1/	0	0	0	0	0	0
Kiteni	0	0	0	0	120,400	24,080
Total	3,417,236	3,612,234	3,921,364	3,804,222	3,890,510	3,729,113

1/ Not implemented as an independent storage centre and deliveries are made through Quillabamba and Quellouno.
Source: ENACO S.A.
Drawn up by: MACROCONSULT S.A.

Furthermore, it is important to emphasize that in some storage centres, the marketed volume has dropped. This does not mean that coca is no longer grown in that area, but that the higher profit obtained by illegal crops results in the production being aimed at drug-trafficking.

On the other hand, if 3'730,000 kg is considered as the average volume bought by ENACO and that the average yield per hectare is 60 "arrobas" (25 lb. per arroba), then:

3'730,000 / 11.5 = 324,347.8 arrobas
324,347.8 / 60 = 5405.8 hectares

5.405.8 hectares of coca were declared. This enables us to calculate the approximate number of illegal hectares. In 1990 approximately 7,711 hectares were considered illegal.

The illegal coca production in La Convencion-Lares consists of registered areas which have been expanded both as far as area and production volume are concerned, and areas that were not registered by coca producers (close to new settlements).

D.3.2 Volume of Production of Other Crops

Table D.3.3 shows the production volume and value of the main crops in La Convencion - Lares and it can be seen that the total production volume in that area suffered a sharp drop in 1983 (41.2%), due to the effects of the "Niño" phenomenon, whereas for 1989 a slight increase of 6.6% was recorded, compared to 1980.

Because of their production volume, the most important legal crops, in descending order, are cassava, coffee and bananas, which were outstanding as a result of their contribution to the Gross Product Value (GPV) in 1989.

Despite the fact that the cultivated area was expanded by 37.7% (Table D.2.5), the expected volume was not produced. Thus, it was proved that the low productivity levels are the main cause of the drop in farming production. The following main factors prevent the recovery or increase in production levels:

- Low technological level of farming exploitation.
- Lack of dissemination of research carried out.
- Weak and inadequate transfer of technology.
- Deficient productive and marketing infrastructure.
- Limited use of fertilizers and pesticides.
- Lack of information on productive resources, etc.

Table D.3.3
PRODUCTION VOLUME AND VALUE OF OTHER CROPS
LA CONVENCION - LARES
(1980-1989)

	1980		1983		1989	
	MT	GPV	MT	GPV	MT	GPV
Coffee	12,734	3,617	10,455	10,651	21,507	32,260,500
Coca 1/	4,192	1,744	5,376	7,316	9,050	18,100,770
Cacao	3,212	1,336	1,388	5,214	3,653	5,479,500
Anatto	527	79	619	175	1,283	1,283,000
Hard yellow corn	7,181	373	2,653	1,247	7,744	2,323,200
Cassava	36,132	1,215	19,774	2,090	38,951	13,632,850
Citrus fruits	8,917	268	2,655	183	6,392	958,800
Tea	9,552	525	2,787	433	2,619	1,440,450
Beans	336	48	231	283	512	256,000
Bananas	11,373	398	9,662	809	14,300	5,720,000
Paws-paws	217	12	765	54	884	618,800
Rice	192	19	512	120	600	180,000
Potatoes	9,912	272	4,540	1,127	4,240	6,360,000
Total	104,477	9,906	61,417	29,702	111,735	88,613,870

1/ Drawn up based on information from the Agricultural Office in Quillabamba for 1980 and 1988. The data for 1989 corresponds to MACROCONSULT S.A. The price per ton of coca leaves was calculated at I/. 2,000 for 1989 (exchange rate = I/. 430,000).

Source: CODEVA Project 1990, MACROCONSULT S.A. Surveys 1990.
Drawn up by: MACROCONSULT S.A.

In 1989 the gross product value in the farming sector was I/.88'614,560. The district with the highest GPV in the study area was Echarate, followed by Lares, Yanatile, Santa Ana and Maranura.

Livestock was also considered due to its importance as family sustenance in the region. Every peasant keeps between 1 and 3 heads of cattle and/or pigs and poultry (turkeys, ducks and chickens) for their own consumption.

At a district level Vilcabamba has the most livestock, with 77% of the region's sheep, 43% of the cattle, 48% of the pigs and 80% of the horses. (table D.3.4).

It can also be seen that Lares-Yanatile is the second most important district as far as livestock is concerned.

With respect to poultry farming, Echarate has the highest number of birds, representing 21% of the region's total.

Table D.3.4 shows that cattle and sheep were of major importance to La Convencion - Lares in 1989. On the other hand, the raising of poultry and guineapigs was very important for popular consumption.

Table D.3.4
NUMBER OF LIVESTOCK BY DISTRICTS
LA CONVENCION - LARES
(heads of cattle)

	Cattle	Sheep	Pigs	Goats	Horses	Poultry	Guinea-pigs
Santa Ana	3,430	650	580	10	10	24,500	28,500
Maranura	650	30	450	-.-	10	15,300	18,000
Huayopata	2,200	1,589	820	15	15	12,500	22,000
Santa Teresa	8,350	2,239	450	-.-	400	12,000	12,500
Echarate	9,920	265	1,590	-.-	126	26,500	15,000
Occobamba	2,350	-.-	315	-.-	-.-	11,070	4,040
Vilcabamba	28,400	53,036	6,369	210	2,282	12,500	43,000
Lares-Yanatile	11,230	11,200	2,560	2,300	-.-	11,000	23,800
Total	66,530	69,009	13,134	2,535	2,843	125,370	166,840

Source: CODEVA Project, 1990
Drawn up by: MACROCONSULT S.A.

It should be pointed out that cattle-raising is still in an incipient stage with a very slow increase rate due to the lack of appropriate management and business criteria for this kind of activity. 60% of the meat comes from the highlands in the Department of Cuzco, mainly from Espinar and Chumbivilcas provinces.

It should be mentioned that livestock can be found in Medio and Bajo Urubamba, raised by native communities, cooperatives and private farmers; breeding mostly involves the Santa Gertrudis and Brown Swiss breeds, making this a highly potential area, since it has the right conditions for extensive cattle-raising.

Table D.3.5. shows the pattern of the livestock activity in La Convencion - Lares during the last decade. Sheep experienced a strong increase (100%), followed by goats (59%), whereas poultry and guinea-pig breeding had varying tendencies.

Table D.3.5
ESTIMATED LIVESTOCK
LA CONVENCION - LARES
(heads of cattle)

	1980	1983	1986	1989	89/80 (%)
Cattle	52,415	53,595	59,252	66,530	26.9
Sheep	34,435	33,610	67,656	69,009	100.4
Pigs	10,700	11,120	12,802	13,134	22.7
Goats	1,595	1,565	2,123	2,535	58.9
Horses	8,745	5,640	2,799	2,843	-67.5
Poultry	154,711	111,865	110,220	125,370	-19.0
Guinea-pigs	189,490	150,275	153,150	166,840	-12.0

Source: CODEVA Project, 1990
Drawn up by: MACROCONSULT S.A.

D.3.3 Yield of Different Crops

Table D.3.6 shows the yield of main crops according to information drawn up by the CODEVA Project for the 1980-1989 period. The majority of cases show a varying tendency, but most crops reach lower or similar yields to 1980, except for coffee, hard yellow corn and cassava with an increase of 100 kg/ha, 130 kg/ha. and 120 kg/ha. respectively. Anatto and rice had maintained steady yields, without variations.

This pattern can be explained by the fact that very low-level technology is used for these crops, i.e. a total lack of phytosanitary control, technical assistance or any type of technological innovation.

The increase of 20% in the coffee yield is explained by the technological transfer achieved by the application of the necessary phytosanitary control. Thanks to this improvement, coffee growers were able to control plagues like rust and "broca", which were attacking their plantations. The problem faced by farmers is that they are not able to pay the high costs of pesticides and therefore prefer to use their traditional annual weeding techniques before the harvest, putting aside such tasks as fertilizing, pruning, shade reduction and rehabilitation.

Table D.3.6
YIELD OF MAIN CROPS: 1980-1989
LA CONVENCION - LARES
(kilograms per hectare)

Crops	1980 (a)	1981	1982	1983	1989 1/ (b)	1989-80 (b)/(a)
Coffee	500	500	501	450	600	20
Cacao	440	452	439	397	400	-9
Anatto	450	766	426	408	450	0.
Hard yellow cor	1,870	1,435	1,782	1,967	2,000	7
Yucca	10,880	11,480	14,117	13,600	11,000	1
Citrus fruits	11,480	8,244	7,946	9,683	8,000	-30
Tea	2,060	2,500	2,500	1,548	1,800	-13
Beans	1,070	929	1,228	1,000	1,000	-7
Bananas	13,920	10,744	10,512	11,395	10,000	-28
Rice	1,500	1,500	1,501	1,501	1,500	0

1/ Proyected
Source: CODEVA Project, 1990.
Drawn up by: MACROCONSULT S.A.

Citrus fruits and bananas sharply reduced their yields by 30% and 28% respectively. The tea yield decreased significantly from 2,500 kg/ha to 1,800 kg/ha during the 1981-1989 period. Tea cooperatives were affected by the credit policy applied by the Agrarian Bank, and this effect, together with the lack of business management and marketing problems, served to encourage more agents, rather than to promote mechanisms so that consumers could be reached directly.

Table D.3.5 analyzes the participation of main crops in La Convencion - Lares at a domestic production level. It shows that 86% of the anatto production comes from the study area followed by cocoa (26.1%) and coffee (13.8%).

Finally coca shows a yield of 60 "arrobas" per hectare reflecting the technological level used in the zone, i.e. medium technology level. At this level culture work is done, such as pruning and weeding.

The above table shows that legal crops could increase their yield, despite the very poor technology applied, thus leaving room for improvement. The expense involved in improving technology is another limiting factor. A satisfactory profit margin cannot be predicted for export crops, since income is seriously affected by fluctuations of international quotations.

Furthermore it is important to emphasize the role played by the CODEVA Project in La Convencion - Lares. CODEVA (La Convencion - Lares Development Agreement) is a project financed by the United Nations, which conducts an integral development program in La Convencion - Lares valley.

The proposed objective is to offer aid to the communities in these valleys in order to "replace coca plantations with other legal crops", such as coffee, cocoa, anatto and citrus fruits.

Table D.3.7
PARTICIPATION OF MAIN PRODUCTS IN THE NATIONAL PRODUCTION: 1989
LA CONVENCION - LARES

Crop	Level	Area Has.	Yield Kg./Ha.	Produc. TM	Particip. nat. level
Coffee	National	195,155	800	156,124	100.0
	Subregional	35,845	600	21,507	13.8
Cacao	National	28,000	500	14,000	100.0
	Subregional	9,133	400	3,653	26.1
Anatto	National	3,750	400	1,500	100.0
	Subregional	2,851	450	1,283	85.5
Coca 1/	Subregional	13,117	690	9,050	-.-

1/ 60 arrobas (690 kg) of coca per hectare are considered.

Source: CODEVA Project 1990
"Peru in Figures 1990", CUANTO
Drawn up by: MACROCONSULT S.A.

CODEVA provides technical assistance and supplies farmers with seeds and fertilizers, waiving expenditures when coca plantations are replaced. They also finance community projects, such as roads, warehouses, schools, health stations and agroindustrial activities.

However, these objectives have become relative, due to several difficulties encountered. Serious frictions arose between CODEVA and the coca federation, which limited the results of the projects, since producers became reluctant to take advantage of these programmes.

Furthermore, during the last few months their work came to a standstill, since the programs for replacing coca plantations with anatto had little success because the marketing of this product could not be assured. On the other hand, the drop in international prices for anatto prevented

the replacement of coca plantations with this product. In fact, in some cases the opposite occurred, i.e. anatto plantations were replaced by coca.

Finally, there is always the problem of limited resources to finance a more ambitious program.

D.4 SOCIO-ECONOMIC FEATURES

The area under study is one of the oldest settlements in the Peruvian Upper Jungle. This helped to determine its productive profile some time ago, however despite the diversity of its natural resources, a qualitative step towards agroindustry has never taken place. Indeed, at the beginning of the 60s the increase in the international coffee price unleashed an intensive social process which mobilized traditional families from Cuzco who ran haciendas, to lease and sub-lease, in an effort to gain title deeds to the land - an effort which proved successful.

