



Analytical Brief

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Coca crops and human development

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Coca crops and human development

Is coca farming the road to human economic and social development? As in any other product decision made by farmers, the economic incentive is undoubtedly the strongest impulse in the decision of individuals to embark in coca cultivation. Whether or not the decision is a safe route to social prosperity is something that can be better determined based on the data analysis of the Human Development Index (HDI) prepared by the United Nations Development Programme (UNDP).

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HDI and coca crops by districts

In Peru the number of hectares cultivated annually has varied in the last decade from forty five thousand to sixty thousand hectares, according to data provide by UNODC's Illicit Crop Monitoring Programme in Peru. These figures have been very much below the historic maximums of over one hundred thousand hectares of coca crops reached at the end of the decade of the eighties and beginning of the nineties.

During this period that comprehends from 2002 to 2012, the Monitoring Programme registered the presence of coca cultivation in one hundred and twenty districts of Peru, which represents 6.5 per cent of the total of 1,834 districts existing in the country. In 2012 these districts had a total population of 1,457,139 inhabitants, representing 4.8 per cent of the total population in Peru. In 2012 the average HDI, weighted by population, of the coca producing districts was significantly lower than the Peruvian average: an HDI of 0,312 in the coca farming districts compared to 0,498 in districts with no coca cultivation.

Average HDI by districts according to coca cultivation, 2012

	HDI
Districts with coca cultivation	0,31993
Districts without coca cultivation	0,49895

Weighted by population.

Source: Self elaboration based on data from UNDP-HDI.

In other words, the HDI in districts where coca farming is not practiced is 60 per cent

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higher than in those with coca farming. However, although as a whole the HDI levels are manifestly lower than the Peruvian average, a notorious difference exists between the coca farming districts. Coca farming is not found particularly in districts of extreme poverty; the majority of crops are located in districts with a mid-range classification according to their HDI. Sixty seven out of one hundred and twenty districts where coca is cultivated, that is fifty six per cent of the total, are located in the middle band of HDI distribution per district in Peru.

In other words, over half of the coca farming districts are between thirty and seventy per cent with higher levels of all districts. Forty one other districts where coca is cultivated, thirty four per cent of the total are located in the thirty per cent of Peruvian districts with the lowest levels of HDI. In the opposite extreme, twelve coca farming districts are within the group located in the thirty percent of districts with the highest HDI in Peru and one of the districts where coca cultivation has been registered in the last decade, Huepetuhe, is in the privileged group of the ten percent of Peruvian districts with the highest HDI.

Districts with coca crops per HDI deciles, 2012

Decile	Number of coca farming districts	Percentage over districts in their HDI decile
1 (10% of districts with the lowest HDI)	20	10,9%
2	11	6,0%
3	10	5,5%
4	21	11,5%
5	19	10,4%
6	15	8,2%
7	12	6,5%
8	5	2,7%
9	6	3,3%
10 (10% of districts with highest HDI)	1	0,5%
	120	6,5%

Not weighted by population.

Source: Self elaboration based on data from UNDP-HDI.

The difference in the development level between the coast and the interior of Peru and the concentration of coca crops in the Andean region and the rain forest area explains part of the difference of HDI between districts where coca is cultivated and those where there are no coca crops. However, the HDI of coca farming districts is lower than the HDI of non-coca farming districts in almost all the regions of Peru. The only exceptions to this behavior of a relatively lower development in coca farming districts exist in the region of San Martin and Huanuco, where there is a slight difference in the HDI in favor of the coca farming districts.

From this territorial perspective two clear elements appear: on one hand, coca crops are rooted in particularly impoverished areas, and, on the other, a decade of coca cultivation, with the monetary benefits accrued for its producers, has not been capable of closing the gap in the development levels with regard to districts specialized in other economic activities.

Therefore, coca crops are not only located in places with lower development levels in comparison with Peru as a whole, but also within its own region. This difference is only explained partially by the traditional and persistent development difference between urban centers and outlying rural areas, at the Peruvian scale as well as within each region.

