

A GLOBAL EMPIRICAL REVIEW OF DRUG CROP ERADICATION AND UNITED NATIONS' CROP SUBSTITUTION AND ALTERNATIVE DEVELOPMENT STRATEGIES

Graham Farrell

Under international law, the cultivation of opium poppy, coca bush, and cannabis plant is allowed only for limited medical and scientific purposes. All other cultivation of these plants is marked for removal via eradication or other means, and strategies to implement these laws are reviewed. Globally, the annual risk of eradication is consistently below 10% for each crop. Evidence regarding socioeconomic development policies is taken from over two decades of United Nations programs in 11 countries. Using any measure of performance, they have had little impact. Even with marginal revisions in their methodology, the likelihood of these policies achieving their aims in the near future seems minimal.

Introduction

This paper reviews efforts across the globe to reduce illicit crop cultivation. This includes crop eradication and a range of socioeconomic development-related work. The drug crops in question are coca bush, opium poppy, and cannabis plant. With respect to crop substitution and development work, evidence relates mainly to 2 decades of United Nations programs and projects in 11 countries.

The available empirical evidence suggests that, at the global level, there seems to have rarely been more than 10% of any one type of illicit crop eradicated in a given year, and the risks to farmers of imprisonment are minimal. Hence farmers' risks are generally low and they can quickly resume cultivation. A range of obstacles obstruct the implementation of eradication, including popular opinion and public demonstrations, corruption, and sabotage. Where eradication is implemented, farmers adopt a range of adaptive responses to minimize the impact, and the empirical evidence supports these arguments. The most notable adaptive response is relocation and the new planting of crops. It seems that current eradication strategies hold little prospect of making substantial inroads into illicit cultivation.

What began as crop substitution in the 1970s became integrated rural development in the 1980s, and emerged in the 1990s as alternative development. The changes in terminology reflect refinements in methodology of the approach according to proponents, and mark the failure of one and then the next policy according to critics. However, despite efforts to tailor and improve the theoretical underpinnings of the approaches, the empirical evidence regarding their effectiveness is quite damning. More than 2 decades of United Nations (UN) projects and programs show little empirical evidence of reductions in illicit cultivation: projects stumble during

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implementation, in the instances where development is introduced it does not necessarily lead to reductions in illicit cultivation. Where there are reductions in illicit cultivation this is normally within a defined project area, but farmers have had ample time, often several years, to relocate. The recent addition of national and regional drug control plans seems largely rhetorical, adding little of substance to the policies. However, because development work is less punitive than eradication and far more politically acceptable within producer countries, it seems likely to continue.

There is a fundamental point to note at the outset of the paper: economic development is widely accepted as a laudable national and international policy aim, irrespective of drug policy goals. This paper does not question the justification or viability of promoting either economic growth at the national level, economic growth in smaller areas, or rural development in general. However, if rural development is the aim, rather than reducing illicit cultivation, then the resources used in drug control development projects could almost certainly have been better used elsewhere. This is noted to counter the excuse sometimes given that at least the money is being spent in a positive manner. On the contrary, often it is not being productive even if it fails in its drug-control objectives. For a range of reasons described herein, development work within drug-crop-cultivating areas is less efficient than development work elsewhere. Although this is a complex area ethically, politically and empirically, the suggestion is that socioeconomic development work as a means of drug control cannot be logically justifiable solely on developmental grounds. Indeed, the notion itself would seem hypocritical.

The bulk of the research for this paper was conducted during 1995 and consequently reports work and information up to that point. It was conducted primarily via the examination of project and program proposals, progress reports, and evaluations of the United Nations Drug Control Programme (UNDCP), including extensive interviews with U.N. officials and consultants, many of whom had been closely involved with the work reported.

The International Legislative Framework

The current legislative parameters for the control and eradication of opium poppy, coca bush and cannabis plant are set by international conventions (United Nations 1977, 1991). Each crop is legally cultivated for scientific and medical purposes: cannabis in the United States for research (International Narcotics Control Board [INCB] 1995:87) and in the European community for hemp production; opium in India for medical requirements, and Australia, France, Spain, and Turkey to produce poppy straw (INCB 1995: 79); coca bush for chewing, coca tea, and a range of products in Bolivia (around 12,000 hectares) and Peru (around 17,800 hectares). With these exceptions, all other cultivation of opium poppy, coca bush, and cannabis plant is, according to the conventions, prohibited and to be eradicated or removed. The 1988 convention (article 14, para. 2) states that "the measures adopted shall respect fundamental human rights and shall take due account of traditional licit uses, where there is historic evidence of such use, as well as the protection of the environment" (United Nations 1991:19).

Trends in Hectarage of Global Illicit cultivation

The following section sets the scene. A brief examination of measurement issues is required to show the uncertain and sometimes controversial context in which policy is formulated, implemented, and evaluated. It is also important to establish that, despite

problems in measuring illicit cultivation, there is no doubt at all that the most significant increases in global illicit cultivation have been experienced over the period in which strategies to reduce it have been most intensively and extensively introduced.

Measurement Issues

Issues relating to the measurement of illicit cultivation are important because of their effects on resource allocation and on the implementation and evaluation of strategies. General constraints influencing estimates of crop hectareage include the time of the year and stage of the crop cycle when measurement takes place, the characteristics of the crop, and local circumstances. The geographical dispersion and wide variation in field size (small fields are more difficult to detect), the remoteness of some of the terrain, and the deliberate camouflaging of illicit crops through intercropping make accurate estimation difficult. The sheer size of some regions of illicit cultivation may impose logistical constraints and the constantly shifting and sometimes migratory nature of illicit cultivation make it a moving and changing target (see Sader 1991). In addition to general constraints, varying sampling and survey methods can produce different estimates of hectareage. Remote sensing by satellite, observation or photographic sensing from aircraft, and ground surveys of fields or farmers using different methods each have strengths and weaknesses. Although triangulation from different methods may reduce error, it is more costly. Remote sensing estimates vary in accuracy with the technology used, with the method of sampling which areas to observe, with cloud cover (see Lasselin and Galtier 1993:21), and with the digital or visual classification of land use. Ground surveys may be hindered by difficulties in distinguishing between the boundaries of districts in remote locations, while access to some areas can be difficult and risky for survey personnel: in a survey of opium poppy in Afghanistan, surveyors were obliged to pretend to be conducting a survey of other crops (UNDCP n.d.a:9-10).

The main source of information on the hectareage of illicit crop cultivation are the annual estimates of the U.S. government (e.g., U.S. Department of State 1995). These are sometimes based on remote sensing and sometimes on best guesstimates. Due to their relative monopoly, these estimates are widely used (e.g., Tullis 1991; Kennedy et al. 1993; Stares 1995; Farrell 1996). They have been rightly criticized for various inconsistencies (Reuter 1994, 1996), the U.S. Department of State notes that "the picture is not as precise as we would like it to be" (U.S. Department of State 1995:21), and the estimates sometimes conflict with those that are produced by other sources. It is to be hoped that parallel estimates by the United Nations (e.g., Littoy 1993, UNDCP 1995, n.d.a) and the agencies of other governments will maintain some competition and, thereby, greater accuracy in this arena. Despite their limitations, the U.S. government estimates remain the principal reference point for illicit cultivation and production estimates, and are supplemented in this paper by other sources where available. For clarity, single point estimates are presented herein, but these are usually the midpoint of a range of varying size.

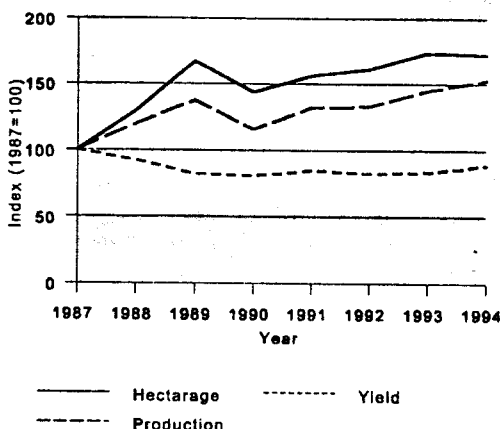
Magnitude of and Trends in Illicit Hectareage

Opium poppy

Opium poppy cultivation increased rapidly in the mid- to late-1980s to about 260,000 hectares, then, after a drop, increased gradually to about 280,000 hectares

in 1994. Figure 1 shows the trend. The apparent reductions in yield shown in figure 1 are probably due in part to changes in yield measurement techniques (see U.S. Department of State 1995:21-22), or possibly to an unusually high yield in 1987.

Figure 1
Trends in Illicit Opium Poppy Cultivation, Opium Yield, and Opium Production, 1987-94



Sources: U.S. Department of State (various years).

Note: where a range of estimates was available, a midpoint was used.

By 1994, Afghanistan and Myanmar were the two main countries of illicit opium poppy cultivation (fig. 2). Since the mid-1980s opium poppy cultivation has been detected in Colombia, and extensive poppy cultivation was detected in Vietnam in 1993 (Littoy 1993). Another significant event was the suggestion that poppy cultivation in Afghanistan declined significantly in 1995 (UNDCP 1995). Estimated 1994 illicit opium poppy cultivation in India in 1994 ranged from the Indian government estimate of 160 hectares to 5,500 hectares estimated by the U.S. Department of State.

Coca bush

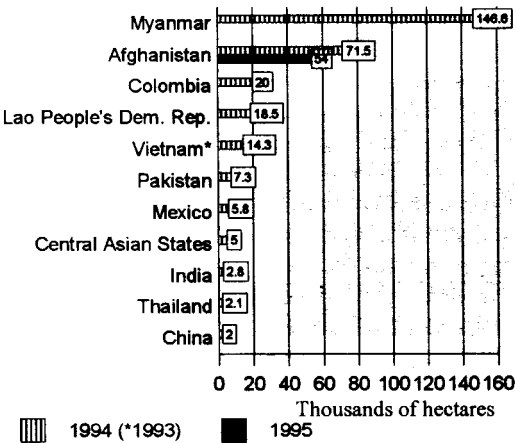
After doubling in the second half of the 1980s to more than 200,000 hectares, the total area of coca bush cultivation, although showing a slight decline, remained relatively stable from 1990 to 1994 (see fig. 3 for trends).