However, both the crisis of the associated agricultural sector and the fluctuations of the international prices for coffee and cocoa prevented producers from improving their position in the market, regardless of whether they were individual farmers or members of the farming production cooperatives.

In this respect it is safe to say that both the human settlements and their problems are old-fashioned, since farmers, whether they are individual owners, settlers or members of a cooperative, have not been able to overcome the production and marketing problems that have existed since the Agrarian Reform took place.

D.4.1 Population: Structure and Growth

The distribution of the population in the area under study is mainly rural, however there is a tendency towards "deruralization". This tendency can be explained by the migratory flow from rural zones to the main cities (Table D.4.1).

The city of Quillabamba was a main centre of attraction for the people from rural areas since it is the most developed urban centre due to its increasing commercial activities.

During the inter-census period - 1972-1981 - the increase at a regional level was slow (23.42%), the urban population having the highest growth rate. On the other hand, annual population growth rates in the urban zones of La Convencion-Lares were 4.38% and 5.13% respectively, whereas the rural growth rates were only 1.99% and 0.03%.

As far as the population growth is concerned, it can be seen from table D.4.2 that the estimated population for 1990 will have an annual increase of 2.37% in La Convencion - Lares. It also shows the districts with the highest growth rate, which are, in descending order, Echarate, Quellouno and Yanatile. It is also important to point out that Lares has a negative growth rate

and the population may have moved to the neighboring district of Yanatile, where road expansion is creating new centres of attraction for the population. Furthermore, it is worth mentioning as a warning, that this new settlement is also one of the newly identified coca areas.

Table D.4.1
DISTRIBUTION OF THE POPULATION: 1972-1981
LA CONVENCION - LARES

Place	1972			1981		
	Urban %	Rural %	Total Inhab.	Urban %	Rural %	Total Inhab.
La Convencion	16.7	83.3	84,161	20.2	79.8	106,967
Lares	7.1	92.9	16,694	11.2	88.8	17,508
TOTAL	15.1	84.9	100,855	19.0	81.0	124,475

Source: CODEVA Project 1990, Hector Maletta and Alejandro Bardales. Peru: The Provinces in Figures 1876-1981.
Drawn up by: MACROCONSULT S.A.

The population in La Convencion - Lares has an average density of 5.2 inhabitants per square metre. However, the Santa Ana district has the highest population density with 100.3 inhabitants/km2 because its capital town, Quillabamba, concentrates the highest urban population of the study area. Quillabamba is one of the first colonies and since its establishment it has been one of the most attractive towns due to its dynamic commercial activity.

Echarate has a lower population density, because it has areas with a limited population, and small groups of native communities occupying large areas. However, it should be mentioned that this is the district likely to attract the rural population migrating to this region, since it offers the best alternative for the development of farming activities and has the most suitable soil for permanent crops.

D.4.2 Migration

The migration phenomenon in La Convencion-Lares represents migration to urban areas as well as from the highlands to the jungle.

Migration to urban zones can be explained by the population's desire to obtain employment, because of the better standards of living in the cities and the deterioration of farming activities.

Table D.4.2
POPULATION, GROWTH RATES AND DENSITY: 1980 - 1990
LA CONVENCION - LARES

Area under study	Population 1980	Population 1990	Annual rate 1980-1990	Expansion (Km2)	Population density Population / Km2) 1980	1990
LA CONVENCION - LARES	140,175	177,241	2.37	34,263.87	4.1	5.2
CALCA	30,282	34,470	1.30	4,414.49	6.9	7.8
Calca	12,137	14,059	1.48	311.01	39.0	45.2
Lares	6,995	5,559	-2.27	527.26	13.3	10.5
Yanatile	11,150	14,852	2.91	3,080.47	3.6	4.8
LA CONVENCION	109,893	142,771	2.65	29,849.38	3.7	4.8
Santa Ana	28,577	36,055	2.35	359.40	79.5	100.3
Echarate	31,728	46,489	3.89	20,788.20	1.5	2.2
Huayopata	9,509	10,888	1.36	524.02	18.1	20.8
Occobamba	4,895	6,421	2.75	840.93	5.8	7.6
Vilcabamba	14,853	19,428	2.72	5,046.47	2.9	3.8
Santa Teresa	7,473	8,977	1.85	1,340.38	5.6	6.7
Maranura	9,391	9,804	0.43	150.30	62.5	65.2
Quellouno	3,467	4,709	3.11	799.68	4.3	5.9

Source: Population Projections per calendar year, according to Departments Provinces, and Districts 1980-1990. INEI. Peru in Figures 1990. Cuanto S.A.
Drawn up by: MACROCONSULT S.A.

Migration to the jungle areas is even greater, since it offers more job opportunities in the agricultural and forestry field. The traditional image of a farming sector consisting of small-scale farms for self-consumption, has been replaced by the image of an increasing jungle agriculture with prevailing export crops and with a rapid tendency towards higher agroindustrial

levels. This fact is reinforced by the existing expansion of family farms, which in the jungle reaches an average of 14 hectares, i.e. 50% higher than the national average.

Table D.4.3
ECONOMICALLY ACTIVE POPULATION: 1980-1989
LA CONVENCION - LARES

	Total EAP		EAP in Farming	
Province:	1980	1989	1980	1989
La Convención	36,797	49,284	22,739	27,606
Lares	17,628	20,381	10,893	11,416
Total	54,425	69,666	33,632	39,022
Annual rate (%)		2.8		1.7
National	5,586,500	7,429,900	2,223,400	2,550,700
Annual rate (%)		3.2		1.5

Source: Evolution of the Peruvian Population during the 80's. Special Bulletin N° 12. Peru: Population Projections by Calendar Years by Departaments, Provinces and Districts 1980-1990. INEI.
Drawn up by: MACROCONSULT S.A.

The absence of dynamic industries in the area, i.e. those that generate inter-industry linkage in the production sector and have a multiplying effect on the economy as a whole, has resulted in a permanent shortage of steady employment opportunities.

On the other hand, to satisfy the labour demand, the farming activity - which is seasonal and has fixed sowing and harvesting periods - has caused temporary and permanent migration from the highland provinces (Calca, Anta and Paruro) to the Kiteni zone, a new centre of attraction.

Industry and agroindustry have not progressed, except for tea, coffee and cocoa, which use medium level technology and unskilled labour.

The following factors limit farming development: the low technology level, difficulties encountered in placing the products on the markets due to poor road infrastructure, lack of energy, tax disadvantages for investments, high interest rates, the absence of an industrial promotion bank. Nevertheless, there is a good potential for the develoment of agroindustry.

New centres of attraction are the new colonies surrounding Kiteni and Koribeni, the areas close to native communities (Pachiria) and the land along the stretch of road between Pongo de Mainique and the Camisea and Ucayali region. It should be emphasized that the new coca leaf plantations and the maceration centres are located in such areas, which are also suitable for the expansion of this crop.

Existing soil potential and large-scale farming possibilities attract people from neighboring zones. Immigrants move from suppressed areas such as Calca, Lares and from the higher provinces, like Canas and Canchis, to the Kiteni areas, where they find farmland and a variety of crops, broadening their economic potential and permitting them to support their families.

As can be seen in table D.4.4, La Convencion - Lares has a labour surplus for most of the year. The labour demand depends on how labour intensive a crop is and how many harvests are obtained per year. Coca ist the most labour intensive crop with an average of 16 day's work per hectare and 3 harvests per year. The future demand for labour will depend on the expansion of legal crops or coca.

Table D.4.4
BALANCE OF LABOUR FORCE: 1989
LA CONVENCION – LARES
(people required)

Month	Labour Demand			Local Supply 1/	Balance
	Legal Crops	Coca	Total		
January	10,768	11,925	22,693	34,468	11,775
February	15,578	1,788	17,366	34,468	17,102
March	11,297	19,079	30,376	34,468	4,092
April	54,358	5,963	60,321	34,468	(25,853)
May	18,757	11,924	30,681	34,468	3,787
June	14,369	10,732	25,101	34,468	9,367
July	19,845	13,117	32,962	34,468	1,506
August	15,966	11,924	27,890	34,468	6,578
September	52,471	4,769	57,240	34,468	(22,772)
October	26,019	1,193	27,212	34,468	7,256
November	19,524	17,887	37,411	34,468	(2,943)
December	13,989	5,962	19,951	34,468	14,517

1/ EAP 15 age and over
Source: MACROCONSULT S.A. Surveys, 1990, ENACO, BAP's Basic Budgets INEI.
Drawn up by: MACROCONSULT S.A.

Unless the marketing problems faced by coffee are solved, and if maceration centres are established as a result of the increase in clandestine landing strips, a mass cultivation of coca would be unavoidable. This would result in a strong migratory flow towards this part of La Convencion province, which would become a very strong centre of attraction due to the higher profits obtained from coca, compared with other legal crops, besides having an assured market.

D.4.3 Economically Active Population

The economically active population age 15 and over in La Convencion - Lares devoted to farming, reached 39,022 people in 1989, approximately 50% of the total EAP of La Convencion - Lares, which was 69,666 people for the same year (table D.4.5).

Table D.4.5
LABOUR REQUIREMENTS: 1989
LA CONVENCION - LARES
(day's work per hectare)

CROPS	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total worked days
Hard Yellow Corn	10	0	3	3	12	10	2	0	0	8	15	20	83
Starchy Corn	0	0	0	5	30	20	5	12	22	14	4	0	112
Cassava	0	0	0	0	0	27	20	0	25	24	20	0	116
Cocoa	6	24	10	10	0	0	0	15	7	5	4	4	85
Coffee	4	3	0	30	8	4	9	5	23	9	6	5	106
Anatto	0	0	35	0	0	0	0	0	22	15	8	0	80
Tea	0	0	15	0	15	0	15	0	35	10	10	10	110
Citrus fruits	0	20	30	10	0	0	5	15	27	5	5	0	117
Sub-total	20	47	93	58	65	61	56	47	161	90	72	39	809
Coca	20	3	32	10	20	18	22	20	8	2	30	10	195
Total	40	50	125	68	85	79	78	67	169	92	102	49	1,004

Source: MACROCONSULT S.A. Surveys 1990, ENACO, BAP's Basic Budgets.
Drawn up by: MACROCONSULT S.A.

During the 1980-1989 period the total EAP showed a higher annual increase rate than the EAP in the farming sector. This tendency was also evident on a national scale, mainly due to the deterioration of the farming activity during that period.

Considering the population as a whole, it can be noticed that the majority of the employed population works in primary activities, i.e. farming and forestry, followed by tertiary activities, mainly services and trade, and then by industrial and manufacturing activites.

It was estimated that 50% of the total EAP in the region are independent workers, whereas the other 50% consists of labourers, unpaid family members, employees and others.

As for the private sector, there is a demand for skilled manpower, classed as employees and labourers.

D.4.4 Technical Labour Requirements

In order to determine the labour requirements, first of all a monthly schedule of man/hours per hectare and crop was drawn up according to the production cost structure. This can be appreciated in table D.4.5.

That table shows the labour requirements per hectare for the main crops in La Convencion-Lares. A calendar was drawn up for each crop, so that the monthly labour demand may be evaluated. The annual requirement obtained does not mean that this number of labourers is actually necessary, because the men who work in January will do so during the other months as well (see methodological Appendix).

As far as coca is concerned, annual requirements per hectare are 195. Supposing one person represents one day's work, then the average number of people working on the coca plantations would be 9,689, considering that there are 13,117 hectares of this crop and that a peasant works 264 days per year. It should be mentioned that harvesting is the highest labour intensive activity especially in March and November, whereas the other harvests are spread over the months of June and July. Culture activities are also quite important and represent 77 day's work per hectare per year (39.4% of the annual total).