Average HDI of coca farming and non-coca farming districts per region, 2012

	Population living in coca farming districts	Average HDI of coca farming districts	Average HDI of non coca farming districts	HDI difference between districts with coca and without coca
Amazonas	5,9%	0,2715	0,3372	-0,0657
Ayacucho	15,1%	0,2531	0,3333	-0,0802
Cajamarca	6,5%	0,2283	0,3383	-0,1100
Cusco	15,5%	0,3501	0,4189	-0,0688
Huanuco	26,9%	0,3542	0,3387	+0,0155
Junin	12,2%	0,2840	0,4570	-0,1730
La Libertad	7,9%	0,2189	0,4659	-0,2469
Loreto	18,9%	0,2920	0,3997	-0,1077
Madre de Dios	7,7%	0,5360	0,5683	-0,0324
Pasco	12,3%	0,2633	0,4072	-0,1439
Puno	4,9%	0,3417	0,3701	-0,0284
San Martin	15,5%	0,4226	0,3906	+0,0319
Ucayali	16,1%	0,3531	0,4432	-0,0900
Peru	4,8%	0,3120	0,4980	-0,1860

Weighted by population.

Source: Self elaboration based on data from HDI-UNDP

In 2012 the HDI of districts with coca farming was an average of 0,098 points inferior to that recorded on the average in the region where it coexists if not weighted by the population and 0,075 if weighted by the population. Only eleven of the one hundred and twenty districts where the existence of coca crops was found along the last decade show a HDI above the average found in the region. In other words, the coca farming districts register an average development differential of twenty five per cent with regard to the HDI average of the region where they are located.

Historical evolution of the district HDI and coca crops

Between 2003 and 2012 the HDI calculated according to UNDP's new reweighting, increased in Peru as a whole by 0,114 points. On the contrary, the average HDI growth, weighted by population, in the one hundred and twenty districts where coca was cultivated during this decade, was barely half: 0,078 points. Only eleven of these districts, that group 16,6 per cent of the population that live in districts where there is coca farming, surpass the average HDI growth in Peru as a whole.

Average HDI per district according to the existence of coca crops, 2003 and 2012

	HDI 2012	HDI 2003	Absolute variation
Districts with coca crops	0,3120	0,2339	+0,0781
Districts without coca crops	0,4980	0,3812	+0,1148

Weighted by population.

Source: Self elaboration based on data from HDI-UNDP.

It could be assumed from a mere theoretical stand point that the divergence found along the last decade in coca farming districts with regard to the whole of Peru could be the effect of an effective reduction of income perceived by farmers in these districts and, ultimately, a depression of the HDI in the area. But the reality is precisely the opposite. On one hand, the hectares with coca cultivation have increased in 36.6 per cent during the decade in Peru, going from 44,200 in 2003 to 60,400 in 2012, which in principle would imply an increase of the economic contribution of coca to the economic development of districts where it is produced.

The improvement in farming techniques has also increased the yield per hectare, which should also result in greater income for farmers. On the other hand, the average price for coca leaf has increased in over fifty per cent along this period, going from 2.1 dollars per kilogram in 2003 to 3.3 dollars in 2013. Therefore, it is possible to discard that the relative impoverishment of coca growing districts can have its origin in a reduction of the cultivated area or of the prices received for production.

Another alternative explanation to this relative depreciation of the HDI in coca growing districts could be found in the economic and social development of their surrounding environment. However, none of this is possible to explain in light of the data, but rather the opposite. When comparing the HDI evolution in coca farming districts versus non-coca farming districts in the same region a general pattern has been observed, being that the HDI has had a better performance in the non-coca farming districts.

With the exception of the districts located in Madre de Dios, San Martin and Puno, the HDI growth in coca farming districts has been lower to that recorded in non-coca farming neighboring districts. Therefore, there seems to be a territorial pattern in the HDI evolution that would be playing against coca-farming districts extending beyond the evolution of crop yield or the sale price of the final product.