In 1994, despite some illicit cultivation of the coca bush in other Latin American countries, the US Department of State estimated that approximately half of the global cultivation took place in Peru (more than 108,000 hectares), while Bolivia (about 48,000 hectares) and Colombia (about 45,000 hectares) each accounted for nearly ¼ of the total, although, as noted above, some of the cultivation in Bolivia and Peru is licit. The estimated hectarage in Colombia increased rapidly from about 3,000 hectares in the early 1980s to about 45,000 hectares by 1994, to some extent offsetting reductions that occurred in Peru in the early 1990s. These estimates are not

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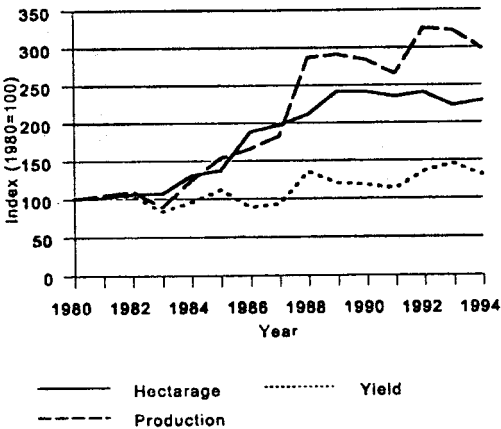
perfect, and a publication of the UNDCP Peru Field Office estimated 298,000 hectares under coca bush in Peru, of which over 199,000 hectares was estimated to be in production (UNDCP 1994).

Figure 2
Opium Poppy Cultivation, Estimated by Country, 1994 and 1995



Sources: Littoy (n.d.), UNDCP (n.d.a, 1995), U.S. Department of State (various years), and United Nations Economic and Social Council (1996).

Figure 3
Trends in Illicit Coca Bush Cultivation, Coca Leaf Yields, and Coca Leaf Production, 1980-94



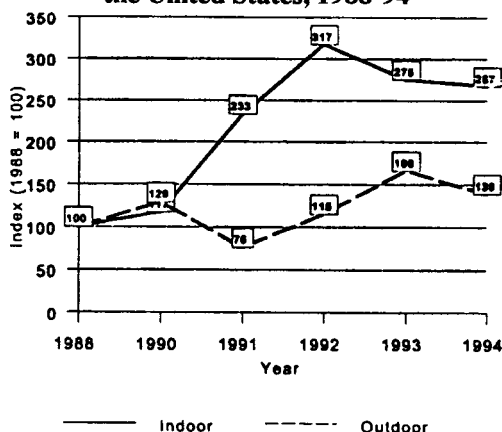
Source: U.S. Department of State (various years).

Note: where a range of estimates was available, a midpoint was used.

Cannabis plant

Estimates of the hectareage of global cannabis cultivation are less readily available than those for opium poppy or coca bush. The reasons include the more dispersed nature of illicit cannabis cultivation, significant amounts of cannabis growing wild, extensive cannabis growth classifiable as stemming from previous licit hemp cultivation, the increasing prevalence of indoor cannabis cultivation, and the fact that there are fewer estimates of the major areas of outdoor cannabis growth. Of those countries where there are some estimates, approximately 170,000 hectares in the member States of the Commonwealth of Independent States (CIS) in Central Asia was reported for 1994, and 82,734 hectares in South Africa (United Nations Economic and Social Council [ECOSOC] 1996:6). Over 50,000 hectares of illicit cannabis is cultivated in Morocco, less than 20,000 in Mexico, and substantial areas of illicit cultivation in Colombia and Jamaica were reported in 1994 (ECOSOC 1996:6). However, the extent of cultivation in the rest of Africa and in much of Asia remains largely unknown. Although the U.S. State Department produces estimates of illicit cultivation for many other countries, they do not appear to produce them for the United States. However, the United States must be one of the world's largest cannabis producers: Although official reports were of only 6-7,000 tons of herb in 1993, nearly 53,600 outdoor plots were eradicated in 1994 of which 72% were defined as "larger" plots eradicated by chemical techniques (ECOSOC 1996:6). If the average size of a "large" plot was just half a hectare, then 20,000 hectares were eradicated. This would be a small fraction of total cannabis cultivation in the United States. If U.S. eradication were more than twice as effective as the global average for coca and poppy (see below), at 20%, the estimate would be 100,000 hectares. This is probably a minimum estimate.

Figure 4
Trends in the Eradication of Indoor and Outdoor Cannabis Cultivation in the United States, 1988-94



Sources: Data for 1991-94 drawn from the annual reports questionnaire of the United Nations International Drug Control Programme; data for 1989-90 drawn from drug enforcement administration sources cited in Clayton (1995). The estimated number of plots seized in 1992 is derived from a report that 271.4 million plants were eradicated in 1992 and from 1993 the average of 6,097 plants per outdoor plot.

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Given this background information, subsequent sections examine strategies to reduce illicit cultivation.

Eradication

Techniques

The four known techniques of eradication are mechanical destruction (usually slashing or uprooting), burning, chemical, and biological (including genetic). In practice, mechanical and chemical eradication predominate (see ECOSOC 1989). A 1989 U.N. expert group stated that "The Group recognized that herbicides were commercially available for the effective control of illicit cannabis, coca and opium poppy, and that these had been proven to be environmentally safe and non-toxic to humans" (ECOSOC 1989:4). The three main herbicides are glyphosate (Roundup™), which has been applied to all three plants, tebuthiuron (Spike™) and hexazinone (Pronone 5G™) for coca bush, and eosine yellowish for cannabis plant (ECOSOC 1989; Rosenquist 1994).

Because environmentally safe eradication methods exist for each plant when the chemicals are used according to their guidelines (which has not always been the case), then the question arises as to why eradication has been attempted only in some areas, and why cultivation often continues anyway. These are issues relating to implementation.

Implementation

The economic interests of farmers mean there is often direct political opposition to eradication, sometimes manifested as protests and demonstrations. Some areas under illicit cultivation are not wholly under the writ of the state, which can make eradication difficult and risky. Detection is hindered by many factors similar to those of measurement. If located, the proximity of illicit cultivation to domestic dwellings can increase the hazards of chemical eradication, and incorrect usage of herbicides can lead to environmental damage. Hence Bolivia, Peru, and Thailand have banned chemical eradication, and the manufacturers of Tebuthiuron stopped sales that were intended for these purposes. However, manual eradication of the coca bush is difficult (see Riley 1996:112), and has previously been made more so by the disruptive tactics of some organizations of coca farmers.

Adaptive responses to different applications of eradication

Eradication has been applied either as one-time or "shock" eradication, or as periodic eradication applied at similar or different time intervals. The specific tactics and adaptive responses, for which Riley (1993) and Kennedy et al. (1993) have developed sophisticated models, play an important role in determining the impact of eradication.

One-time eradication does not necessarily reduce the amount of a drug extracted in direct proportion to the amount of crops eradicated. If 50% of crops are eradicated, the volume of drugs extracted from the remainder can be more than 50% of the previous level, if farmers adapt production and initial processing techniques, or if traffickers adapt manufacturing techniques. Both can adjust the proportion of labor used in order to squeeze out further drugs from a reduced hectareage. Because of its

covert nature, empirical evidence regarding such adjustments is largely anecdotal, but they will take place to the extent that they become economically viable.

The U.S.-sponsored Thailand Opium Yield Project suggested farmers gather at most 85% of the opium from each plant pod after three lancements (U.S. Department of Agriculture 1992:25-31). The smaller amounts gained from further lancements are normally not worth the extra effort or labor cost. Similarly, farmers do not bleed opium from many of the smaller pods, estimated at 20% of the total. If opium shortages due to eradication caused the price of opium to increase, it could become economically viable for farmers to extract more opium from each pod, and from smaller pods. A conservative estimate is that this could increase production by 15% to 20%. At the same time, heroin manufacturers will make efforts to maximize the extraction of morphine from opium. Supporting though not conclusive evidence might be drawn from comparing Thailand to Afghanistan where labor is cheap and mobile, and one survey found that opium pods are lanced five times on average (UNDCP n.d.a:47).¹

With respect to coca leaf, farmers employ more labor in times of shortage to pick a greater proportion of leaves from the bush. This includes smaller and less attractive leaves with lower alkaloid content. Processing is conducted more carefully and over a longer period to ensure the removal of greater amounts of alkaloids (Riley 1993:90). When leaf prices are low it has also been observed that farmers have an increased tendency to undertake first-stage processing to add value to the product prior to sale.

Periodic eradication produces a different adaptive response from producers. Latin America has seen both violent and non-violent protests, the camouflaging of crops against aerial observation through inter-cropping, and the removal of cultivation to more remote and protected areas. However, the main response to periodic eradication is anticipatory planting of larger areas of illicit crops. Such a response may lead to even larger areas of illicit cultivation.

In short, adaptive responses to eradication seem to have three effects. The short-term response is to reduce the impact upon the volume of drugs extracted, the second is to make eradication more difficult, and the third, owing to anticipatory new planting, is to cause diminishing returns to investment in repeated eradication efforts. This leaves eradication faced with a paradox that is supported by the empirical evidence below: without continual eradication there is little chance of reducing production, but continual eradication can lead to new planting of even greater areas.