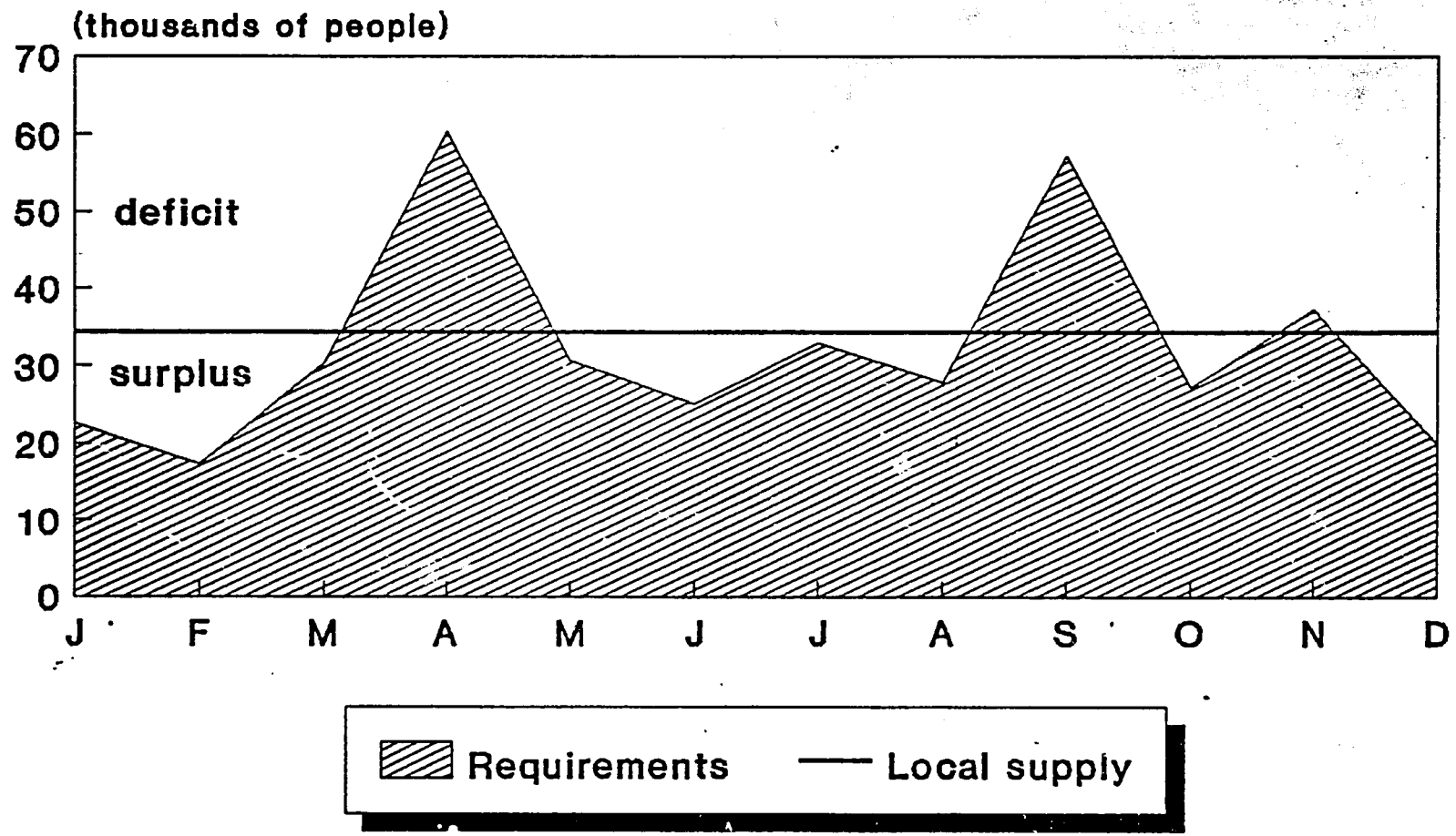
As can be appreciated, the largest number of man/hours is taken up by permanent crops, since the crop diversification practiced by farmers results in better quality soils being used for companion crops to citrus fruits or staple food crops.

Using the same method for the rest of the crops, the monthly labour demand is obtained. We will see that the months with the highest labour demand do not coincide with coca. However, March is the month with the highest labour demand for anatto and citrus fruits, which coincides with the highest labour demand for coca.

As illustrated in table D.4.4, there is only a labour surplus for three months, mainly in April when the corn, coffee and cocoa harvests coincide, and in September with the fieldwork for anatto, coffee, cassava and tea, and the cocoa and citrus fruit harvests (see graph D.3). The

Graph D.3

BALANCE OF LABOUR: 1989
LA CONVENCION - LARES



Source: INEI, MACROCONSULT S.A.
Drawn up by: MACROCONSULT S.A.

labour deficit is covered by peasants migrating temporarily from the higher areas like Canas and Sicuani, during the harvests of main crops, prompted by their depressed income.

Table D.4.6 shows the total daily labourers required for main crops as well as for coca. Under the total-column it can be seen that in the 1989 season, coffee was the most labour intensive product, followed by coca. As a matter of fact, coca requires the most man/hours per hectare, however, when considering total man/hours (day's work per hectare multiplied by the cultivated area) coffee is the most labour intensive product.

At the same time it is important to determine the structure of daily labour requirements. Table D.4.7 shows the percentage of daily labourers required for legal crops and for coca per month. Harvest months for legal crops (April and September) coincide, therefore practically the entire daily labour requirements are absorbed by these crops. Furthermore, these are the months with the highest daily labour demands.

The months with the highest daily labourer demand for coca leaves are January, March and November, which are the harvesting months. On the other hand, the third harvest takes place during May and August. Even though this does not coincide with the harvests of the majority of the legal crops, it is important to point out that it does coincide with anatto and citrus fruit harvests. The area covered by these crops is not very big, and therefore no labour deficit occurs.

It should be mentioned that these are only approximate man/hour requirements, since not all crops are included, given their small areas. 80% of the hectares under cultivation grow the permanent crops that have been taken into consideration.

D.4.5 Potential Labour

If we consider the potential expansion of coca leaves, which has been estimated at 95,598 hectares (see Chapter D.2), an average of 70,612 men per year would be needed. The expansion possibilities for coca plantations largely depends on available manpower. Despite the fact that there is a surplus of labour in this region, this would not be sufficient if the potential expansion of coca plantations was achieved, as a further 36,144 people would be needed in this case.

The availability of additional manpower depends both on migration and on the release of manpower from other legal crops. The case of anatto is a befitting example: since no market can be found for its production, farmers look for other crops to help them "temporarily" overcome this situation. At present many small anatto farms have been abandoned. If all anatto plantations were to be abandoned, coca could be expanded by 1,170 hectares due to the labour that would become available.

Table D.4.6
TOTAL DAILY LABOURERS REQUIRED FOR EACH CROP: 1989
LA CONVENCION-LARES
(total day's work)

CROPS	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Hard Yellow Corn	38720	0	11616	11616	46464	38720	7744	0	0	30976	58080	77440	321376
Starchy Corn	0	0	0	9600	57600	38400	9600	23040	42240	26880	7680	0	215040
Cassava	0	0	0	0	0	95807	70820	0	88525	84984	70820	0	410756
Cocoa	54798	219192	91330	91330	0	0	0	136995	63931	45665	36532	36532	776305
Coffee	143380	107535	0	1075350	286760	143380	322605	179225	824435	322605	215070	179225	3799570
Anatto	0	0	99785	0	0	0	0	0	62722	42765	22808	0	228080
Tea	0	0	21825	0	21825	0	21825	0	50925	14550	14550	14550	160050
Citrus fruits	0	15980	23970	7990	0	0	3995	11985	21573	3995	3995	0	93483
Sub-total (a)	236898	342707	248526	1195886	412649	316107	436589	351245	1154351	572420	429535	307747	6004660
Coca (b)	262340	39351	419744	131170	262340	236106	288574	262340	104936	26234	393510	131170	2557815
Total (c)	499238	382058	668270	1327056	674989	552213	725163	613585	1259287	598654	823045	438917	8562475
Days worked (d) per month	22	22	22	22	22	22	22	22	22	22	22	22	264
Monthly Demand (a/d)	10768	15578	11297	54358	18757	14369	19845	15966	52471	26019	19524	13989	22745
Coca Demand (b/d)	11925	1789	19079	5962	11925	10732	13117	11925	4770	1192	17887	5962	9689
Total Demand (c/d)	22693	17366	30376	60321	30681	25101	32962	27890	57240	27212	37411	19951	32434

Source: MACROCONSULT S.A. Surveys 1990, ENACO, BAP's Basic Budgets.
Drawn up by: MACROCONSULT S.A.

Table D.4.7
STRUCTURE OF DAILY LABOURER REQUIREMENTS: 1989
(percentages)

	Legal Crops %	Coca %	Total day's work
January	47.5	52.5	499,238
February	89.7	10.3	382,058
March	37.2	62.8	668,270
April	90.1	9.9	1,327,056
May	61.1	38.9	674,989
June	57.2	42.8	552,213
July	60.2	39.8	725,163
August	57.2	42.8	613,585
September	91.7	8.3	1,259,287
October	95.6	4.4	598,654
November	52.2	47.8	823,045
December	70.1	29.9	438,917
Total	70.1	29.9	8,562,475

Source: ENACO, BAP's Basic Budgets.
MACROCONSULT S.A. Surveys, 1990
Drawn up by: MACROCONSULT S.A.

The table of labour requirements shows that the most labour intensive crops are coffee, cocoa, cassava and hard yellow corn. For instance, if the international coffee price were to drop, causing a 50% reduction of the cultivated surface, 1'899,785 labourers would become available, who could be employed in the 9,743 new hectares of coca. However, it is highly unlikely that this will happen, therefore there is little chance of the necessary labour being released to cover the total coca potential.

Therefore, the current expansion of coca areas is not limited by manpower. However for a maximum expansion, heavy migratory flows would be required, since the labour released from legal crops would not be sufficient to cover labour requirements.

D.4.6 Characteristics of the rural worker

The following are among the main characteristics of rural workers:

a) A strong farming vocation, as a result of soil conditions which favour crop diversification and assure family units, and the income obtained from cultivating permanent crops.

b) Most farm labourers are permanent migrants who have settled in new colonies. The farms they now work in are much larger than those in the Andean region from where they came, where soils are poor, land is scarce and productivity levels are low, due to the lack of suitable technology.

c) Temporary migrants are young workers from the higher provinces of the Cuzco Department, who are between 20 and 25 years old, who occasionally arrive during harvest periods for the main crops (coffee and cocoa) to take advantage of the higher wages paid at that time. They usually leave their families behind in the Andean regions where they have small farms growing staple food crops.

d) The average family unit consists of six members - two adults and four children - who start working as unpaid farm labourers at the age of 6. On farms that are smaller than 1 hectare, most of the work is carried out by family members, because they use farming methods which do not require special skills.

Medium and large-scale farms of over 5 hectares contract manpower for their main export products.

D.4.7 Distortions Caused by Illegal Coca

There is no significant expansion of legal production areas, therefore no indicators are available to show the effects generated by drug trafficking on the populated settlements, as would be the case in Quillabamba. On the contrary, the standard of living of the rural population shows uniform socio-economic features, as they live off a diversified selection of permanent crops in addition to coca.

The farmer who is not a drug dealer uses coca as a financial resource for his legal crops without having to resort to loans from the Agrarian Bank.

D.5 DIAGNOSIS OF THE PRODUCTION AND MARKETING OF MAIN CROPS IN THE AREA COVERED BY THE STUDY

In this chapter the problems faced by legal crops will be analysed, whether or not these are associated with coca leaves.

Coffee, cocoa, anatto, tea and citrus fruits are the crops with the highest expansion rate in La Convencion-Lares.

These crops show specific problems during the different stages of their growing cycles. It is therefore necessary to individualize and specify the problems that arise with respect to production, marketing and distribution, which prevent an intensive development or the expansion of the farming sector.

As far as forestry utilization is concerned, the Selva Alta and Selva Baja show different characteristics. In Selva Alta as far as Pongo de Mainique, the activity is mainly concentrated on logging, and to a lesser extent, on sawn lumber.