Average variation of the HDI between 2003 and 2012 in the coca farming and non-coca farming districts per region

	Variation of the HDI in districts with coca cultivation	Variation of the HDI in districts without coca cultivation	Difference in HDI between districts with coca and without coca
Amazonas	+0,0509	+0,0899	-0,0389
Ayacucho	+0,0654	+0,0820	-0,0165
Cajamarca	+0,0224	+0,0927	-0,0702
Cusco	+0,1101	+0,1311	-0,0210
Huanuco	+0,1315	+0,1325	-0,0009
Junin	+0,0501	+0,1100	-0,0599
La Libertad	-0,0224	+0,1118	-0,1342
Loreto	+0,0683	+0,1535	-0,0852
Madre de Dios	+0,2538	+0,2055	+0,0483
Pasco	+0,0315	+0,0974	-0,0659
Puno	+0,0789	+0,0748	+0,0041
San Martin	+0,1519	+0,1259	+0,0260
Ucayali	+0,1071	+0,1390	-0,0319
Perú	+0,0781	+0,1148	-0,0367

Weighted by population.

Source: Self elaboration based on data from HDI - UNDP

From a different perspective, the coca farming districts have lost the train of development of their immediate surroundings during the last decade. In 2003 the average distance in HDI between coca farming districts and the average in their region was 0,047 points in 2012 the distance has jumped to 0,098 points, without weighting by population. If weighted by the population of each district, the gap between coca farming districts and the average of the region had increase in similar proportions: from 0,035 distance points in 2003 up to 0,075 points in 2012. In 2003 fifteen out of one hundred and twenty coca farming districts registered a HDI above the regional average, in 2012 the number went down to eleven.

Average difference of the districts HDI in relation to the regional average 2003 and 2012

	2003	2012
Not weighted by population	-0,0466	-0,0984
Weighted by population	-0,0345	-0,0754

Source: Self elaboration based on the data from HDI-UNDP

The case of Tocache

In spite of a slightly increasing tendency of the overall number of coca crop hectares in Peru, the province of Tocache has experienced a remarkable reduction in the intensity of coca crops. It has gone from cultivating 2,304 hectares in 2004 to merely 455 hectares in 2011.

This decline of economic activity lubricated by coca farming has not been reflected at the level of economic development in the region. On the contrary the districts of Tocache have shown the greatest progress in their average HDI, slightly above the rest of districts in San Martin, ahead of the HDI registered in districts with no coca cultivation and well ahead of the HDI registered in the rest of districts in Peru with coca crops.

	HDI 2003	HDI 2012	Vari- ation
<i>Districts with coca cultivation</i>	0,2300	0,3051	+0,0752
<i>Districts without coca cultivation</i>	0,3859	0,5006	+0,1147
<i>Remainder of districts in San Martin</i>	0,2675	0,3907	+0,1231
<i>Coca farming districts of Tocache</i>	0,2851	0,4413	+0,1562

Weighted by population.

Source: self elaboration based on HDI – UNDP

Tocache has become a regional development model and reference, with a coca alternative productive development base that has been ratified by the HDI data. San Martin is the region with the greatest poverty reduction in recent years. This reduction has been more intense in the rural rain forest area thanks to the dynamics of primary activities due to the increasing yield and prices.

This is precisely the area of intervention of alternative development strategies, where it has developed its full potential and has been crucial for the impact reached. Alternative development has promoted three of the crops with the largest cultivated area in the Peruvian rain forest such as palm oil and cacao, as well as coffee that is the main product with the largest export volumes and highest income for producers previously dedicated to coca farming.

Demographics and coca crops

In the past coca crops could play a relevant role as a magnet for internal migrations due to the economic opportunities associated to this activity. But in spite of the increase in cultivated surface and the sale prices for coca leaf, this initial seduction for internal migration to districts with coca cultivation seems to have become saturated with the passing of time and lost its allure and even becoming negative.