Empirical Evidence Regarding Recent Efforts to Reduce Hectarage via Eradication

Throughout this paper the presentation of national-level efforts are grouped into those relating to opium poppy, coca bush, and then cannabis plant. Within crop-types, countries are reviewed in alphabetical order. It is worth noting that some of the major producer countries are missing from the discussion because eradication has not even been undertaken there.

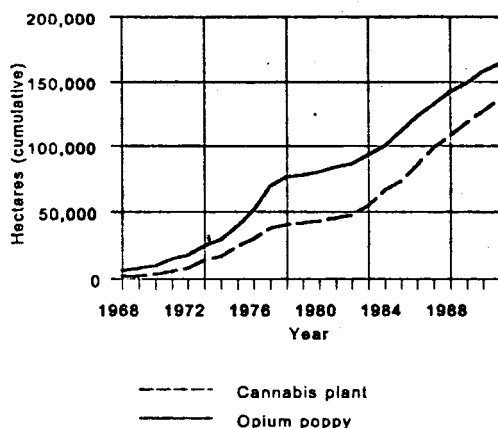
Opium poppy

In Colombia, extensive efforts beginning in late 1994 were estimated to have eradicated around 4,000 hectares of opium poppy cultivation by the end of 1995 (ECOSOC 1996: 9). The impact of these efforts is difficult to gauge because the

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U.S. Department of State conducted its first "scientific" estimates of poppy cultivation in Colombia in 1995 and revised its estimates down to 2,180 hectares (U.S. Department of State 1996:85). In the 1990s, Lebanon introduced extensive forced eradication of opium poppy, conducted primarily by the Syrian army, and hectareage fell from between 3,500 and 5,000 hectares prior to 1990 to minimal levels by 1994 (ECOSOC 1996:9). Both mechanical and chemical eradication of opium poppy and cannabis plant have long been conducted in Mexico, from which one result was that cultivation in previously exposed and large fields quickly switched to being remote and dispersed (Toro 1995). During the 1990s Mexico has again been a major source country, with farmers responding to eradication by new planting: two thirds of the almost 12,000 hectares of opium poppy were eradicated in 1993, but the hectareage of poppy had expanded by 1994 (U.S. Department of State 1995). The aggregate effect of these cat and mouse tactics is uncertain: Although eradication undoubtedly increases risks and costs, the proximity of the U.S. heroin market appears to have maintained profit margins and ensured continued opium production.

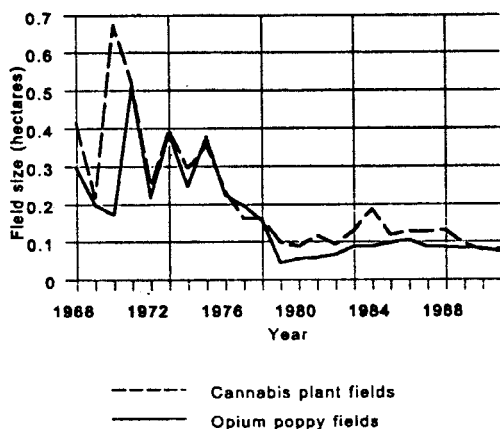
Figure 5
Hectares Eradicated (Cumulative) in Mexico, 1968-91



Source: Toro (1995).

Thailand undertakes annual eradication by manual techniques. This has maintained poppy cultivation at relatively low levels and the country is discussed more later in relation to socioeconomic development work. The country in which eradication has probably had greatest impact to date is Turkey, though Reuter (1985:90) denoted even this a "pyrrhic" victory. Turkey was a major licit opium producer by the early 1970s, but extensive diversion and illicit production led to an opium ban, with strict control of licit cultivation through a shift to poppy straw production. It is probable that part of the impact of the control measures may have been the threat to eradicate the poppy crop of a whole community if one of its members was found to be illicitly producing opium (ECOSOC 1996).

Figure 6
Decline in Average Field Sizes in Mexico, 1968-91



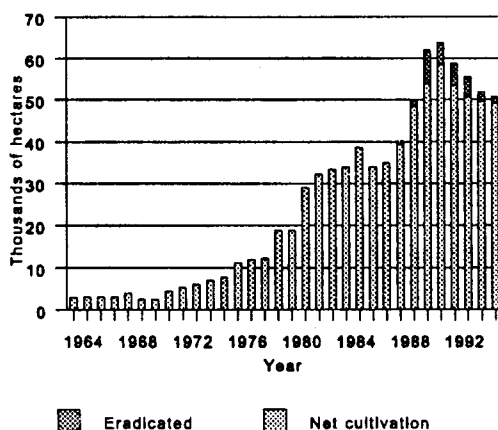
Source: Toro (1995).

Coca bush

After the banning of chemical eradication in Bolivia, mechanical or manual eradication has proven vulnerable to intimidation, violence, and disruption from coca farmers. In 1994, forced eradication efforts were halted when they met with violent resistance, and protests have included sit-ins, roadblocks, and public demonstrations, although eradication was reactivated in 1995. Estimates of coca bush cultivation and eradication in Bolivia are shown in figure 7. It is clear that the impact of eradication is minimal.

Voluntary eradication has been attempted in Bolivia in recent years. Farmers have been paid for each hectare of coca bush voluntarily submitted for eradication, which was reported by Reuters News Agency to be US\$2,500 per hectare by mid 1995. Coca cultivation undertaken prior to the enactment of Law 1008 in 1988 became eligible for voluntary eradication. However, there was no prior census of cultivation, and the coca bush after 2 or 3 years of growth is difficult to distinguish from older crops, which made the eligibility criteria of the law difficult to apply (Riley 1993). An unanticipated effect has been that some farmers voluntarily submit for eradication those crops that are old and of low yield, because it is more profitable to take the money and reinvest it in new coca bush. When payment has been received, the absence of a census of the crops means that new planting can be undertaken with relative impunity. The effect is that paid voluntary eradication can provide a minimum wage per hectare that farmers can earn if the profitability of coca leaf falls. Indeed, some increases in voluntary eradication have been noted when leaf prices fall (Henkel 1994:1), although there has been little impact upon overall cultivation. Hence "Some observers have concluded that U.S. eradication efforts in Bolivia are little more than a coca support program at U.S. taxpayers expense" (Falco 1996:126).

Figure 7
Coca Bush Cultivation and Eradication in Bolivia, 1963-94



Sources: Painter (1994) and U.S. Department of State (various years).

Note: Where an estimated range was given, a midpoint was used.

No pre-1987 eradication data were available.

In Colombia, eradication efforts beginning in late 1994 were reported to have destroyed approximately 25,500 hectares of coca bush by the end of 1995 (ECOSOC 1996:11). This would amount to half or more of that cultivated. However, coca cultivation rose from 44,700 hectares in 1994 to 50,900 in 1995 (U.S. Department of State 1996), suggesting extensive new planting has more than outweighed eradication.

In Peru, eradication during the 1980s destroyed less than 4,000 hectares per year, equivalent to approximately 5% of illicit cultivation. Morales (1990) suggested that "the real effect of the current drug policy is to increase coca production" (Morales 1990:630) via the adaptive responses discussed above. The Shining Path insurgent group provided protection for farmers, receiving payment in return. In the first half of the 1980s, some eradication workers were killed and farmers shifted to more remote and difficult terrain in the Upper Huallaga Valley, where mechanical eradication is difficult (Riley 1993). Peru has also used voluntary eradication along the lines described above in relation to Bolivia.

Cannabis plant

Lebanon has implemented eradication of cannabis plant in addition to opium poppy. From an estimated 9,000 hectares of cannabis plant cultivation prior to 1990, hectareage was estimated to have fallen to minimal levels in 1994 (ECOSOC 1996:11).

In Mexico, chemical eradication in the 1970s brought significant reductions in cannabis cultivation at least in the medium term (Reuter and Ronfeldt 1992: 19). As with opium poppy, eradication and new planting saw half of the 21,000 hectares eradicated in 1993 but an estimated 19,000 hectares were in cultivation in 1994 (U.S. Department of State 1995).

The United States undertakes extensive eradication of domestic cannabis plant cultivation. As noted, more than 53,000 outdoor plots were reported to have been eradicated in 1994. Similarly, indoor cultivation may have increased more rapidly than outdoor cultivation in recent years (fig. 4), which may reflect a trend in many developed countries, and is almost certainly more difficult to detect.

Global Impact Of Eradication Efforts

Perhaps the most compelling indictment of eradication efforts is when they are put into a global context. The estimated percentage of illicit cultivation eradicated in each country in 1993 and 1994 is shown in table 1, presented in the format used by Farrell and O'Brien (1995:116), but with more recent data. There was also a large drop in coca bush cultivation in Peru in 1992/93, not shown in table 1, that was primarily due to factors other than eradication; namely crop disease and migration of farmers caused by fighting between government and insurgent groups. Table 1 shows a figure of net change in illicit cultivation. From this figure it can be inferred that even in some instances where there is fairly extensive eradication, new planting of drug crops produces little or no overall reduction in hectareage. In 1994, an increase in hectareage took place at the same time as eradication of coca bush in Bolivia and Colombia and of opium poppy in Afghanistan and Pakistan, suggesting, as discussed earlier, that farmers may expand cultivation in anticipation of or reaction to eradication.

The estimated percentage of global illicit cultivation of opium poppy and coca bush that was eradicated between 1987 and 1994 is shown in figure 8, based on aggregations using the method in table 1. It was not possible to generate corresponding estimates for cannabis due to the methodological difficulties in estimation that were discussed earlier. Two aspects of figure 8 stand out: (1) the absolutely low average risk of eradication and (2) the consistency of this risk across years and crop type. The global average estimated percentage of eradication of opium poppy and coca bush was always less than 10 per cent between 1990 and 1994. The implication is that, at the global level, eradication has a consistently low impact and is often easily replaced by new planting either in the same or a different place.