Although there are 27 varieties which can be used, 44% of the production consists of only four species: Walnut, Sandimatico, Zarzafras and Aguano. As a control measure, the Forestry Administration in Quillabamba imposes restrictions on the number of permits and contracts granted to avoid the irrational utilization of valuable timber.

Figures for sawn lumber dropped in volume from 3,581.35 m^3 in 1981 to 354,112 m^3 in 1989, and with this the number of permits and contracts. These figures, however, do not reflect the real logging volume, since clandestine activities are going on.

The local market absorbs 67% of the production, Cuzco 22%, and Arequipa 11%. In the Selva Baja, from Pongo de Mainique to the Mishaima river, the activity is concentrated on fine lumber logging, mainly Cedar and Mahogany. These are taken downstream to the sawmills in Shepalma, Atalaya and Pucallpa in Ucayali.

This activity is controlled by the Forestry Administration in Atalaya.

The activity controlled by the Forestry Administration in Quillabamba is shown in table D.6.8 (see Appendix).

D.5.1 Production Problems

The principal limitations encountered for the development or progress of the production system are credit facilities, yield levels, technical assistance, farming machinery, seeds and other inputs.

D.5.1.1 Credits

Credit facilities are limited and selective, and mainly granted by the Peruvian Agrarian Bank, through its main office in Quillabamba. Insufficient human and logistic resources and a lack of liquidity make it impossible to cover this wide area efficiently.

Table D.5.1 shows the number of loans, the surface financed and the amounts granted by the Agrarian Bank through its branch in Quillabamba for 1988 and 1989.

Table D.5.1
AREA FINANCED BY BAP CREDIT: 1988 - 1989
LA CONVENCION - LARES
(thousands of Intis)

Purpose of the Amount	1988 Number of loans	1988 Financed Area has.	1988 Amount (thousands)	1989 Number of loans	1989 Financed Areas has.	1989 Amount (thousands)
Total	3,111	537,769.25	851,274	3,394	135,750.25	19,704,200
1. Maintenance	2,608	388,519.25	259,823	3,375	9,923.25	9,550,261
-agriculture	2,557	8,139.25	249,803	3,290	9,139.25	8,771,331
-livestock	43	380.00	136	84	704.00	772,840
-forestry	6	380,000.00	9,350	-.-	-.-	-.-
-agroindustry	2	-.-	534	1	80.00	6,090
2. Marketing	38	149,250.00	548,285	17	125,827.00	10,115,534
3. Capitalization	465	-.-	43,166	2	-.-	38,405

Source: Peruvian Agrarian Bank - Quillabamba Branch
Drawn up by: MACROCONSULT S.A.

It can be seen that approximately 86% of the loans granted to the area under study are for permanent crops (table D.5.2).

Coffee is the crop which receives the most credit support from the BAP, 77% of the total amount assigned to the area in 1989. Coffee and cocoa are the main crops grown since they are export products, which generate the highest income compared to other crops. However, only 18% of the total coffee area and 8.6% of the cocoa area were financed, illustrating the deficient credit facilities in this region.

During the last few years loans for other crops and for capitalization were either insignificant or non-existent due to the critical financial situation of the Agrarian Bank. If we add to this the guarantees requested, organization problems encountered by cooperatives, the land ownership problem and the small amounts assigned to these valleys, we find that credit facilities are deficient and that producers who are settling in these new farming colonies do not have sufficient funds available to finance their legal crops, and thus have to resort to obtaining their own finance, through coca.

Table D.5.2
CREDITS GRANTED FOR DIFFERENT CROPS: 1989
LA CONVENCION – LARES

Crops	Amount granted (thousands of Intis)	Percentage	Financed Area (a)	Cultivated Area (b)	(a)/(b) %
Permanent crops:	7,526,024	85.80			
Anatto	19,651	0.22	33	2851	1.2
Cocoa	637,834	7.27	782	9133	8.6
Coffee	6,756,755	77.03	6464	35845	18.0
Fruit trees	111,785	1.27	99	2322	4.3
Annual crops:	437,967	4.99			
Yellow corn	281,027	3.20	418	3872	10.8
Potatoes	156,940	1.79	172	n.d.	n.d.
Livestock:	801,250	9.13			
Beef-Cattle	801,250	9.13			
Agroindustry:	6,090	0.07			
Total	8,771,331	100.00			

Source: Peruvian Agrarian Bank – Quillabamba Branch
Drawn up by: MACROCONSULT S.A.

D.5.1.2 Profitability of Coca vs. other Crops

Table D.5.3 shows a summary of the production costs for main crops as well as their profitability index. It should be pointed out that for most crops low-level technology is applied, however the data provided responds to medium-level technology since it is principally based on information supplied by the Peruvian Agrarian Bank, which only has information available for this level.

Legal crops show negative profits, except for bananas and tea. Bananas have a high yield because this is a crop almost entirely destined for local consumption. On the other hand, tea is the crop with the lowest costs in this region, with a modern infrastructure for final product

Table D.5.3
PRODUCTION COSTS SUMMARY AND PROFITABILITY ANALISIS. 1/
LA CONVENCION – LARES
(thousands of Intis)

	Coca 4/		Coca 5/		Anatto	Cocoa	Coffee		Corn	Bananas	Tea
	t2	t3	t2	t3	t2	t2	t1	t2	t2	t2	t2
Price (thousands of I/./Kg.)	548	548	652	652	108	350	391	391	90	40	110
Yield (Kg/ha) 3/	805	690	805	690	690	460	920	552	2,500	10,000	1,800
GROSS INCOME	441001	378001	525000	450000	74520	161000	359720	215832	225000	400000	198000
Direct Cost	335006	199620	335006	199620	107950	150100	342500	173920	303120	256200	147500
– Labour	156800	102000	156800	102000	64000	68000	84800	104000	68400	51600	74000
– Inputs	178206	97620	178206	97620	43950	82100	257700	69920	234720	204600	73500
Indirect Cost	0	0	0	0	10000	20000	10000	10000	0	0	0
Finance Charges 2/	0	0	0	0	13123	27339	73781	38496	13575	23477	40395
TOTAL COSTS	335006	199620	335006	199620	131073	197439	426281	222416	316695	279677	187895
PROFITABILITY RATE	31.6%	89.4%	56.7%	125.4%	–43.1%	–18.5%	–15.6%	–3.0%	–29.0%	43.0%	5.4%
BREAK-EVEN PRICE	416	289	416	289	190	429	463	403	127	28	104

t1 = High technical level
t2 = Medium technical level
t3 = Low technical level

1/ Annual cost per hectare, exchange rate = I/. 430,000 per dollar.
2/ Deductible interest rate.
3/ Varies according to technological levels.
4/ The price considered is the illegal drug-trafficking price –the legal price is I/. 5'000,000 per "arroba" (I/. 434,783 per kilo).
5/ This is the price paid in Kiteni–Yanatile where the maceration pits are found.

Source: BAP, MACROCONSULT S.A. Surveys, 1990.
Drawn up by: MACROCONSULT S.A.

processing. However, previous price levels were not recovered due to the crisis suffered by the farming cooperatives, which made it impossible to find a market for the entire production. As a result, these crops were replaced by coca plantations.

The negative profitability of anatto is due to the drop in the price received by farmers, due to the surplus supply offered to buyers in the region. The case of coffee and cocoa is different, since the drop in these prices is due to the low prices quoted on the international market.

As far as hard yellow corn is concerned, the traditional technological level has been applied. Its negative profitability is due to the fact that transport costs to the main cities are high. Lastly, coca is the crop with the highest profit margin, which can be explained by the high prices and yields obtained. Prices for coca leaves are higher in production areas in which the product is used for mastication purposes, and where there are maceration pits.

Profits are higher when low-level technology is used, since this means lower costs for inputs and also fewer daily labourers.

Coca in La Convencion - Lares yields three harvests per year and besides, it initially requires lower investment costs (see Table D.5.4), and needs little phytosanitary care or fertilization. In addition, support prices are assigned to the coca production and purchase is guaranteed by ENACO, whereas other crops are subject to price variations on the market, with consequent risks.

Table D.5.4
COST OF PLANTS AND SEEDS FOR MAIN CROPS: 1990
LA CONVENCION – LARES
(thousands of Intis)

Crop	Plants/hect.		Price per unit		Total value
Hibrid corn (marginal 28)	25	Kg.	500	/Kg.	12,500
Catimor coffee	5,000	plantas	30	/planta	150,000
Cocoa	952	plantas	50	/planta	47,600
Coca leaf	10,000	plantas	1	/planta	10,000

Source: MACROCONSULT S.A. Surveys, 1990
Drawn up by: MACROCONSULT S.A.

D.5.1.3 Production Costs

One of the characteristics of producers in this valley is that traditionally, they produce a variety of different crops. Therefore naturally, although their technical levels are low, this crop diversification enables them to balance their budget, since they do not depend on the profits of only one crop, and are thus protected against possible price drops.

The crops with the highest level of applied technology in the Lares Valley are white corn from the Urubamba valley and barley, both annual crops. On the other hand, permanent crops - cocoa and coca - provide a fairly regular income for producers in this valley, throughout the year. Coca produces three crops per year, which are guaranteed by the prices paid by ENACO S.A. with a significant profit margin. This margin can, of course, be improved by offering the production to the illegal market.

The best prospects for farmers in La Convencion valley are the development of permanent crops which are eminently good for exports, such as coffee, cocoa and anatto.

Coffee plantations generate the highest costs because they require fertilizers and phytosanitary products in order to improve their yields and to protect plants against diseases like rust.

As far as culture work is concerned, it should be stated that these are labour intensive crops, as they need permanent control (see Chapter IV).

On the other hand, farmers reduce the productivity of their crops because they are unable to use fertilizers and phytosanitary products, in view of their high costs and the lack of credit facilities for the farming sector.

From the above it may be concluded that in the short term there is a danger that strong plagues may affect permanent crops, therefore coca leaf plantations which are more resistent and need less additional inputs, are more likely to develop and expand.

D.5.1.4 Seeds and Inputs

The supply of seeds and inputs is low, and comes from three sources: ENCI, CODEVA and private companies. Improved seeds come from nurseries which belong to the cooperatives that form part of COCLA and the CODEVA Project. These mainly supply coffee and cocoa seedlings, as well as seeds for hard yellow corn, soya beans, beans, anatto and orange seedlings.

Table D.5.4 shows that for one hectare two strips of coca plants are needed (each strip consists of 5,000 plants and represents the value of 1 arroba = I/. 5'000,000), i.e. I/. 10'000,000; if

this investment is compared with that of corn, coffee and cocoa, it is quite clear that coca is the cheapest as far as initial investments are concerned.

The use of phytosanitary products, herbicides and fertilizers, which help to preserve the crops and improve their yield, is insufficient because ENCI, the State-owned company, does not comply with its role as distributor of these products. At the time this study was made, the city of Quillabamba had not received a regular supply of urea for three months.

On the other hand, producers in these valleys do not make much use of phytosanitary products and herbicides, due to the fact that small and medium scale producers generally apply an incipient technology which does not allow them to increase yields, and also due to the high prices of these inputs.

D.5.1.5 Technical Assistance

The Agrarian Offices in Quillabamba and Calca are responsible for this service and their coverage is reduced due to the limited number of farming extensionists. Therefore the extenive area under study cannot be covered, and assistance is preferably aimed at export crops, such as coffee and cocoa. Their activities are very limited compared with other mainly annual crops.

D.5.1.6 Farming Machinery

The use of agricultural machinery is not very common in farming work, mainly due to its high costs, the predominant rugged topography of present crop areas, and the type of the most prominent crops.

The use of farming machinery in the Medio and Bajo Urubamba is feasible for incorporating these extensive areas into the farming activity, since these zones are open areas where modern technology can be applied.

D.5.2 Marketing Problems

D.5.2.1 Marketing Coca Leaves

Coca leaves in La Convencion - Lares valleys are traded in the following manner:

a) In the first place, the coca leaf production that is delivered to ENACO S.A., represents approximately 70% of the total production in these valleys.