In 2003, 1,375,316 people inhabited the one hundred and twenty districts where coca cultivation had been practiced during the decade. In 2012, the population in the same districts had increased 5.9 per cent reaching 1,457,139 inhabitants. This growth, notwithstanding, is notably inferior, a little less than half, to the population increase of 11.3 per cent observed in the rest of Peru. The percentage of Peruvian population that resides in coca farming districts has declined during the last decade from 5,1 per cent in 2003 to 4,8 per cent in 2012.

Population living in districts with and without coca cultivation, 2003 and 2012

	2003	2012	Variation
Districts with coca cultivation	1.375.316	1.457.139	+5,9%
Districts without coca cultivation	25.775.462	28.678.736	+11,3%
Population in districts with coca over the total	5,1%	4,8%	

This relative decrease of population in coca farming districts is observed even when the comparison is limited to regions where coca crops exist. The growth of 5,9 per cent in coca farming districts is lower than the 7,1 per cent recorded in the districts of the same regions where coca was not grown during the last decade. From these figures one can infer that the capacity of coca crops to attract population has diminished along time until becoming inferior to that recorded in places where coca crops do not exist, which, moreover, results to be coherent with the logic that non coca farming districts have recorded greater levels of growth in their HDI.

HDI and amount of coca crops

The least developed districts of Peru are not those dedicated more intensely to coca farming and, consequently, are more dependent on coca farming. Over half of the hectares of coca cultivated in Peru were located in districts placed in the fifth and sixth deciles of the distribution of IDH per district. Thirty four of the one hundred and twenty coca farming districts are in this middle band of HDI district classification. In other words, over half of the coca cultivated hectares are cultivated in one fourth of the coca farming districts that present an HDI near the average, which would tend to

divert from the idea that it is extreme poverty which situates itself in the origin of coca cultivation.

Distribution of hectares cultivated with coca by HDI deciles, 2012 (percentage of the total number of hectares with coca crops)

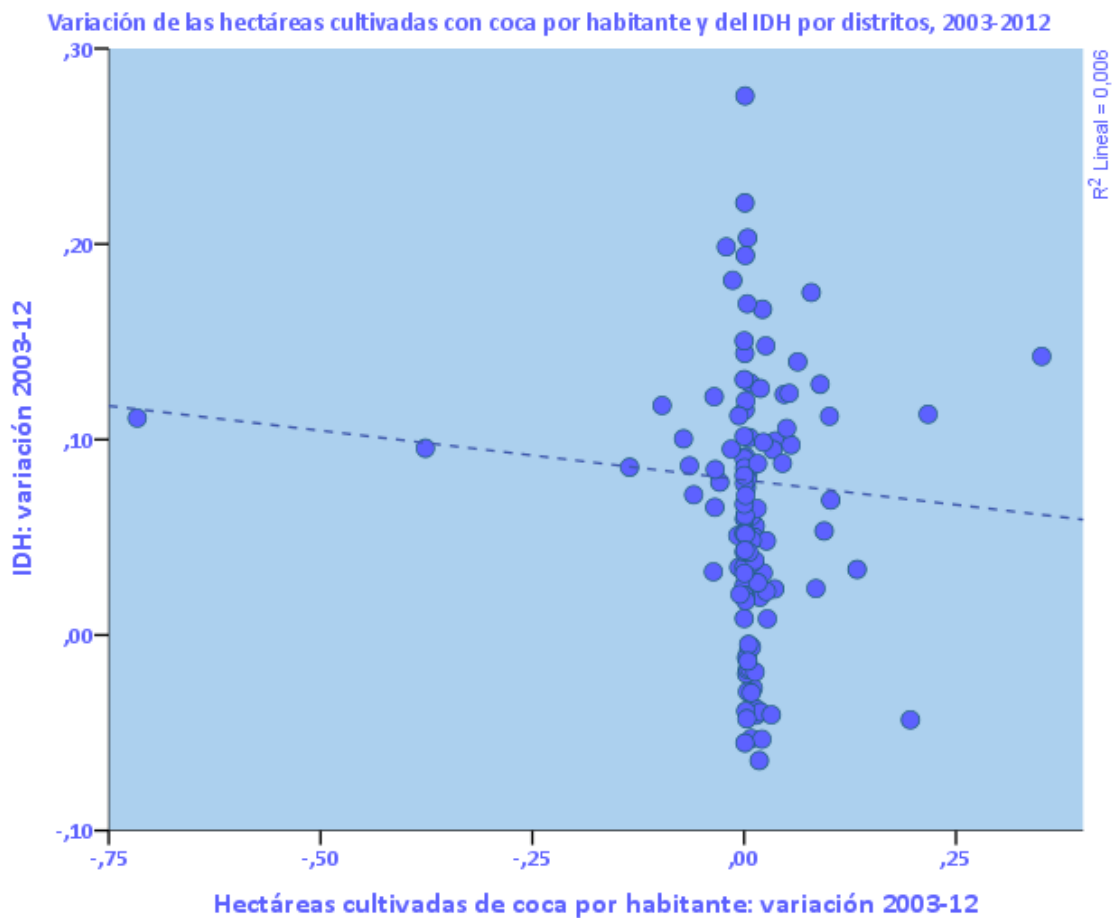
Decile	Number of coca farming districts	Percentage of hectares cultivated with coca
1 (10% of districts with lowest HDI)	20	1,9%
2	11	8,3%
3	10	5,7%
4	21	8,6%
5	19	30,4%
6	15	26,1%
7	12	6,9%
8	5	7,5%
9	6	4,6%
10 (10% of districts with highest HDI)	1	0,0%
	120	100,0%