Socioeconomic Development Strategies

Crop Substitution and its Limitations

Crop substitution involves giving farmers incentives to switch from illicit to licit crop cultivation. Achieving economic viability and competitiveness poses major difficulties for crop substitution. Some agronomically viable licit crops are not economically viable, while others are economically viable but not competitive with licit crops produced elsewhere or with illicit crops. A 1986 evaluation by the United States Agency for International Development (USAID) of global crop substitution programs concluded that

"the crop substitution strategy has been unsuccessful in introducing substitute crops and in controlling illicit cultivation, at least in the limited span of the typical development initiative. Viable substitute crops are difficult to identify given the generally unfavorable climatic conditions and poorly developed infrastructures that characterize most remote poppy- and

coca-growing areas. In many instances, there are not alternative crops that can be grown profitably" (Kumar et al. 1986 cited in Lee and Clawson 1993:7).

Table 1
Estimated Eradication of Illicit Cultivation in Major Producer Countries, 1993 and 1994, and Net Impact After New Cultivation

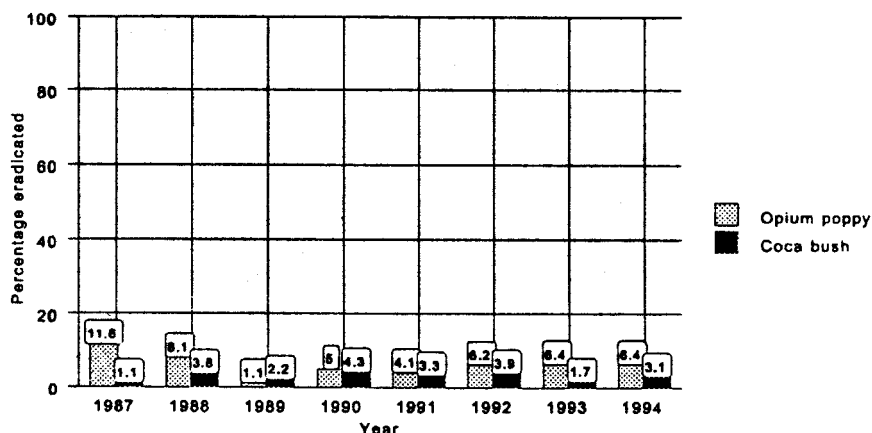
Country and totals	1993 % (risk of eradication)	% eradicated (risk of eradication)	1994 Change in net area of cultivation (impact)	Percentage of global net cultivation
A. <u>Coca bush</u>				
Bolivia	4.84	2.15	+ 1.91	23.85
Columbia	1.96	9.84	+13.35	22.31
Peru	<u>0.00</u>	<u>0.00</u>	<u>-0.18</u>	<u>53.84</u>
Global Coca bush	1.61	2.87	+ 3.07	100.00
B. <u>Opium poppy</u>				
Afghanistan	0.00	0.00	+38.43	12.32
India	0.00	0.00	+25.00	2.32
Pakistan	<u>12.00</u>	<u>5.99</u>	<u>+15.76</u>	<u>3.07</u>
Sub-total	2.62	1.09	+32.08	17.71
China	..	0.00	-	0.83
Lao People's Dem.	0.00	0.00	-28.88	7.82
Myanmar	0.36	2.23	-11.58	61.87
Thailand	<u>0.00</u>	<u>0.00</u>	<u>-26.74</u>	<u>0.89</u>
Sub-total	0.31	1.94	-13.11	71.41
Columbia	32.93	18.95	0.00	8.44
Mexico	<u>66.38</u>	<u>53.32</u>	<u>+46.34</u>	<u>2.45</u>
Sub-total	42.11	30.45	+ 7.66	10.89
Global opium	7.21	5.99	- 5.39	100.00
C. <u>Cannabis plant</u>				
Morocco	67.7
South Africa	19.9
Columbia	1.01	0.28	- 1.0	2.0
Jamaica	38.0	69.2	-16.6	0.1
Mexico	47.1	44.6	-10.1	4.2
United States	<u>..</u>	<u>..</u>	<u>..</u>	<u>4.1</u>
Global Cannabis	4.0	3.5	-0.4.5	100.0

Sources: Estimates based on U.S. Department of State (1995), with Morocco and South Africa figures from ECOSOC (1996).

Notes: Rounding may create small discrepancies in table totals. Two dots (..) indicate that data are not available. A hyphen (-) indicates that data are not applicable. Global eradication estimates include all estimates of cultivation even if eradication data not available.

Many agronomically viable crops have now been identified, but the necessary years of research limited initial crop substitution efforts. After identification of the crops, the main constraints have been found to be the lack of means of transport of products to markets and the costs and difficulties of marketing. Efforts to overcome those constraints are discussed later. There remain, however, two further major factors: the inherently attractive qualities, in agronomic, processing and marketing terms, of some of the illicit crops; and, more importantly, the consistently higher prices paid for illicit crops by traffickers.

Figure 8
Estimated Percentage of Global Illicit Cultivation Eradicated, 1987-94



Source: Estimates based on U.S. Department of State (various years).

Unlike most crops, coca bush will grow on steeply sloping land, in soil of low fertility, and at high altitude (Rosenquist 1994). It produces a leaf that is of lower weight per hectare than most crops, which, although it needs to reach the market within 3 days, can be relatively easily transported if traffickers do not come to the farm to collect it. Although coca bush does not reach full production until the second year, there is partial production in the first. Moreover, because it is perennial and typically produces for 12 to 15 years, its slow process of natural decline is not conducive to substitution of licit alternative crops in the short run (Clawson 1994:4). Harvested several times per year, it requires relatively little tending and provides a steady flow of income. Cannabis plant thrives in a wide variety of conditions and requires little nurturing, and although opium poppy does require regular attention for weeding, the opium product is of low weight and perishability.

The main reason why licit crops lack economic competitiveness is that middlemen and traffickers can often maintain the price of illicit crops above those of licit crops. Tables 2 and 3 show net farm income from opium poppy and coca bush farming, compared to agronomically feasible alternative crops, in, respectively, Pakistan in 1992 and Bolivia in 1990. Although prices and incomes vary across time and space, the implications of the tables are likely to remain the same. Reviews of previous studies suggest that the differentials between licit and illicit crop prices were previously much larger than those shown in the tables (see for example Whyne 1991; Painter 1994 in relation to Latin America). Essential oils and saffron, not listed, can compete with opium poppy on a per hectare basis, but the markets will not sustain large increases in supply. Table 3 also shows years until full production, because although macadamia nuts and rubber are more profitable than coca bush when fully productive, they need 9 and 15 years, respectively, until full production is reached (though rubber plants that mature within about 5 years have been identified and used in some areas). Investment in such crops requires a loss of

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current earnings and a risky long-term investment, the profitability of which is dependent upon the vagaries of markets that will not sustain increases in supply without producing a fall in price and profitability.

Table 2
Net Farm Income (per Hectare) from Opium Poppy and Alternative Crops in Pakistan, 1992

Crop	Net Income per Hectare (U.S. Dollars)	As Percentage of Income from Poppy
Opium poppy	1,689	100.0
Onion	1,272	75.3
Mint	1,178	69.8
Brassica	913	54.1
Corn	279	16.5
Barley	256	15.1
Wheat	222	13.1
Lentils	219	12.9

Source: UNDCP (1994) and Buddenburg (1996).

Note: Figures include production costs (seeds, fertilizers, pesticides, hired labor and family labor, irrigation, etc.).

The reason why traffickers can maintain the price of illicit crops above that of licit crops in most instances is that the price of the raw material crops is a small fraction of the profits to be made from the manufacture, trafficking, and sale of illicit drugs, as reflected in figures 9 and 10 for heroin and cocaine trafficking to Europe and the United States, respectively. Because only a small proportion of the final retail price returns to farmers, where necessary traffickers can significantly increase the price they pay for crops to maintain or increase the supply in a time of shortage (as per the risks and prices model of Reuter and Kleiman 1986:293).

Economic Growth and Illicit Cultivation

Some definitions of drug policy, or even alternative development, have included aspects of general economic growth, or proposed that comprehensive economic growth in producer countries is an alternative strategy to reduce the supply of illicit drugs. It is necessary to distinguish general economic growth from what is described below as alternative development.

Sustainable economic growth in developing countries is an aim of national and international economic and social policies, irrespective of the goals of drug policy (see e.g., UNDP 1995). However, the notion that the level of economic development of a country is the principal or root cause of illicit cultivation and of the extraction

and production of drugs is at best overstated, and at worst simplistic. The reasons for this are relatively obvious: there are many developing countries where illicit cultivation does not occur, there are developed countries where extensive illicit cultivation occurs, and the illicit production of many synthetic drugs has increased in many developed as opposed to developing countries. In addition, although economic growth may indirectly benefit health, education, and other areas of social policy, including drug policy, it can also facilitate different aspects of illicit drug trafficking (see for example Keh and Farrell 1997).