Producers of small volumes in the different coca producing valleys or regions, jointly send their production to ENACO S.A.'s storage centre, where it is registered. This gives them two advantages: the freight cost is sometimes assumed by the company and the coca leaf is clas-

sified (this crop is qualified as first class, thus avoiding ENACO's price discrimination with respect to individual deliveries).

b) Secondly, the production that does not flow to ENACO S.A. but is aimed at illegal drug-trafficking and the manufacture of BCP (basic cocaine paste).

Brokers buy the crop "on site", pay in cash with a profit margin of 25% over the price established by the Government enterprise for one "arroba" of coca leaves. This is the parametre used to determine the prices of the parallel drug-trafficking market. Brokers receive a 15% profit.

The coca maceration areas are close to the storage centres currently located in the regions of Yanatile (Lares) and Kiteni (Echarate).

After maceration and once BCP is manufactured with the help of chemical products, the export production from the study area is marketed, for which two means of transport are used: the road which connects Lares with Cuzco and the clandestine airports located in the Medium Urubamba area. Empresa Nacional de la Coca (ENACO S.A.) buys the coca leaves from the storage centres established in production zones; but there is a certain percentage of coca used for mastication and drug-trafficking purposes which is marketed through other channels.

The official price for coca is negotiated and periodically established between producers, represented by the "Federacion Provincial de Campesinos" and ENACO.

At present the only farming product bought by the State is coca, for which 100% of its value is paid in cash; bonds for staple foods at subsidized prices are also issued by ENACO. Furthermore, with the construction of new storage centres in illegal expansion areas like Palma Real, Maranura, Santa Maria, Putucusi and Kiteni, and with the installation of 15 shops which are consolidating the commercial movement in this region, ENACO is contributing to "legalize" coca crops in this unregistered area.

The expansion of coca crops has occurred at the same time as the construction of the road from Kiteni to the Pongo de Mainique and the colonization process.

D.5.2.2 Marketing of Legal Crops

According to the diagnosis established for these valleys, the main farming products marketed are coffee, cocoa, anatto, hard yellow corn, tea, coca, cassava, beans; tomatoes and a variety of fruits.

Products are mainly marketed by intermediary agents who buy the products on site, paying arbitrary prices, to the detriment of farmers. Only tea, cocoa and coffee as well as coca are traded through associated enterprises.

The flow of agroindustrial export products showed a fluctuating tendency during the 1985-1989 period, caused by changes in farming production and international market conditions, whereby due to the drop in coffee and cocoa prices, many producers were forced to reduce their production areas.

The largest transactions took place in 1986 when a total of 17'351,601 kg was reached, whereas in 1989 business dropped to 11'133,080 kg, of which 91.5% went to extra-regional markets and 8.5% to regional markets (table D.5.5).

The flow of farming food products for export shows that in 1989 transactions amounting to 183,380 kg were carried out (mainly avocados, tomatoes, hard yellow corn and cassava), which meant an increase of 181% over 1981, due to a more dynamic regional market (see table D.5.6). Fruit trees (citrus fruits, bananas, mangos, avocados, pineapples and paw-paws) have shown a strong increase during the 1981-89 period, 1983 being the best year. On the other hand, agricultural food products did not show any increase during that period on the extra-regional markets, since higher freight costs did not allow their expansion to coastal zones (Matarani and Lima).

Table D.5.7 shows the consolidated flow of farming products; it can be appreciated that the fluctuations that occurred during the 1982-1989 period - caused by price variations - have resulted in a smaller supply. For example, coffee reached its highest sales volume in 1987 and dropped by 33% in 1989, and cocoa suffered a drop of 86% between 1982 (boom) and 1989.

Anatto and Peruvian saffron showed a decrease in their volume of sales since 1986, due to the lack of a market for this production. As a result, many farmers left these new crops and replaced them with other more profitable crops.

As far as tea is concerned, the financial crisis suffered by the Huyro Tea Cooperative, resulting from the split-up among associated cooperatives, caused the drop in production. The tea plant, installed by the Dutch government, worked at idle capacity and many plantations were replaced by coca. However, at present a considerable recovery of this product is evident, due to the appearance of brokers who are buying the production.

D.5.2.3 Storage Infrastructure

The area under study has warehouses which belong to the main export companies. Basically, these have been suitably equipped for storing the coffee and cocoa crops obtained from the production cycle. Products suitable for export are stored therein and the capacity of these

Table D.5.5
FLOW OF AGROINDUSTRIAL EXPORT PRODUCTS: 1985 - 1989
LA CONVENCION - LARES
(kilograms)

Year	1985			1986			1987			1988			1989		
Product	Regional Market	Extra-Reg. Market	Total	Regional Market	Extra-Reg. Market	Total	Regional Market	Extra-Reg. Market	Total	Regional Market	Extra-Reg. Market	Total	Regional Market	Extra-Reg. Market	Total
Coffee	1812892	10730590	12543482	1843836	11298258	13142094	1835187	11551702	13436889	1053433	6455032	7508470	640242	8168075	8808317
Cocoa	68360	1944649	2013029	62720	1803954	1866674	58645	1686743	1745388	56760	1632521	1689281	62854	1119163	1182017
Anatto	86725	1557720	1644445	107292	1913279	2020571	95019	1694424	1789443	74706	1332186	1406892	213112	266919	480031
Peruvian saffron	11675	458644	470319	9805	296589	306394	3752	113485	117237	5901	175466	181267	22200	121643	143843
Peanuts	1501	3336	4837	-.-	-.-	-.-	5686	-.-	5686	516	-.-	516	3420	1034	4454
Tea	-.-	-.-	-.-	1500	14368	15868	10787	61129	71916	66000	374005	440005	100	514318	514418
Ginger	1835	-.-	-.-	-.-	-.-	-.-	-.-	-.-	-.-	-.-	-.-	-.-	-.-	-.-	-.-
Total	1983003	14694939	16677947	2025153	15326448	17351601	2059076	15107483	17166559	1257221	9969210	11226431	941928	10191152	11133080

Source: CODEVA Project, 1990
Drawn up by: MACROCONSULT S.A.

Table D.5.6
FLOW OF AGRICULTURAL FOOD PRODUCTS: 1981 – 1989
LA CONVENCION – LARES
(kilograms)

Year	Measuring	1989			1983			1981		
Product	Unit	Regional Market	Extra-Reg. Market	Total	Regional Market	Extra-Reg. Market	Total	Regional Market	Extra-Reg. Market	Total
Citric Fruits	unit	8,150,080	5,957,280	14,107,360	4,729,222	11,285,507	16,014,729	657,405	590,770	1,248,175
Bananas	unit	2,435,700	1,183,060	3,618,760	2,446,075	4,034,900	6,480,975	218,840	125,800	344,640
Mango	unit	3,433,785	126,700	3,560,485	1,283,500	1,944,200	3,227,700	269,330	171,600	440,930
Paw-paws	kg.	83,095	13,060	96,155	9,180	10,160	19,340	10,220	-.-	10,220
Potatoes	unit	-.-	-.-	-.-	16,000	-.-	16,000	-.-	-.-	-.-
Avocados	unit	14,000	4,500	18,500	11,400	-.-	11,400	2,240	-.-	2,240
Pineapples	unit	450	215	665	2,650	350	3,000	-.-	-.-	-.-
Tomatoes	kg.	65,075	-	65,075	8,460	-.-	8,460	6,190	-.-	6,190
Yellow corn	kg.	17,050	2,000	19,050	18,460	-.-	18,460	47,212	1,300	48,512
Cassava	kg.	3,100	-.-	3,100	1,500	-.-	1,500	360	-.-	360
Total	unit	14,034,015	7,271,755	21,305,770	8,488,847	17,264,957	25,753,804	1,147,815	888,170	2,035,985
	kg.	168,320	15,060	183,380	37,600	10,160	47,760	63,982	1,300	65,282

Source: CODEVA Project, 1990
Drawn up by: MACROCONSULT S.A.

warehouses varies between 25,000 and 40,000 quintals, which enables them to offer services during harvest periods.

Table D.5.7
CONSOLIDATED FLOW OF FARMING PRODUCTS
LA CONVENCION – LARES
(kilograms)

Years	Coffee	Cocoa	Anatto	Peruvian Saffron	Tea	Peanuts	Total
1982	996,473	8,376,507	965,037	155,426	–.–	–.–	10,493,443
1983	6,643,479	1,056,229	863,714	187,652	4,000	2,564	8,757,638
1984	10,392,340	953,781	1,400,023	204,609	10,152	10,000	12,970,905
1985	12,543,482	2,013,029	1,644,445	470,319	–.–	4,837	16,676,112
1986	13,142,094	1,866,674	2,020,571	306,394	15,868	–.–	17,351,601
1987	13,446,889	1,745,388	1,789,443	117,237	71,916	5,686	17,176,559
1988	7,508,470	1,689,281	1,406,892	181,267	440,005	516	11,226,431
1989	8,808,317	1,182,017	480,031	143,843	514,418	4,454	11,133,080

Source: CODEVA Project, 1990
Drawn up by: MACROCONSULT S.A.

The following are the main business firms with adequate storage facilities:

- Negociación Guzmán S.A. NEGUSA
- Comercial Holguin e Hijos S.A.
- Selva Industrial S.A.
- Rolando Ugarte S.R.Ltda.
- COMERSA
- COCLA
- COLNATUR
- Carguill Amazonía S.A.
- Exportadora EL SOL
- LABECO S.R. LTDA
- Hugo Valdivia - Canal de Exportaciones S.R.LTDA.
- Exportadora La Convencion
- COLDELMA
- Marco Winter.

The storage capacity of these business firms varies between approximately 20,000 and 40,000 MT and they are all located in the city of Quillabamba. It should be mentioned that these facilities are only available for products suitable for exports, such as coffee and cocoa.

Other crops are harvested, stored and directly distributed by the owners; as a result, most of the farmers who do not have storage facilities for their products prefer to work with local brokers, middlemen and commission agents. As far as fruits are concerned, in view of the fact that there is no agroindustrial project, and because of the perishable nature of the products and the high transport costs which prevent these crops from being stored or aimed at extra-regional markets, most of the production is aimed at self-consumption in the family unit.

In general there is an evident lack of State infrastructure in the valley, as there are no silos, depots or warehouses. The existing warehouses belong to third parties who deal exclusively with export products - they receive the valley's production which they process and sell abroad.

D.5.2.4 Marketing Channels

Because of the very nature of the activities, with no agroindustry or added values, the marketing process involves selling the products through a number of middlemen, who benefit most from the volumes marketed.

The main economic agents involved, are the associated producers (farming production and service cooperatives) and individual producers in charge of the distribution to middlemen, brokers, wholesalers and retailers.

Depending on the economic agents involved, the dynamics of the marketing channels are intensive for cocoa, fruits, anatto and Peruvian saffron; selective for the coffee that is exported, as well as for the tea production; and excluding for coca as far as the production which flows to the domestic market is concerned, due to the monopoly exercised by ENACO.

The main problems of the marketing circuit are as follows:

a) Excessive number of middlemen: Their action generates considerable variations in monetary terms, since producers find it difficult to transport the products themselves, because of the lack of a suitable road network and the resulting high freight costs.

These middlemen have different working methods: some are local brokers who collect the production from one region and transport it to wholesale markets; others are transporters who go from farm to farm gathering the production and then selling it to local brokers or wholesalers. Different types of agents carry out this task. In some cases they are middlemen specialized in a zone and/or a product, who already know the producers and have a fairly permanent relationship with them. In these cases, sometimes they buy the crops "in advance",

other times "on an average" and occasionally they provide "credit" for the producer before the harvest.

The purchase of crops "in advance" generally involves a type of credit operation whereby the middleman pays a certain amount of money to the producer before the harvest has taken place, "estimating" the final volume of the production. In these cases the harvest is generally calculated at less than the real volume, therefore the middleman pays less than he should since the total production is not weighed.

The producer resorts to this system because he has no credit facilities. Besides, he is not sure whether he can sell his production.

The "average" purchasing system consists of the middleman visiting the farm when the production is ready for harvesting, he "estimates" the production and pays the producer. Generally this estimate is lower than the value of the actual production, which is a disadvantage for the producer since he receives less money. Sometimes the middleman carries out the harvest work and deducts the cost of this work from the price he pays the producer.