Not weighted by population.

Source: Self elaboration based on data from HDI – UNDP

A theoretical explanation of this relative depreciation of HDI in coca farming districts could be found in the internal migration of crops that have been accumulated in more impoverished areas in the rest of its economic vectors. However, none of this is possible to explain based on the data. On one hand, the migration of coca crops observed from the inter-district variation, with the exception of a few districts, has been small along the decade.

On the other hand, districts with an increase in coca farming have not shown greater development. If we conduct a lineal regression between the quantity of coca crops per capita and the district HDI, the relation between both variables, although very marginal ($R^2 = 0,06$ if it is weighted by the population and $R^2 = 1$ is a perfect correlation and $R^2 = 0$ is a null correlation), is negative. The same scarcely significant relation although negative can be perceived when reduced in analysis to municipalities with great surfaces dedicated to coca crops (over one hundred hectares on an annual average) or it is limited to districts that register greater density levels of crops per capita. In other words, on the average and with an adjustment far from perfect, if the amount of hectares dedicated to coca cultivation is reduced, the HDI increases.



Weighted by population.

Source: Self elaboration based on data from HDI – UNDP

The evidence derived from this regression, although statistically insignificant, is unquestionable: a complete eradication of coca crops has a neutral effect over the evolution of the HDI in the district and, in the best case, implies a positive evolution of the HDI in the district. Moreover, this results in being coherent with the referred HDI tendency in Peru as a whole that in the last decade has had a better behavior in the non-coca growing districts than in those where coca is produced, in spite of the general increase in coca crops.

Coca cultivated hectares per district, 2002-2012 (annual average)