Table 3
Net Farm Income (per Hectare) from Coca and Alternative Crops in Bolivia (1990) and Years Required before Commercial and Full Production

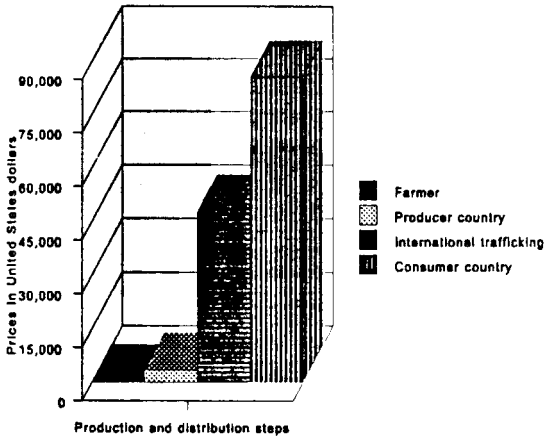
Crop	Net Income per Hectare (U.S. Dollars)	As Percentage of Income from Coca	Years Before Commercial Production	Years Before Full Production
Coca	1,940	100.0	1	2 to 3
Macadamia nuts	3,640	187.6	7	9 to 10
Rubber	2,104	108.5	10	15
Pineapple	1,679	86.5	1	2
Black pepper	1,217	62.7	4	5
Oranges	1,156	59.6	4	7
Hearts of palm	1,071	55.2	4	5
Coffee	907	46.8	4	6
Cacao	588	30.3	4	8
Annatto	412	21.1	3	5
Bananas	157	8.1	2	2
Corn	146	7.5	1	1

Sources: UNDCP and USAID, cited in Painter (1994).

Note: Figures include production costs (seeds, fertilizers, pesticides, hired labor and family labor, irrigation, etc.).

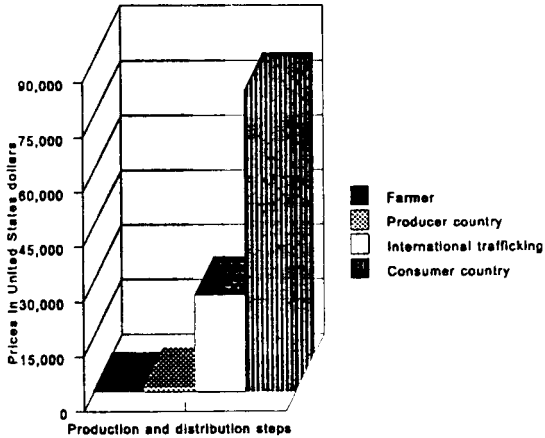
There appear to be two mechanisms whereby economic growth could promote drug control. The first would occur if state control over previously isolated areas of cultivation is increased by improved road and communications infrastructure. This could facilitate law enforcement and eradication. The second would be the possibility that economic growth creates competitive economic opportunities that restrain others from taking up illicit cultivation or induce migration of labor and farmers away from areas of illicit cultivation. If the relinquished hectareage and the possible gap in the illicit market are not offset by the activities of other farmers, then a reduction in illicit hectareage is the result.

Figure 9
Generation of “Value Added” of Heroin in Distribution Network Toward Europe, 1992



Source: ECOSOC (1995a:12).

Figure 10
Generation of “Value Added” of Cocaine in Distribution Network Toward the United States, 1992



Source: ECOSOC (1996:15).

From a drug-control perspective, the diversionary aspect of general economic growth is subject to the constraints of economic competitiveness described for crop substitution, constraints that are determined by the higher and more flexible prices of illicit crops and the subsequent higher income that can be earned. Moreover, in negotiating arrangements for reducing illicit cultivation, general economic assistance carries less weight than targeted alternative development assistance. Although there is evidence that economic depression in the licit sector may cause workers to migrate

to illicit cultivation, as in Bolivia during the 1980s, it is not incontrovertibly proven that the reverse is true once illicit cultivation is established. In the Andean region, the workers who are tempted to migrate back to licit economic activity would more likely be the migrant subsidiary workers of the coca trade, leaf pickers and stompers, instead of farmers who had become accustomed to more regular and higher income, and had made some investment in the area. Consequently, economic growth would be expected to have only a marginal indirect impact upon the area of illicit cultivation. Once farmers are established in coca bush cultivation, the long-term effect of substantial migration to urban areas might be primarily to increase the marginal cost of seasonal migrant labor in the production process.

The Human Development Index

Efforts to reduce illicit cultivation that are based on the amelioration of socioeconomic conditions are predicated upon an assumption of an inverse relationship between the level of socioeconomic development and illicit cultivation. Some empirical examination of this relationship is possible at the national level. The human development index (HDI) gives a crude cross-national comparative indicator of development (UNDP 1995). Of the major countries of illicit cultivation, Colombia, Mexico, Thailand, and the United States are rated at a high level of human development; countries of the CIS in central Asia are rated at either a high or a medium level of human development; Bolivia, China, Jamaica, Lebanon, Morocco, Peru, South Africa, and Vietnam are rated at a medium level of human development; and Afghanistan, India, Lao People's Democratic Republic (Laos), Myanmar and Pakistan are rated at a low level of human development. Because the HDI is a composite indicator that cannot reflect variations in the levels of development within a country, the area approach to alternative development is discussed in the next section. However, national indicators present an important starting point for analysis. Within-country variations in development will vary around the national averages to different extents, but this can only be determined with data at a lower level of geographical aggregation. The analysis presented below was first developed in ECOSOC (1996:16), and Mansfield and Sage (n.d.) note that there may be a relationship between illicit cultivation and the HDI indicators.

Table 4 shows estimated areas of cultivation by country, the HDI, HDI rankings, and gross domestic product. Table 5 shows the Pearson correlation coefficients from bivariate correlations. If countries without significant areas of cultivation were factored in (that is, the rest of the world), then the relationships could only become weaker, because only slightly over 10% of the 174 countries in the Human Development Report are here classified as having illicit cultivation. When the United States is excluded because it is a significant outlier, there is scarcely any change in the results. Again, it is important to note the limitations of the data: large areas of illicit cultivation of cannabis plant in Asia and Africa, and both indoor and outdoor cultivation of cannabis plant in many developed countries, could affect the results, but the analysis by crop type that looks at coca bush and opium poppy individually, largely assuage the impact of these measurement problems.

This analysis suggests that, at the national level, there is no significant correlation between the HDI index, HDI rankings or gross domestic product, on the one hand, and the total or crop-specific area of illicit cultivation, on the other. This is true even

when only countries with significant areas of illicit cultivation are considered. While this does not preclude the possibility of correlation between socioeconomic indicators and illicit cultivation when smaller geographical units or different socioeconomic indicators are analysed, it may shed a little light on the simplistic assumptions that are sometimes made regarding the causes of illicit cultivation.

Table 4
Illicit Cultivation and Indicators of Development

Country and totals	1994 Estimated area of illicit cultivation (000's hectares)	Human Development Index (HDI)	1992 HDI Ranking	Gross Domestic Product
A. Opium poppy				
Afghanistan	71.5	.228	170	819
India	5.5	.439	134	1230
Pakistan	7.3	.483	128	2890
China	2	.594	111	1950
Lao People's Dem.	18.5	.420	138	1760
Myanmar	146.6	.457	132	751
Thailand	2.1	.827	58	7790
Viet Nam	14.3	.539	120	1010
Colombia	20	.836	57	5480
Mexico	5.8	.842	53	7300
B. Coca bush				
Bolivia	48	.588	113	2410
Colombia	45	.836	57	5480
Peru	108	.709	93	3300
C. Cannabis plant				
Central Asian Republics	170	.798	64	4270
Morocco	50	.554	117	3370
South Africa	170	.705	95	3799
Colombia	5	.836	57	5480
Jamaica	1	.721	88	3200
Mexico	19	.842	53	7300
United States	12.4	.937	2	23760

Sources: Human Development Report 1995; U.S. Department of State (1995); ECOSOC (1996); Afghanistan estimate from UNDCP (1994a). Cannabis plant estimates were included where available, though there are areas in Africa and Asia of unknown extent, and significant outdoor cultivation (and increasing indoor cultivation) in Europe and other developed countries. The U.S. cannabis estimate (an under-estimate, conservative for these purposes) based on midpoint of government production estimate of 6-7,000 tonnes, and yield estimate of Mexico of 1.9 tonnes per hectare in 1994. Human development indicators for Kazakhstan were used for Central Asian Republics.

It is recognized that the present analysis leaves open-ended the question of the extent of the causal influence of socioeconomic factors upon illicit cultivation. It primarily shows that the relationship is neither simple nor clear-cut. It should also be acknowledged that the present review does not overcome all inconsistencies. In particular, much of the present analysis of socioeconomic development work draws the conclusion that licit economic activities have difficulties competing with illicit cultivation.

Table 5
Pearson (and Spearman) Correlation Coefficients, Hectarage of Illicit Cultivation by Socioeconomic Development Indicators

	Human Development Index	Human Development Index Rank	GDP
Opium poppy	-.1039 (-.2448)	-.8076 (.2448)	-.2526 (-.4126)
Coca bush	-.0572 (-.5000)	.2053 (.5000)	-.2775 (-.5000)
Cannabis plant	-.5486 (-.4286)	.5318 (.4286)	-.3027 (.0857)
Total hectarage, all illicit crops	-.0590 (-.1393)	.0689 (.1393)	-.1873 (-.1682)
Results excluding the United States (significant outlier)			
Cannabis plant	-.5216 (-.5000)	-.5806 (.5000)	-.3244 (.2000)
Total hectarage,all illicit crops	-.0019 (-.1225)	-.0181 (.1225)	-.1426 (-.1495)

Note: One-tailed correlation coefficients because inverse relationship expected. Significance levels not included; no significant results found at the 5% level.

Alternative Development

The work described below relates predominantly to over 2 decades of U.N. efforts to reduce illicit drug crops through a variety of development-related techniques. Although this excludes, for the most part, similar work undertaken by individual governments and other international development agencies such as the U.S. Agency for International Development (USAID), it is believed that a global empirical evaluation of projects of this nature has not previously been undertaken. Programs and projects are reviewed by crop-type and alphabetically by country. It would be possible to say that the review of all U.N. projects is not generalizable to those of other agencies, but this would probably be overly critical; they are almost certainly characterized by their similarities rather than their differences. Even if this were not the case, there is ample reason for reviewing the U.N. projects as a whole. Much of the description of the methodology of alternative development is based upon interviews and extensive discussions with experts from the United Nations, whereas specific project details and figures are taken from project reports and evaluations; internal reports that are not cited here but that would be traceable through the project numbers given and details that were published in ECOSOC (1996). There is variation in the depth of coverage of projects, which is dependent upon the extent of information available.