Finally, "credit" consists of the middleman lending money to the producer during the crop's productive season, on condition the farmer sells him the crop after its harvest. This loan is deducted from the production price.

b) International price fluctuations for export products, especially coffee, which is low at present, since the termination of the International Coffee Agreement, of which Peru was a member.

As the transformation of the farming products in these valleys has not developed, producers collect the products themselves. These are only raw materials and traditional export products with no scaled economy or multiplying effects. On the contrary, they are severely affected by the international market prices, which are often lower than production costs. If the lack of improved technology for crop development is added - which results in low productivity levels then the outlook is very discouraging for producers in this valley who continue to grow legal crops.

c) Lack of sufficient and timely financing which would allow the producer to intensify his sowing areas and obtain better prices for his harvests, as he could then eliminate the middleman and sell his production directly on the subregional market.

The lack of finance also results in a great portion of the land being deferred, since the producer cannot cover production costs on his own.

d) Deficient transport facilities for marketing the products. This is a limiting factor since it makes the cost of transport expensive on the network comprised of the region's roads and railways, and is a barrier for the potential surplus of this area, since higher transport costs reduce marketing areas; furthermore, producers who do not own their own trucks are exploited by middlemen.

D.5.2.5 Representative Organizations

In the project area, there are organizations of several groups of producers, depending on main production areas and export crops.

As a result of the structurization that took place after the Agrarian Reform, producers are now organized in production and service cooperatives. However, these are not suitably prepared to offer better marketing channels.

The main production organizations in the area are:

COCLA - "Central de Cooperativas de la Convencion y Lares"
Cooperativa Agraria Aquilaya Ltd. N 084
Cooperativa Agraria Alto Urubamba
Cooperativa Agraria Chacco-Huayanay
Cooperativa de Servicios Potrero-IDMA
Cooperativa de Servicios Mateo Pumacahua
Cooperativa Agraria Jose Olaya
Cooperativa Agraria Santa Ana
Cooperativa Agraria Tupac Amaru

The only official producer organization is the "Federacion de Cocaleros", (Coca Farmers Federation). There is no formal labour organization in this region.

D.5.3 Distribution Problems

The problems encountered with the transport network are directly related to the flow of products and the impossibility to transport them due to bad road conditions and high transport costs, which sometimes are higher than production costs.

The following road network exists in the area covered by this project:

- The Cuzco-Urubamba-Ollantaytambo-Abra Malaga-Quillabamba- Chahuares-Chinguiriato road, which is approximately 442 km long. This is a third-class road; the 77.4 km. Cuzco-Urubamba-Ollantaytambo section is paved, whereas the rest is unpaved with unfinished construction work and sections in a very poor state.

- The 418 km. Cuzco-Pisac-Calca-Abra Amparaes-Quellouno- Chahuares-Chinguiriato Road is also a third class road. The 50.5km. Cuzco-Pisac-Calca section is paved and the rest is an unpaved network with no maintenance whatsoever.

These roads meet in Chahuares and continue as one single road up to Chinguiriato (road check point), with evident maintenance problems.

By-roads lead off this road in different directions. The Chinguiriato-Pongo de Mainique section is presently under construction and there are only 14 Km. to go before reaching Pongo de Mainique.

The total road network in La Convencion-Lares is approximately 954.6 km long with the following distribution at a departamental level:

a) Main roads	523.6 Kms.
Section 101: Abra Malaga-Chaullay-Quillabamba	
Chahuares-Kiteni-Chinguiriato	375.3 Kms.
Section 103: Abra Amparaes-Chahuares	148.3 Kms.

b) Local roads

Furthermore there are coach roads, trails, bridle paths and footpaths. The bad state they are in and the lack of bridges, footbridges or "oroyas" (baskets hanging from rope bridges for river crossings) do not provide adequate internal and external subregional connections.

The following roads are under construction:

- Chinguiriato-Ponto de Mainique	14 kms.
- Kinturi-Yavero	75 kms.
- La Quebrada-Lacco	85 kms.

The Kiteni-Pongo de Mainique road is to be extended and interconnected with the marginal highway going through Camisea.

Railways

There is a railway network between the La Convencion-Lares valleys and the city of Cuzco, the Department's capital city.

It is a narrow, 174 km long track with problems in certain sections due to bad rail conditions and because of the original design, as it crosses areas where permanent landslides occur,

affecting the service. In spite of this, it is the most used means of transport for mass cargo and passengers.

At present the railway service is deficient due to its obsolete state and excessive number of rolling stock (table D.5.8).

Table D.5.8
CUZCO-QUILLABAMBA RAILWAY FLEET
ACCORDING TO ROLLING STOCK: 1989

Rolling stock	Total units	Operating units	Units in repair	Units out of service
Locomotive Diesel Engines	7	5	2	-.-
Electric Locomotives	2	2	-.-	-.-
Steam-engines	-.-	-.-	-.-	-.-
Forestry and Marcose wagons	10	4	4	2
Railcars	3	2	1	-.-
Coach wagons	29	23	6	-.-
Freight wagons	45	43	2	-.-
Tank wagons	4	4	-.-	-.-
Mineral wagons	15	9	2	-.-
'Jeules'	20	9	-.-	-.-
Flat platform wagons	34	25	-.-	-.-
Total	169	126	17	2

Source: ENAFER PERU S.A.
Drawn up by: MACROCONSULT S.A.

River Transport

This is the most important means of transport in the jungle outskirts and in the lower jungle itself, mainly from Kiteni onwards throughout Urubamba, since it connects with the Ucayali lengthwise (from the Pongo de Mainique down the Urubamba river). Low-draught boats with outboard motors, are used to sail on the Alto, Medio and Bajo Urubamba towards Ucayali.

Air Transport

Air transport consists of flights on small aircraft, between the different regions that have landing strips in Medio and Bajo Urubamba, connecting with Cuzco, Ayacucho, Pucallpa, Atalaya.

There are 17 landing strips in the region, which are used by high-income earners, since the settlers and native population cannot afford this means of transport due to its high costs compared with other ways of travelling.

The main airports are located in the following areas:

Comunidad Nativa Miaria
Comunidad Nativa Kitepampani
Comunidad Nativa Shivankoreni
Poblado de Picha
Poblado de Camana
Comunidad Nativa Shimaa
Poblado de Maranura
Poblado de Camisea
Poblado de Pichesi.

Transport Costs

Transport costs in La Convencion-Lares, directly affect the marketing volume of the products, since the high costs involved do not permit an increase in the volume that could be marketed if a suitable road network were available.

Thus, transport costs between the main stretches in the study area are as follows:

	I/./MT
1. Cuzco - Quillabamba	100'000
2. Cuzco - Calca - Lares	125'000
3. Quillabamba - Kiteni	50'000

These freights affect the production of agroindustrial products, since higher transport costs do not help to create the right conditions for the expansion of farming products, which have low selling prices and maintain low profit margins, often below cost.

These high freight charges limit the direct marketing opportunities for producers in new colonies, because they have fewer extension units and lack the necessary resources, such as means of transport. They must resort to middlemen, who obtain higher profits than producers..

As a result of this, producers of legal crops generally feel discouraged to expand the production area, since a higher production is not justified unless the surplus can be taken outside the production area.

D.6 NATURAL RESOURCES AND CONTAMINATION

D.6.1 Contamination from agrochemicals

The following products are used for the coca crops grown under medium technology levels in La Convencion and Lares region: GRAMOXONE (herbicide), THIODAN (insecticide) and BAYFOLAN (fertilizer).

D.6.2 Contamination from the processing of basic cocaine paste

Chemicals and other inputs used in the processing of basic cocaine paste, end up in the region's rivers, contaminating them and affecting their ecosystem.

The input requirements during the maceration stage, according to Marc Dourojeanni, are the following:

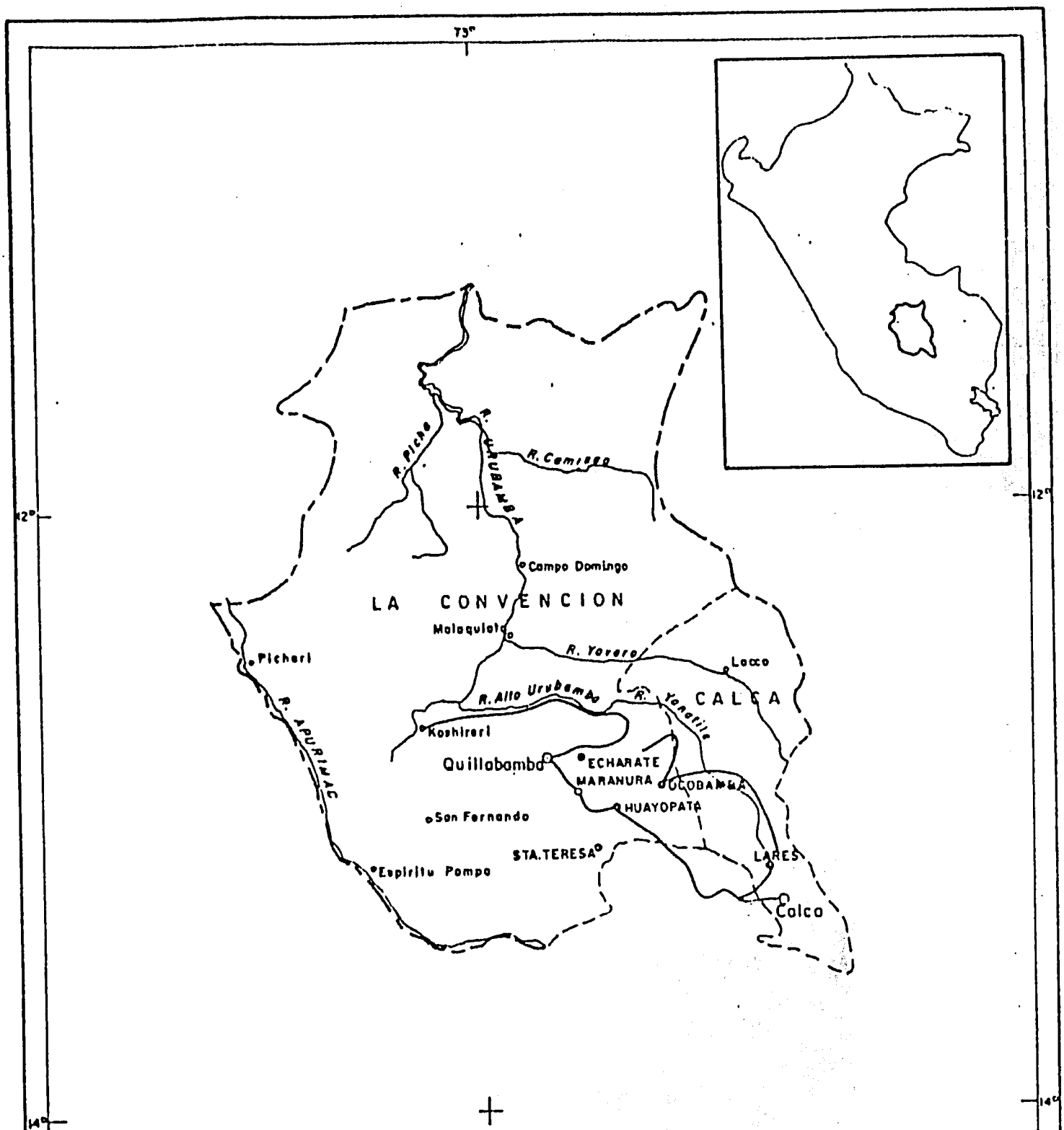
Kerosene	18 lts x 115 kg of leaves (10 @)
Sulphuric acid	10 lts x 115 kg of leaves
Potassium carbonate	5 kgs x 115 kg of leaves
Carbide	1 kg x 115 kg of leaves
Toilet paper	5 kgs x 115 kg of leaves

Considering the 9'050,000 kg of coca leaves produced in La Convencion and Lares (including the production of registered hectares) the following must have been used for the processing:

Kerosene	1'416,521 lts.
Sulphuric acid	786,957 lts.
Potassium carbonate	393,478 kgs.
Carbide	78,696 kgs.
Toilet paper	393,478 kgs.