District	Province	Region	Hectares
Monzon	Huamalies	Huanuco	7.496
Yanatile	Calca	Cusco	4.030
Llochegua	Huanta	Ayacucho	2.692
Santa Rosa	La Mar	Ayacucho	2.602
Santa Ana	La Convencion	Cusco	2.403
Pichari	La Convencion	Cusco	2.368
Quellouno	La Convencion	Cusco	2.317
Kimbiri	La Convencion	Cusco	2.245
Rupa-Rupa	Leoncio Prado	Huánuco	1.973
Alto Inambari	Sandia	Puno	1.813
San Miguel	La Mar	Ayacucho	1.734
Anco	La Mar	Ayacucho	1.435
José Crespo y Castillo	Leoncio Prado	Huanuco	1.418
Maranura	La Convencion	Cusco	1.205
Echarati	La Convencion	Cusco	1.098
Pangoa	Satipo	Junin	1.083
Padre Abad	Padre Abad	Ucayali	1.028
Sivia	Huanta	Ayacucho	1.011
San Pedro de Putina Punco	Sandia	Puno	909
Puerto Bermudez	Oxapampa	Pasco	892
Luyando	Leoncio Prado	Huanuco	876
Mariano Dámaso Beraun	Leoncio Prado	Huanuco	842
Cochabamba	Huacaybamba	Huanuco	736
Santa Teresa	La Convención	Cusco	732
Yuyapichis	Puerto Inca	Huanuco	702
Río Tambo	Satipo	Junin	696
Ocobamba	La Convencion	Cusco	668
Irazola	Padre Abad	Ucayali	548
Ayapata	Carabaya	Puno	516
Ayna	La Mar	Ayacucho	515
Ramon Castilla	Mariscal Ramon Castilla	Loreto	440
Daniel Alomía Robles	Leoncio Prado	Huanuco	440
Pólvora	Tocache	San Martin	436
Huayopata	La Convencion	Cusco	308
Cholon	Marañon	Huanuco	300
Tocache	Tocache	San Martin	236
Yavari	Mariscal Ramón Castilla	Loreto	230
Teniente Manuel Clavero	Maynas	Loreto	216
Kosñipata	Paucartambo	Cusco	216
San Gaban	Carabaya	Puno	207
Mazamari	Satipo	Junin	172
Putumayo	Maynas	Loreto	163

District	Province	Region	Hectares
Uchiza	Tocache	San Martin	135
Balsas	Chachapoyas	Amazonas	112
Vilcabamba	La Convencion	Cusco	104
Pisuquia	Luya	Amazonas	99
Ongon	Pataz	La Libertad	92
Nuevo Progreso	Tocache	San Martin	90
San Juan del Oro	Sandia	Puno	90
Napo	Maynas	Loreto	77
Cocabamba	Luya	Amazonas	73
Jircan	Huamalies	Huanuco	69
HermilioValdizan	Leoncio Prado	Huanuco	55
Otuzco	Otuzco	La Libertad	55
San Pablo	Mariscal Ramon Castilla	Loreto	49
Ocumal	Luya	Amazonas	49
Campanilla	Mariscal Caceres	San Martin	45
Yanahuaya	Sandia	Puno	40
Sayapullo	Gran Chimu	La Libertad	35
Lucma	Gran Chimu	La Libertad	33
Huaranchal	Otuzco	La Libertad	30
Celendin	Celendin	Cajamarca	28
Cascas	Gran Chimu	La Libertad	28
Chinchao	Huanuco	Huanuco	25
Jose Sabogal	San Marcos	Cajamarca	25
Compín	Gran Chimu	La Libertad	21
Pataz	Pataz	La Libertad	21
Bambamarca	Bolivar	La Libertad	19
Chumuch	Celendin	Cajamarca	18
Camanti	Quispicanchi	Cusco	18
Longotea	Bolivar	La Libertad	17
Sitacocha	Cajabamba	Cajamarca	17
Cortegana	Celendin	Cajamarca	16
Bolívar	Bolivar	La Libertad	15
Providencia	Luya	Amazonas	14
Campoverde	Coronel Portillo	Ucayali	13
Camporredondo	Luya	Amazonas	13
Indiana	Maynas	Loreto	13
Phara	Sandia	Puno	13
Llaylla	Satipo	Junin	13
Charat	Otuzco	La Libertad	12
Sartibamba	Sanchez Carrion	La Libertad	12
Chuquibamba	Chachapoyas	Amazonas	11
Usquil	Otuzco	La Libertad	11
Choropampa	Chota	Cajamarca	10