Technique

In different manifestations, alternative development has been termed integrated rural development, area development and highland development. A more comprehensive history of the transition from one methodology to the next is contained in UNDCP (1993), an unpublished document that is widely known and influential in the field. Reflecting both context and the fact that different agencies emphasize different aspects (see e.g., CICAD 1993; Lyon 1993; UNDCP 1993; USAID 1993; BMZ 1992, 1995; ECOSOC 1996), the methodology outlined here has obviously varied greatly in its application.

Alternative development in the 1990s operates through an interplay of incentives and disincentives. This primarily takes the form of the conditional exchange of development assistance incentives for reductions in illicit cultivation, with the application of law enforcement where appropriate. Development assistance takes three main forms: infrastructure development, provision of alternative agricultural sources of income, and provision of alternative non-agricultural sources of income. The latter two are intended to provide a reasonable alternative income because experience has demonstrated that economic competitiveness with illicit crops cannot be the sole aim of alternative development. The alternative development approach incorporates a flexibility designed to suit local needs and circumstances, includes feasibility studies and research, and is a lengthy and gradual process.

In the negotiation process, projects are envisaged as giving a community the opportunity to prioritize certain amenities. This gives initial development work a "spearhead" or quick reward function intended to gain local confidence. As part of the contract with the development agency, the community undertakes to reduce or eradicate illicit cultivation, as a phased process in line with progress in infrastructural development and the provision of alternative sources of income.

Conditionality is the term applied to the provision of development assistance that is conditional to reductions in illicit cultivation. The existence or level of conditionality and law enforcement varies according to circumstances and the balance of power in the negotiation process, with wide variation in viewpoints regarding the optimal mix (see e.g., Durana 1994 compared to Lyon 1993).

Infrastructural development can cover a range of possibilities, including the provision of drinking-water, electricity, hospitals, and schools, all of which carry weight in the negotiation process. Economic infrastructural development includes road building to provide market access, irrigation, provision of livestock and fish and training in their farming methods, and building crop storage, processing, and agro-industrial facilities. Technical assistance to licit economic activities includes cooperation in agricultural research and training, provision of fertilizer and seed for licit crops, and assistance in the development of transport and in marketing research and operations. The provision of credit facilities for farmers is intended to reduce economic dependence on illicit cultivation during the period of transition to licit economic activity.

As development work is completed, it is intended that local communities are obliged to keep their side of the bargain and phase out illicit cultivation in line with the agreed timetable. A further inducement to ensure that the timetable is adhered to can be the use of law enforcement, perhaps implemented in consultation with

community leaders. Such a step can be less punitive during the period of transition, and would be well publicized to achieve the maximum deterrent effect.

With growing recognition of the phenomenon of displacement of illicit cultivation, recent efforts have tried to integrate a national, or even regional level component. In 1995, for example, the Colombian government published its National Alternative Development Plan (Colombia 1995). However, although such plans have a greater geographical coverage than most previous projects, they do not appear to have an explicit formulation of a mechanism by which they would reduce displacement of illicit cultivation within a country or region.

The ideal indicator of performance of an alternative development project is the net social benefit, per unit of expenditure, of a reduction in consumption and related costs due to a decrease in illicit supply (ECOSOC 1996:17). More realistically, projects can measure the cost per hectare of reductions, and attempt to measure displacement of illicit cultivation to other areas if it occurs. Ideally, a range of intermediary indicators are used, including rural development indicators such as the net production value of economic activity in an area, which can indicate the existence of a reasonable alternative income. However, there does not yet exist a definitive or commonly accepted set of performance indicators for rural development (see Coleman 1987; Kumar 1994; International Fund for Agricultural Development 1992; United Nations Administrative Committee on Coordination [UNACC] 1995).

Risks

Alternative development is not without substantial risks. Improving irrigation can end up being counterproductive if it is used to improve illicit cultivation. Roads may make it easier to transport illicit as well as licit crops, and there are recorded instances of roads being used as landing strips by traffickers. In 1986, road construction by USAID in the Chapare region of Bolivia was stopped for those reasons, although it was resumed in 1988 (Painter 1994: 110). Roads do not necessarily make crops marketable, and transport costs can still be restrictively high. It has been estimated that transport costs from the Upper Huallaga Valley of Peru can amount to 60% of the money to be made from the sale of the crops, and as much as 80% to 85% for crops being transported to Cochabamba from the Chapare region (UNDCP and USAID sources cited in Lee and Clawson 1993: 56). There are reports that normal market rates for the transport of crops to La Paz from the Chapare region are almost equal to the money that would be made from the sale of the crops. When crops are transported to national centers, gaining entry into international markets, which are usually difficult to penetrate and highly competitive, is not guaranteed. Recent market feasibility studies for Andean products are discussed later in the report.

The lack of state or governmental control of areas in which illicit cultivation takes place has lead some to question the viability of even attempting alternative development in these areas. As of 1995, the German government's official position was that "development cooperation generally—and hence Alternative Development—is not feasible in regions with no scope for state control or influence (e.g., Areas controlled by the warlords in Afghanistan)" (BMZ 1995:8). As will be seen in the review of projects, this is a major risk factor influencing both implementation and sustainability.

One of the principal limitations of alternative development has been termed *reverse conditionality*. To communities that do not undertake illicit cultivation, the possibility of gaining development assistance can make illicit cultivation appear attractive. Hence, there is a threat of an expansion of illicit cultivation. The policy response to such a threat in the 1980s was alternative development at the area level, so as to include potential as well as actual areas of illicit cultivation. However, this increases costs in proportion to coverage, and, paradoxically, leads to a decline in the bargaining power of development assistance in areas of illicit cultivation. In such circumstances, the distinction between drug policy and development policy has become blurred both conceptually and in practice.

The program approach to alternative development (a program consists of several related projects) was designed to reduce illicit cultivation within designated areas. Such an approach, however, makes alternative development likely to promote the displacement of illicit cultivation to other areas, almost certainly more so than in the case of eradication, because of the lengthy and gradual nature of development work. Traffickers have ample time to seek and nurture other sources of illicit crops.

Although economic competitiveness with illicit crops is not an aim of alternative development, the fact that illicit crops can be a larger source of income than licit economic activities remains a major problem. In most circumstances, licit crops are economically less attractive than illicit crops. There are sometimes overt efforts to maintain the existing state of affairs, including protests against development and sabotage of infrastructure and licit crops. Traffickers have been known to give credit to farmers to ensure that they continue illicit cultivation, an incentive which, on occasion, has been enhanced by the threat, or actual use, of violence. The small fraction of profits that returns to farmers (figures 9 and 10), combined with the pulling power of established consumer markets, serves to maintain the economic attraction of illicit cultivation.

Implementation

Alternative development work requires exceptionally skilled multidisciplinary staffing, which is a scarce resource. An inexhaustive list of required areas of expertise would include: agriculture, geography, geology, administration and personnel, finance, communications, linguistics, a thorough knowledge of local culture and politics, economics, engineering, law enforcement, negotiation skills, training expertise, a knowledge of credit systems, quantitative monitoring, evaluation skills, report preparation, and project management. In short, these are difficult to acquire in the small teams of people who implement a project. Even where the resources are present, the scale and logistics of the work can lead to coordination problems within projects. Experimentation with alternative crops may require several years within each area. Although it is necessary to have the backing of the local community and of the government at all levels, this support may be difficult to mobilize. The financing of projects within the necessary multi-stage bureaucracy may proceed slowly, and equipment may be difficult to procure.

Even rural development outside of areas of drug crop cultivation is extremely difficult. The Subcommittee on Rural Development of the United Nations Administrative Committee on Coordination (UNACC) noted in 1995 that the criteria for the implementation, monitoring, and evaluation of rural development are not clear-cut

and are sometimes revised in response to changing needs (UNACC 1995). The sixth Meeting of the Working Group on Industrial Contribution to Rural Development, reviewing replies from 12 rural development agencies to a fact-finding questionnaire, noted in its report that the apparent failure and subsequent abandonment of integrated rural development approaches in the past had been a result of technical, administrative, and programming errors rather than flaws (UNACC 1995:14, para 35). One of the enduring problems of rural development was noted to be its sometimes damaging environmental impact and the lack of genuine commitment of some governments to the overall goal of rural development (UNACC 1995:28, para. 78). The crux of the issue here is that the implementation of alternative development requires all of the elements necessary for rural development, but is undertaken in circumstances that are considerably more difficult. Furthermore, alternative development work is conducted with the additional consideration that the work is an indirect means of achieving a reduction in illicit cultivation.

Recent Efforts to Reduce Hectarage via Development-related Efforts

Alternative development has been or is currently the subject of programs or projects in most of the major areas of illicit cultivation of opium poppy or coca bush cultivation. International efforts to reduce opium poppy began in Asia in the early 1970s, and to reduce coca bush in Latin America in the 1980s, and so some of the projects discussed below were conducted under the banner of crop substitution or integrated rural development. Although information regarding national and bilateral efforts is presented where available, the emphasis is upon U.N. projects and programs for which information was available up to mid-1995.

Each U.N. project has a unique identification number for administrative purposes. In what follows these are given in parenthesis to enable cross-referencing with other publicly available documents (see e.g., United Nations ECOSOC 1973, 1995b).