Contamination caused by chemicals in subsequent stages should also be considered.

ZONE D : LA CONVENCION-LARES



ANALYSIS OF COCA AND MAIN LEGAL CROP PRODUCTION IN FOUR UPPER JUNGLE REGIONS OF PERU

ZONE D : LA CONVENCION - LARES

SOURCE: Physical Political Road Map of Perú NG-I
SCALE: I: 2'200,000
DATE: December 1990

CONVENTIONAL SIGNS

DEPARTMENTAL CAP.	◎
PROVINCIAL CAP.	○
DISTRICT CAP.	○
INTERNATIONAL BORDER	– – ———
DEPARTMENTAL BORDER	——— – ———
PROVINCIAL BORDER	– – – – –
PAVED ROAD	———
UNPAVED ROAD	———

METHODOLOGICAL APPENDIX

METHODOLOGY FOR THE DEFINITION OF AREAS GROWING COCA AND OTHER CROPS

The methodology used to estimate coca cultivated areas has been limited to information available in each one of the areas under study, including information obtained through interviews and surveys carried out during field work.

The availability of the information has varied according to the area, due to factors such as the existence of special projects, statistical information from institutions such as ONERN and ENACO and the presence of police and military quarters, amongst others. In fact, the economic and social situation of the country in the last few years, has been an inhibiting factor as far as the availability of information is concerned, because on the one hand it has made it impossible to obtain resources for the upkeeping of statistical information, much less create new work in this field (and others in general); and on the other hand, it has limited the State's presence in some parts of the areas studied, due to the terrorist phenomenon.

The wide and extensive desk work carried out previously in Lima provided an adequate knowledge of the field work site, on the basis of information available in the city and in those regional research centres related to matters discussed in this study. Obviously, it has also allowed the supervision of results obtained in field work.

Field work has been the main source of information. The information obtained as a basis for further studies, has required strict quality control procedures in order to guarantee the reliability of the estimates made.

Experts with a knowledge of the subject, experience in field work and a capacity to face and solve security and technical problems, have participated to fulfil these objectives and conditions.

For this reason, researchers were sought not only for their technical capacity but also for their knowledge and experience of each area, so that access could be gained to all private and public sources, thus making their work easier. For those areas where the State's presence is important as far as obtaining information is concerned, personnel with experience and contact in such institutions were contracted.

In all these cases, access to information has been complemented with technical farming and socio-economical aspects, in order to provide a broader outlook of the coca crop phenomenon and its problems in each one of the areas under study.

However, due to the lack of standardized information, the methodology used in each zone had to be adapted to the statistical information available, and in all cases, be supplemented with the results obtained from visits made to the areas. Therefore, it is necessary to describe both the desk work and field work methodology used for each area under study.

A. ALTO MARAÑON

The principal information used has been the production record provided by ENACO through its storage centres. However, because these centres are not located in all the areas under study, the methodology has had to adapt to this inconvenience. Besides, only the legal coca production is covered by these records, which are available only up to certain dates.

In Bolivar Province, the records of marketing volumes in the storage centres in Balzas and Tingo have been used as basic information. These centres, located at the boundary between the departments of Amazonas and Cajamarca, register the production of these coca producing districts.

On the basis of information provided by the workers of the above institution it has been assumed that these storage centres receive 50% of the overall production of the zone (the rest is destined to drug-trafficking and self consumption).

Calculation of production volumes, together with average productivity data of the district, estimated by ENACO (on the basis of its knowledge of the production conditions in the area and on information obtained at interviews), corroborated by the field work carried out, has enabled estimates to be made of the cultivated area.

The same methodology has been applied to calculate the cultivated area in the province of Sanchez Carrion, although this includes 80% of the volume of coca production presumably delivered to ENACO's storage centres. Similarly, this percentage has been considered on the basis of information provided by the workers at the storage centres, who are aware of the volumes produced in the area, not only because they live there but also because they work in the legal part of this activity.

In the case of the Province of Pataz, over the last few years ENACO has not recorded the volumes delivered to the storage centres. Nonetheless, there is information available on the cultivated area, supplied by the results of the constant operations carried out by officials of this institution in that region. Estimates of the cultivated surface have been based on this information and on calculations made by a branch of the Central Bank in Trujillo.

Subsequently this information was identified on a map and flights were made over the area in order to confirm the existence of the cultivated land and its distribution. For this purpose, the right banks of the River Marañon and the left banks of the Huallaga River were flown over, as well as the coca areas of Chillic, Huayo, Tamije, Challas, Huamachuco and the district of Ongon. At the same time, information was obtained from people in the areas of Urpay and Ongon, who supplied data on the approximate number of hectares, of both coca and other basic food crops.

Nevertheless, tests carried out through field work have proved that the cultivated area was often over-estimated - specifically in the area of Ongon - in relation to the data obtained from basic sources.

It has been possible to assume that the over-estimated land under cultivation in this province is a result of the methodology used by ENACO, which consisted of dividing the registered production volumes by certain average productivity rates which were applied indistinctively to different areas.

The appraisal "in situ" proved that the district of Ongon has characteristics which differentiate it from the rest of the production areas in the region, due to higher temperatures, quantity of rainfall and technological levels used in the cultivation of coca (due to its geographical proximity to the Alto Huallaga).

Subsequently, through a sample productivity analysis in different areas, it was proved that there was a larger productivity rate in this region, resulting in fewer hectares than the figure provided by basic sources (to a determined estimated production volume).

Different average productivity levels were verified through visits made to some plantations and interviews, such as those carried out with the ENACO personnel regarding the cultivated land in the Condebamba Valley in the Province of Cajabamba.

As regards estimates of the areas currently growing legal crops, information was basically obtained from the RDU (Rural Departmental Unit) in the region covered by this study. This information was compared with the results of interviews and surveys carried out during field work.

B. CENTRAL HUALLAGA

In view of the fact that the Central Huallaga region has been the subject of several studies, the basic information used to estimate the legally cultivated areas has been obtained mainly from the records of the Sectoral Statistics Bureau (OSE) of the Ministry of Agriculture.

This information - regarding main scheduled crops in the region, peak harvests, production and productivity of legal crops between 1985 and 1989 - has been contrasted with that obtained from field work, in order to determine the areas growing legal crops.

Similarly, in order to estimate the areas growing illegal crops, emphasis has been made on the results obtained through field work. Although the statistical information provided by APODESA (National Development Institute in Support of the Development Policy of the Higher Jungle Region), the main source of information has been interviews carried out with farmers, producers, coca growers, state authorities, civilian and military personnel and engineers in the area. Likewise, interviews have been carried out with the authorities of the National Police Division for the Investigation of Illicit Drug-Trafficking, the Police Drug Division and the National Office for the Evaluation of Natural Resources (ONERN). Through these interviews and the ecological information on each of these areas, it has been possible to estimate the area under cultivation as well as calculate average productivity rates.

C. AGUAYTIA - PACHITEA

The methodology used to estimate the surface area has consisted in comparing information obtained from field work with that obtained from certain institutions, such as ONERN, the General Fauna Bureau and the INADE documents, amongst others.

Field work has comprised prospecting visits, interviews with farmers, lumbermen, merchants, civilian associations, military personnel in the area and especially illegal crop handlers. We also had the opportunity to hold an interview with a person involved in storing basic cocaine paste, who also distributed raw materials for processing, and seedlings. Interviews were also held with prominent people in the area, belonging to cooperatives and the Agricultural Federation of Ucayali.

All these visits were possible thanks to the support of United Nations personnel (extensionists), who work in the Pachitea and Boqueron del Padre Abad areas, as well as the INIAA extension staff in Pucallpa, who work in the Ucayali region, and the field work officer of the Agrarian Bank.

This field work was reinforced by the helicopter flights that took place over the areas under study, which provided a better appraisal due to the manoeuverability of this aircraft. A detailed survey of the overall area was thus obtained, especially over the rivers Tamaya, Pichis and Palcazu. Similarly, flights were made over the Pachitea and Aguaytia rivers, as well as the Federico Basadre Highway and the Marginal Highway from San Alejandro to Puerto Bermudez.

However, only rapid flights could be made over areas such as the Boqueron del Padre Abad, for security reasons and because advantage was taken of the flights made by service groups or civilian aid flights. Research of the Tamaya river area was possible thanks to the forced permanence for six hours of civilian aid flights at Puerto Putaya.

D. LA CONVENCION - LARES

In order to estimate the coca area under cultivation, statements made by the producers themselves in 1988 were considered as a starting point. These declarations were recorded by ENACO to establish the location of the new storage centres (Kiteni, Santa Maria, San Lorenzo and Putucusi) and the redistribution of existing crop deliveries.

Additionally, joint work was carried out between ENACO and farmers, to estimate a specific average productivity rate for the area. The calculated productivity and the area of the different crops under cultivation have allowed estimates to be made of the total area under coca cultivation in 1988.

The estimated area has been increased by 25%, a percentage which is usually destined to deferred land - a normal practice in the valley.

After obtaining the information concerning the estimated area under coca cultivation in 1988, the expansion that has occurred since that time was calculated. For this purpose, interviews were held with ENACO personnel (they carry out field tests regularly), CODEVA personnel, who exercise direct action in rural areas, as well as with workers from the Ministry of Agriculture. Testimonies were given by the latter regarding events that occurred during the last few years, in view of their constant communication with new colonization areas.

Estimates obtained have been contrasted with those supplied by the Coca Farmers Federation in the area, which made it possible to calculate the coca plantations in new expansion areas such as Yanatile and Kiteni.

Finally, as regards legal crops, information supplied by a United Nations document on the CODEVA project was used, which includes the recording of production, productivity and cultivated land rates. These rates have been verified by visits made to the areas involved.

METHODOLOGY FOR THE DEFINITION OF POTENTIAL AREAS FOR COCA AND OTHER CROPS

In order to estimate potential areas for coca, a similar methodology has been used for the four areas under study, although with slight alterations, depending on available information and on the results obtained from field work in each of the areas.

This methodology has consisted basically in the identification of land that has been considered ecologically appropriate for the crop (for which a previous classification was made whenever possible).

Subsequently, the areas considered to be inadequate for coca were deducted from this "ecologically potential" land for both strategic and socio political reasons.

The first reason for deducting potential lands was their proximity to highways, rivers and towns. In other words, easily accessible lands were deducted because although the highways and rivers are a key point of penetration to the production area and provide access to markets, they also provide access for public officials. In view of this, such lands, located at a distance of up to approximately 1 to 2 kilometres, were not considered as potential expansion areas for coca.

As far as the proximity of the towns is concerned, this has a negative influence on the cultivation of coca within a radius of 4 to 5 kilometres. This is due to the presence of civil servants and because the relatively permanent farming activities that provide food for the population, are normally concentrated around them.

As regards the second reason - the socio-political aspect - a similar criteria was used, but in relation to the proximity of the State's presence, either through civilian, police or military centres, as well as the area's accessibility and marketing possibilities.

Thus, in the case of the **Central Huallaga**, the initial point was to estimate the largest possible area according to its capacity, per type of crop, i.e. according to whether the lands were suitable for permanent crops (C) pastures (P) or Forestry (F). These areas were obtained from research carried out by INADE and APODESA on the basis of ecological characteristics outlined in the Land Capacity Map of 1990.

From the land with a maximum utilization capacity, determined at a provincial level, deduction has been made of permanent crop areas (C) already cultivating other legal crops, and all other land that at present cultivates legal or illegal crops. These areas were estimated according to the methodology outlined in the previous appendix i.e., those resulting from data provided by the OSE and contrasted with data obtained during field work).

From this ecologically potential area, pastures, permanent crops and forests located close to rivers, highways and cities were also deducted, as well as those located near areas under State control.

In order to determine the potential area for legal crops, the land with a greater utilization capacity was subtracted from land currently cultivated for type (A) soil, since these cannot be used for illegal crops . As regards the remaining land, only those not included as potential coca areas have been considered, i.e. those that are still not cultivated and have been discarded for socio-political or strategic reasons.