District	Province	Region	Hectares
Chungui	La Mar	Ayacucho	10
Codo del Pozuzo	Puerto Inca	Huanuco	10
Puerto Inca	Puerto Inca	Huanuco	9
Palcazu	Oxapampa	Pasco	7
Cospán	Cajamarca	Cajamarca	7
Utco	Celendin	Cajamarca	7
Oxamarca	Celendin	Cajamarca	6
Ayahuanco	Huanta	Ayacucho	6
Chimban	Chota	Cajamarca	6
Condormarca	Bolivar	La Libertad	5
Cochorco	Sanchez Carrion	La Libertad	5
Manu	Manu	Madre de Dios	5
Mazan	Maynas	Loreto	5
Ucuncha	Bolívar	La Libertad	4
Inahuaya	Ucayali	Loreto	4
Torres Causana	Maynas	Loreto	4
Miguel Iglesias	Celendin	Cajamarca	3
Juanjui	Mariscal Caceres	San Martin	3
Pachiza	Mariscal Caceres	San Martin	3
Jorge Chavez	Celendin	Cajamarca	3
Shunte	Tocache	San Martin	2
Jose Manuel Quiroz	San Marcos	Cajamarca	2
Contamana	Ucayali	Loreto	2
Huepetuhe	Manu	Madre de Dios	2
Sandia	Sandia	Puno	1
Vargas Guerra	Ucayali	Loreto	1
Pajarillo	Mariscal Caceres	San Martin	1
Masisea	Coronel Portillo	Ucayali	1
Coviriali	Satipo	Junin	1
Pion	Chota	Cajamarca	1
Tournavista	Puerto Inca	Huanuco	1
Satipo	Satipo	Junin	0
Pebas	Mariscal Ramon Castilla	Loreto	0
Los Amazonas	Maynas	Loreto	0
Huicungo	Mariscal Caceres	San Martin	0
Padre Marquez	Ucayali	Loreto	0
Pampa Hermosa	Ucayali	Loreto	0
TOTAL			53.808

Coca cultivated hectares per province, 2002-2012 (annual average)

Province	Region	Hectares
La Convencion	Cusco	13.448
Huamalies	Huanuco	7.565
La Mar	Ayacucho	6.295
Leoncio Prado	Huanuco	5.604
Calca	Cusco	4.030
Huanta	Ayacucho	3.709
Sandia	Puno	2.865
Satipo	Junin	1.965
Padre Abad	Ucayali	1.576
Oxapampa	Pasco	900
Tocache	San Martin	900
Huacaybamba	Huanuco	736
Carabaya	Puno	723
Puerto Inca	Huanuco	721
Mariscal Ramon Castilla	Loreto	719
Maynas	Loreto	477
Marañón	Huanuco	300
Luya	Amazonas	248
Paucartambo	Cusco	216
Chachapoyas	Amazonas	123
Gran Chimu	La Libertad	117
Pataz	La Libertad	113
Otuzco	La Libertad	108
Celendin	Cajamarca	82
Bolivar	La Libertad	60
Mariscal Caceres	San Martin	53
San Marcos	Cajamarca	27
Huanuco	Huanuco	25
Quispicanchi	Cusco	18
Chota	Cajamarca	17
Cajabamba	Cajamarca	17
Sanchez Carrion	La Libertad	17
Coronel Portillo	Ucayali	14
Ucayali	Loreto	8
Cajamarca	Cajamarca	7
Manu	Madre de Dios	7
TOTAL		53.808

Coca cultivated hectares per Region, 2002-2012 (annual average)

Region	Hectares
Cusco	17.712
Huanuco	14.951
Ayacucho	10.004
Puno	3.588
Junin	1.965
Ucayali	1.590
Loreto	1.204
San Martin	952
Pasco	900
La Libertad	414
Amazonas	371
Cajamarca	149
Madre de Dios	7
TOTAL	53.808