Opium poppy

In Afghanistan, the one UNDCP alternative development project was not successful in achieving its drug-control objectives, despite project expenditures of approximately 8.5 million United States dollars (US\$) by mid-1995 (project AD/AFG/89/580). Disruption caused by factional fighting in project areas impeded operations and led to the postponement or transfer of programs, while logistical difficulties due to the remoteness of project areas required days of travel by foot or pack animal. The lack of effective central government created obstacles to implementation. When the project area was reached the identification of suitable resources in rural communities slowed down activities. By April 1995, levels of opium poppy cultivation had increased. The estimated reduction in opium poppy cultivation between 1994 and 1995 was independent of alternative development efforts.

In the Lao People's Democratic Republic (Laos), U.N. highland alternative development projects began in 1989 in an area with an estimated 390 hectares of opium poppy cultivation and 3.5 tons of opium production, slightly more than 1% of the estimated total for the country as a whole (project AD/LAO/89/550). A road connection was constructed, and the production, storage, and processing of rice, coffee, fruit, and vegetables developed, along with livestock and fisheries. There was

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an approximately 60% reduction in estimated opium poppy hectareage across the whole of the country during the period concerned, a large part of which was attributable to poor weather rather than eradication or other policy measures (National Narcotics Intelligence Consumers Committee [NNICC] 1995:39). In Laos, opium poppy cultivation was not prohibited at the time of writing, and so it can be inferred that the reduction was not caused by eradication. Within the project area, by 1994, after expenditures of \$6 million, estimated hectareage had fallen by 80% and estimated production by more than 90% to 300 kilograms. The conservative conclusion is that, taking into account the general reductions, up to 20% of the reduction in the project area might be attributed to the alternative development work. If this was the case, then by 1994, the estimated cost per hectare of reductions was approximately \$92,307.

The UNDCP program of projects in the Xieng Khouang Highland area of Laos began in 1991 (projects AD/LAO/91/551-553). The 1995 evaluation by UNDCP, the International Food and Agriculture Organization (IFAD), and representatives from the German and Laotian governments concluded that the projects had not achieved any drug-control objectives, after project expenditures of \$6 million. The evaluation noted that the work was plagued by delays, indecision and disagreement, a long supply line to the area, an unrealistic time-frame, and unrealistic assumptions about the administrative capacity of central and provincial governments to ensure support of the project. There were problems recruiting project staff, in procuring equipment, managing counterpart funding, program activities, and the disbursement of IFAD loan funds. The multi-agency approach was noted as a source of project failure, with the evaluation noting "The drug control objectives were appropriate by themselves, but it was never realistic to expect that the program, as designed, would ever be able to attain a suitable partnership with the very much wider objectives of the IFAD programme." The IFAD program had wanted to concentrate activities in the non-poppy growing lowlands rather than the poppy growing areas because potential cost-effectiveness of technical assistance was higher due to population density and better accessibility. It was concluded that the long-term aims of IFAD, as province-wide agricultural development, and the narrower UNDCP aims of progressive elimination of opium poppy cultivation, were not mutually compatible, and a significant proportion of UNDCP funds were diverted away from opium poppy reduction activities.

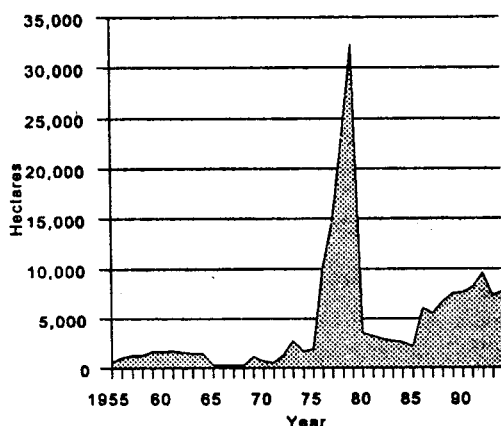
In Mexico, the U.N. program of alternative development ran from 1989 to 1992. It was designed to promote licit economic activities and worker cooperatives through seminars, training, and technical assistance as well as infrastructure development (projects MEX/89/590, 591, 592). At the conclusion of the project, illicit cultivation had increased after expenditures of \$15 million in the areas of Oaxaca, Guerrero and Michoacan.

In Pakistan, the Buner project in the Swat district of the North-West Frontier Province has been cited as a model (see UNFAO 1985, UNFDAC 1986; UNDCP 1993) (projects AD/PAK/76/362, PAK/81/362, PAK/87/362). Research and feasibility studies began in the early 1970s, with preliminary socioeconomic reports and pilot surveys providing good baseline data by 1974-75 (Pakistan Narcotics Control Board [PNCB] 1974, 1975). Prior to 1976, Buner accounted for approximately a third of the opium produced in Pakistan. In the project area, opium poppy cultivation of 2,878 hectares in 1975-76 rose to 4,025 hectares in 1978-79, but had

fallen to 0 by 1983 (FAO 1985; UNDCP 1993). For many years this was taken as an indication of success of crop substitution work in the range of documents cited above. However, the evaluations were for the most part incorrect in the attribution of "success" to the project activities (a Type I evaluation error). This is important because of the flagship role this project played in securing the continuation of socioeconomic development projects of this sort. However the author does not intend this as a criticism of either the project staff or evaluators because the nationwide information used below was not necessarily available at the time, and criticism with hindsight is always easy.

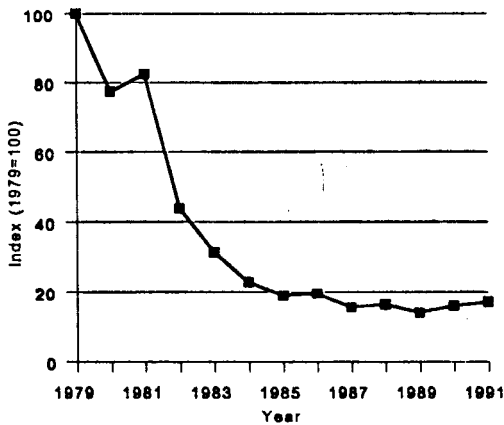
During the time of the Buner project opium poppy hectareage fell massively throughout the whole of Pakistan. It is almost certainly factors accounting for this change, rather than those specific to the socioeconomic development project, that led to the decline in opium poppy cultivation in Buner. Estimated opium poppy cultivation in Pakistan from 1955 to 1994 is shown as figure 11. The enforcement of a nationwide opium ban in 1979 (see Buddenberg 1996 for a history of drug policy in Pakistan), combined with a sharp fall in opium prices due to increased competition from Afghanistan (fig. 12), greatly reduced poppy cultivation across the whole country. By 1981-82, opium poppy cultivation had dropped to 20% of its previous levels in the Buner subdistrict, and to 10% of its previous levels in the remainder of Pakistan. Figure 13 shows this data as indexed trends after 1979. Despite the general reductions, those in Buner do seem more significant so that, although it is difficult to establish a clear causal connection between the policies and the results achieved, it is arguable that alternative development work in Buner accounted for up to 20% of the reductions in the area. The project cost \$11.36 million in 1995 prices, which would be equivalent to a minimum cost of \$12,202 per hectare of reductions.

Figure 11
Opium Poppy Cultivation in Pakistan, 1955-94



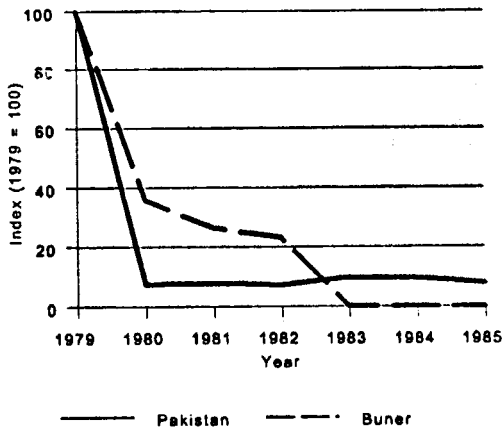
Source: Government of Pakistan, UNDCP, and the International Narcotics Control Board cited in UNDCP (1994) and Buddenberg (1996).

Figure 12
Trends in Opium Farm-gate Prices in Pakistan, 1979-91 (Inflation Adjusted)



Source: Pakistan Narcotics Control Board cited in Kahn (1991).

Figure 13
Drop in Illicit Opium Cultivation in the Buner Subdistrict and Other Areas of Pakistan, 1979-85



Source: Government of Pakistan, UNDCP, and the International Narcotics Control Board.

U.N. alternative development efforts in the Dir district of Pakistan began in 1985 and are planned to continue to the end of 1999 (projects AD/PAK/85/374-375, AD/PAK/94/820-840). The 1993 evaluation concluded that, as a result of the U.N. project and the phased enforcement measures, the areas concerned were virtually free of opium poppy. However, the evaluation noted that displacement to neighbouring

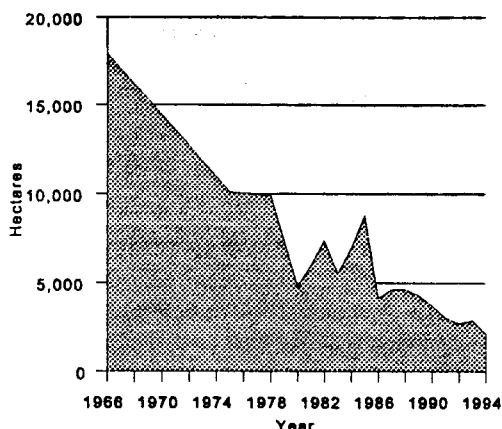
areas was extensive. Its extent can be estimated. Opium poppy cultivation in neighbouring areas rose from 296 hectares in 1984 to more than 4,900 hectares in 1993. At the national level, opium poppy cultivation increased from 2,690 hectares in 1984 to 8,170 by 1993. Hence the increase in neighbouring areas was 5 times greater than the threefold national average increase, suggesting that displacement was extensive. Project expenditure by the end of 1994 was approximately \$23.5 million.