With respect to the estimates of potential areas for coca in the **Alto Marañon**, the me- thodology used is similar to that in the area explained above, although the information is limited due to the fact that maps of the area are non-existent.

Nevertheless, after comparing available information with that provided by ONERN and with the results obtained from the field study, it was possible to determine that the only potential area for this crop is the area of Ongon. This is because the remaining areas cultivate mainly Andean crops and besides, the construction of new irrigation schemes would be required.

In order to estimate the maximum limit (total potential land for cultivation), records from ONERN and the Study of the Salaverry-Juanjui Highway for the Ongon area have been taken into account. A corrective factor was applied to the areas suitable for the potential development of coca, prepared by the UNDP for the Alto Huallaga Region, in order to deduct the area covered by the towns and rivers in the area.

In this regard, it should be pointed out that the strategic and sociopolitical criteria was not been applied in this region, due to the fact that Ongon is located far away from towns and civilian and military authorities, and because access is difficult.

Therefore, using similar methodology to that used in other areas, the areas currently growing legal and illegal crop were deducted, as well as the percentage of deferred land (obtained from the field study concerning routine farming practices in the region).

To estimate potential areas for legal crops in the Ongon area, the conclusion reached is that this land has no potential for such crops, because of its difficult access and its geographical proximity to the Alto Huallaga, proved through field studies. Given the fact that in the other areas studied, there is practically no land available for crop expansion - as mentioned in the previous appendix - it has been established that there is no potential for the expansion of legal crops in the Alto Marañon.

For the **Aguaytia-Pachitea** region, the Land Capacity Map and the Map of Vegetation Coverage were used, both drawn up by ONERN. The latter includes satellite images taken in 1977 and 1983, whereby an expansion factor was applied to areas of interest to determine the current use of land. This factor was taken from the Geographical Information System of ONERN's data centre.

The Land Capacity Map provided information regarding the ecological possibilities for developing traditional systems of farming production (mainly according to land and climate conditions) and above all, regarding the conditions and limitations of the geographical areas under analysis.

The second map, Vegetation Coverage, supplied information concerning which areas have already been exploited by man and cannot be used for future coca production, either because they are already being used for the production of legal or illegal crops or because they are deferred lands permanently used for crop production. This map has also allowed us to establish the qualities or limitations of certain geographical areas as far as coca production is concerned (e.g. areas known as "aguajales", where drainage is bad and therefore unsuitable for this crop).

The comparison between the information obtained from both maps, and that obtained during field work (explained in the previous appendix) allowed us to estimate the maximum area suitable for cultivation, according to the characteristics of the area under analysis.

The potential area for coca was obtained by subtracting the areas that correspond to the strategic and socioeconomic criteria and those currently under cultivation, from the maximum forestry area suitable for cultivation, owing to the fact that forestry land has been considered ecologically suitable for the expansion of illegal crops.

In order to estimate the potential area for legal crops, the area currently under cultivation and that corresponding to permanent crops (Type C) have been subtracted from the maximum areas of land suitable for tillage. (Type A).

Finally, in order to estimate the potential area for coca in **La Convencion-Lares**, records of land classed as suitable for forestry because of adequate ecological conditions, were referred to. These records by type of land, were provided by ONERN.

As for the previous cases, alluvial forests were deducted with the help of the Forestry Map of Peru. Similarly, land suitable for forestry occupied by native communities was also deducted, calculated on the basis of information provided by CODEVA, and also traditionally devastated forestry land; the latter were located with the help of maps as well as interviews carried out in the area.

As regards the surface that could be used for legal crop expansion, the land suitable for tillage (Type A) and the land growing permanent crops (Type C) have been added. Land currently under cultivation for both legal and illegal crops was subtracted from the above sum, after which the potential area was obtained.

METHODOLOGY FOR PROFITABILITY ANALYSIS

Profit calculations for the different crops have been done on the basis of information provided by the Budgets of the Agrarian Bank of Peru (BAP) in each one of the regions under study. Additionally, information was obtained from producers in Aguaytia and Pachitea, La Convencion and Alto Marañon, as well as from the Unidad Agraria de San Martin (Agrarian Unit of San Martin) in the case of Central Huallaga.

In the case of coca, requirements have been estimated on the basis of information obtained from field work, because of the obvious lack of information in the Agrarian Bank of I Peru.

The prices of the different factors have been updated with the values obtained in the field in November last year, so as to reflect the present market conditions.

The results obtained express the costs incurred in sowing, harvesting, etc. per hectare in one year. The following items have been considered:

a)Gross Income

The result was obtained from the producers' price in force in October and November 1990, expressed in Intis per kilogram, by the annual average yield of each crop.

To calculate the average yield, expressed in kilograms per hectare, the total annual production was divided by the number of cultivated hectares for each product. In the case of coca, the total legal and illegal production was considered. Furthermore, obviously when considering the total production in each area, the losses and damage caused by transfers and other factors were not taken into consideration.

b) Direct Costs

These include labour costs expressed by the number of man/hours and the cost of each man/hour for each crop and area, respectively. In the specific case of Aguaytia and Pachitea, the maximum wage per man/hour paid in others areas has been used, due to the lack of information.

With respect to investment costs, the total figure was obtained by adding the costs considered intermediate investments (expressed in Intis per hectare per year) such as seeds, fertilizers and pesticides, as well as the cost of tools and equipment used by the producer.

The average annual requirements of the quantities of raw materials and machinery used in each hectare per type of crop was obtained from the budget sheets of the Agrarian Bank of Peru.

In the case of the Alto Marañon and La Convencion, the cost of transport for raw materials was also included, although in other areas this variable was not included because of lack of information.

c) Indirect Costs

Administrative expenses, basically related to social benefits and unforeseen expenses have been considered Indirect Costs. In the case of some crops such as coca, and depending on the zone, expenses incurred in payment of social benefits are non existent.

d) Financial Costs

In this case, a deductible interest of 12% per month has been considered, which was the interest on loans charged by the Agrarian Bank during the last 4 months of last year. To obtain the real monthly rate of 2% used in the calculations, the average monthly inflation rate for September, October and November have been applied to the nominal cost of loans granted during the above months, presuming the other months of the year have maintained this pattern.

According to information obtained from the Agrarian Bank of Perú, the disbursements are made in 3 installments. In this case, it was considered that the first installment is paid during the preparation of the land, the second at the beginning of the sowing period and the last, during the harvesting period.

e) Profitability Index

This was obtained by dividing the difference between gross income and total costs by the total cost.

$$\text{Profit Index} = \frac{\text{Gross Income - Total cost}}{\text{Total Cost}}$$

f) Break-even Price

$$\text{Break-even price} = \frac{\text{Total Cost}}{\text{Yield}}$$

Finally, it should be pointed out that the Agrarian Bank of Perú's policy does not consider total financing for farmers, underestimating crop production costs.

METHODOLOGY USED TO ESTIMATE THE LABOUR FORCE

Labour Force Involved

Farming labour is usually measured in man/hours. These man/hours represent activity undertaken in one working day. In order to calculate the labour demand, it is assumed that one working day is carried out by one person.

To estimate labour demand, man/hour requirements for one cultivated hectare were calculated as a result of interviews and surveys carried out in field work. These requirements vary according to the crop and area where it is produced, and are basically divided into labour requirements for culture and harvesting tasks.

To determine the seasonal labour demand, the man/hour requirements per crop have been separated into months on a month by month basis.

The total monthly demand of man/hours has been obtained by multiplying the number of hectares for each crop by the monthly demand required per hectare. Considering that farm labourers work 22 days per month, by dividing these monthly man/hours by this number, the aggregate monthly labour demand is obtained, i.e. the number of workers required.

To determine the average labour demand in one year for one crop or in total, the number of hectares involved was multiplied by their annual man/hour requirements. If this result is divided by 264, the number of days the labourers work in.one year is obtained.

Local Labour Supply

In view of the lack of information in this regard, it was assumed that the EAP (economically active population) in the coca areas and the EAP in the Department, were proportionately similar.

Therefore, to determine the available labour supply in the area, calculations were based on the population in the coca districts divided by the total population of the departments to which they belong. (These details have been obtained from information provided by INEI).

This quotient was multiplied by the EAP age 15 and over in the Department's farming sector, in order to estimate the available labour in each of the coca growing areas.

The sum of the results obtained by district provides the local labour supply calculation. However, this calculation has not included the population of other districts in the same province that could be participating directly in the coca growing districts, nor the immigrant population.

ALTO MARAÑON

The coca plant sown in the Alto Marañon pertains to the "TRUJILLENSE" or "TUPAC" group.

Vigorous plants with abundant stems, small long leaves with an average size of 41 x 18 mm were observed during field visits.

The total life span of these plants is approximately 40 years. They are sown under the shade of banana or guava trees (Inga sp.) on irrigated land.

In the district of Sitacocha, province of Cajabamba, a sample analysis was carried out in the Chirac Sector, with the following results:

Field area:	1.5 hectares
Coverage:	Banana and Guava trees
Distance between each other:	1.10 x 0.85
Assumed Density:	10.695 plants/hectare
Uncultivated area under guava trees:	40%
True Density:	6,417 plants/hectare
Weight of fresh leaf per plant:	120 grams
Dry leaf/fresh leaf weight ratio:	23%
(This figure is an estimate as the leaves could not be picked)	
Weight of dry leaf per plant:	28 grams
Yield Dry leaf x ha/harvested:	180 kgs.
Yield dry leaf x ha/year:	540 kgs. (40@)

LA CONVENCION - LARES VALLEY

The coca planted in the La Convencion Valley is the Lamark type.

The following morphology has been recorded: medium sized bush, average height approximately 1.20 mts., thin stems, big leaves of approximately 58 x 29 mm, not including flower stalks.

Field measurements were taken with the purpose of finding out the true conditions in which the plants are sown. Some tests were taken with measuring tools but in other cases the sizing stick method (step by step measurement) was used to avoid the negative reaction of owners or local neighbours.

The field tests were as follows:

Santa Ana District

Serranuyoc Sector (left bank of the river Vilcanota)

1st Plantation

Area sown	1,000 mts2
State	soca sprouting (**)
Inclination	8 - 10%
Ground	colluvial terrace
Distance	0.73 x 0.38 mts
Density	36,011 plants/hectare

Observations

- Hilling, judging from the different diameters of the base of the stems.
- Not suitable for harvesting
- Cultivation conditions unusual in the sector.

** Soca is the felling of a bush to a height of 15 to 20 cm., from the ground to obtain improved sprouting.

2nd Plantation

Area sown	150 mts2
State	Blooming; green leaf, not adequate to harvest.
Inclination	20 -25%
Distance	0.84 x 0.6 mts.
Density	19,841 plants per hectare
Plantation age	4 years

Agullayoc Sector (right bank of river Vilcanota)

Area planted	3,000 mts2
State	Planted, leaves ready to be harvested.
Inclination	15 - 20% (common)
Distance	0.9 x 0.9 mts.
Density	12,345 plants per hectare
Weight fresh leaves per plant	90 grams
Weight dry leaves per plant	21 grams
Yield dry leaf/fresh leaf	23%
Yield per harvest	247 kilos per hectare
Yield dry leaf/year (3 harvests)	741 kilos
Plantation age	8 years

Echarate District

Calzada Sector (left bank of river Vilcanota)

Area sown	620 mts2
Age of the plantation	15 years .
State	green leaf, not time to be harvested
Inclination	2-3% (uncommon)
Ground	alluvial terrace
Distance	0.76 x 1.14 mts
Density	11,540 plants/hectare
Number of plants counted	715

Harvest declared by owner	17 kilos dry leaf/harest.
Weight of dry leaf, per plant	24 grams
Yield per harvest	277 kilos of dry leaves
Yield per hectare/year	831 kilos of dry leaves (3 harvest seasons

Lares District

Putucusi Sector

Area sown	3,000 mts2
State	new guide (**)
Inclination	20 - 25 %
Distance	0.86 x 0.5 stems
Density	23,252 plants/hectare
Weight of dry leaf per plant	18 grams
Dry leaf/harvest yield	418 kilos
Dry leaf/year yield	1,254 kilos
Plantation age	15 years

** Guide is a young shoot of a tree left for training others