Thailand has experienced significant reductions in opium poppy cultivation, which are maintained through annual eradication efforts. Extensive documentation of Thailand and opium poppy policy exist elsewhere (e.g., Rerkasem et al. 1989; Moreland et al. 1993; Lee 1994). From an estimated level of 18,000 hectares in 1965, opium poppy cultivation had fallen to 2,110 hectares by 1994, a reduction of 88% (fig. 14). Such a change is believed to have been due to a range of factors, in particular the following: a firm commitment by the government of Thailand to increasing state control over highland areas; positive long-term trends in the growth of the Thai economy, which has performed better than neighbouring economies; and reduced profitability of opium due to competition from rapidly expanding cultivation in Myanmar, which more than filled the gap in the market left by the reductions in Thailand. Such a convergence of elements seems to have made the highland areas ripe for the implementation of development work, although the bulk of U.N. alternative development assistance was not provided until the 1980s, by which time a large part of the reductions had already occurred. One independent 1993 estimate of the total cost of combined alternative development efforts was \$125 million (Lee 1994), which, taking the 1965 hectareage as the base, would give an estimated cost of \$7,812 per hectare of reductions. It is possible that this could misleadingly attribute causality to the alternative development work rather than increased competition from rapidly expanding opium production in neighbouring Myanmar. It seems logical that if prices fell due to competition from Myanmar, and if Thailand had either more law enforcement than Myanmar or a similar market disadvantage such as more costly transport or labor costs, then there would be a market-driven reduction in Thai opium poppy cultivation. Without more consistent time-series data on production and prices for both countries it is probable that the proportion of the reductions attributable to the different factors will remain unknown, but it is also probable that reductions are attributable to the convergence of all the factors rather than to a single one.

In Myanmar (Burma), surveys by the United Nations in 1964 and 1967 suggested 30,000 and 36,382 hectares of opium poppy cultivation, respectively (cited in Renard 1996:105). Estimates by the U.S. Department of State were 146,600 hectares by 1994, though the reliability of these estimates has been questioned and the official government estimate for 1994 was 93,000 hectares (UNDCP 1996:27). Renard suggests there is a strong argument that U.S. estimates are exaggerated (Renard 1996: 92). United Nations alternative development work began in 1992 in the Tachilek township in the Eastern Shan State, as a 3-year UNDCP project costing \$2.3 million. It was scaled down in 1994 because of fighting between Khun Sa's insurgent forces and those of the government (project AD/RAS/92/721). Road-building was deferred and although some agricultural work was started, villages in the project area were ransacked during the fighting, there were problems of staffing the project, and communication networks were poor and unreliable. Subsequently,

a 1-year pilot project involving preparatory assistance for alternative development was begun in the area under the control of the Wa people, with a budget of \$348,085 (project AD/RAS/94/724). Its primary aim was to design possible future initiatives, but there were reported difficulties in gaining the confidence of the local population in areas of civil instability.

Figure 14
Opium Poppy Cultivation in Thailand, 1966-94



Source: Moreland et al. (1993:58).

Note: Data for missing years (1967-74, 1976, 1977, and 1979) estimated from contiguous values.

Coca bush

One 1993 review of USAID and UNDCP efforts in Latin America concluded that "more than a decade of crop substitution programmes in cocaine-source countries has had little impact on the dynamics of Andean coca cultivation. There has been little actual crop substitution" (Lee and Clawson 1993:1). They noted that although some projects have recorded increases in licit economic activity and reductions in coca cultivation within designated project areas, these do not guarantee a hold on the overall scale of illicit cultivation. A 1993 evaluation of UNDCP programmatic efforts in Latin America concluded that under specific planning and implementation conditions, alternative development could reduce illicit cultivation within project areas, but that general rural development without a drug-control component should not be funded by UNDCP (Gutelman et al. n.d.).

In relation to Bolivia, Painter (1994) reviews alternative development work up to 1991, including USAID and U.N. efforts. Alternative development projects were initially undertaken by USAID, and the Chapare Regional Development Project was begun in 1983 ending in 1992 after expenditure of \$64.2 million. The Associated High Valleys project, located outside the main producing areas, was designed to reduce in-migration and increase out-migration from coca-bush cultivating areas of the Chapare. A 1990 USAID evaluation noted that even if the Associated High Valleys project were to prevent labor movements from the area, the large and mobile

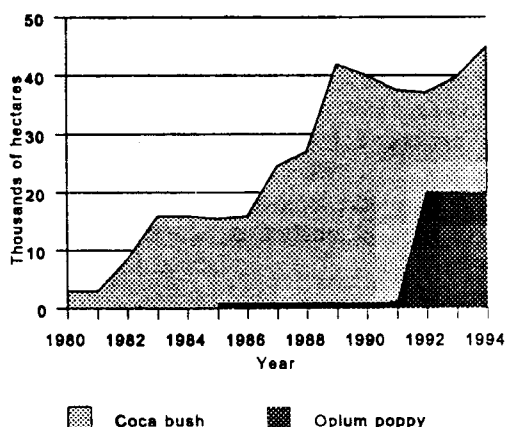
labor force in other parts of Bolivia would more than compensate the coca-bush cultivating areas for the loss. More recent USAID work provides marketing and export assistance and technical advice on agricultural services, credit services, and infrastructural development. Historically, both development work and economic policy in Bolivia have had a mixed relationship with drug policy, and have even inadvertently contributed to increased coca bush cultivation at different times (Whynes 1991:480; Painter 1994:chap. 6). Migration to the Chapare during the 1960s and 1970s was facilitated by an internationally funded "colonization" program and a paved road constructed to the area. Electrification of some areas was delayed because of fears that it would assist drug processing, although such action has been reversed in the 1990s. During the Bolivian drought of 1983-84, a credit program designed to relieve hardship encouraged migration to Chapare and the pursuit of illicit cultivation as the easiest means of ensuring repayment (Painter 1994:6).

U.N. efforts in the region of Las Yungas region of Bolivia began in 1985, and were reduced in 1990 after expenditures of \$21.8 million because under Bolivian Law 1008 of 1988 the majority of the coca bush cultivation in the area had transitional status (projects AD/BOL/84/405, 86/408, 414, and 419). That legislative change, although not reducing the area of land under coca bush cultivation, brought the most extensive recorded reductions to date in illicit cultivation. The main reason it has not been more widely used is that is essentially legalization and could bring repercussions (including a reduction in or cessation of development assistance) if it contravened the international conventions. Alternative development efforts in Bolivia were refocused toward assisting a transition from coca (projects AD/BOL/419-719). By 1995, of the eight "Mayachasita" community centers constructed in Las Yungas since 1988, one was working satisfactorily, three were functioning regularly, and four were abandoned because of problems of profitability. Expenditures in Las Yungas totaled about \$30 million by 1995. The Chapare has recently been the focus of an extensive UNDCP program of alternative development and it is estimated that 24,000 hectares of coca bush have been eradicated since 1987 within project areas, although the overall impact has been reduced by new planting elsewhere (projects AD/BOL/411, 412, 418, 415/815, 818, 918, 927).

Although there have been reductions within some project areas, in the aggregate, Bolivia seems to have experienced the parallel development of coca bush and licit agricultural activities (Lee and Clawson 1993:44; Kellerman 1994; Pool 1994). The cultivation of alternative crops has increased greatly, but not necessarily at the overall expense of coca bush cultivation. Rather, there has been an overall increase in agricultural output.

In Colombia, although the aggregate level of coca bush and opium poppy cultivation increased in the decade up to 1994, there were some reductions in coca bush cultivation within UNDCP project areas. Figure 15 shows the estimated hectareage of coca bush and opium poppy cultivation in Colombia, where there have been no U.N. alternative development operations in areas of opium poppy cultivation. The phenomenon of opium poppy cultivation in Colombia and the absence of alternative development activities in those areas is the clearest example of a "grey area" in alternative development policy. There does not appear to be a clear-cut definition of what constitutes "traditional" or "opportunistic" cultivation, or specification as to whether either or both should receive development assistance.

Figure 15
Illicit Cultivation of Coca Bush and Opium Poppy in Colombia, 1980-94



Source: U.S. Department of State (various years).

By mid-1995 the UNDCP program in Colombia included ongoing projects in four areas (projects AD/COL/85/426, 89/627, 89/630, and 89/629). Efforts began in 1985 in the Southern Cauca and Northern Narino areas, where estimated coca bush cultivation was reduced from 5,400 hectares in 1986-87 to about 1,700 hectares by 1994. The project budget was \$4.4 million, representing an estimated cost of only \$1,189 per hectare of reductions, although new planting of coca bush in nearby areas was reportedly extensive (fig. 15 shows only nationwide estimates). Other projects have been in operation only since 1991. In Caqueta, with a budget of \$3.85 million, the estimated 2,000 hectares of coca bush cultivation in 1991 had been reduced to around 1,500 hectares by mid-1995, while illicit cultivation expanded outside the project area. In the third project area, Guaviere, an estimated 8,900 hectares of cultivation at the beginning of work in 1991 had been reduced by 200 hectares, and a further 350 hectares were in the process of being removed by mid-1995. Rubber trees that take only 4 to 5 years to reach maturity were planted in the midst of coca bush with which they compete for light (and hide from aerial observation) within 6 months. In the Putumayo, of the estimated 3,200 hectares of cultivation at the start of alternative development work in 1991, about 500 hectares had been removed by mid-1995.

In Peru, the results of work in the Upper Huallaga Valley since 1981 were described in a 1986 evaluation by USAID as disappointing due to the greater profit to be made from coca, the repercussions of protests, and the relocation of cultivation within the Valley. Overall, hectareage of coca bush cultivation declined in the early 1990s as a result of crop disease and the relocation of farmers away from fighting between insurgent and government forces.

UNDCP efforts in the Upper Huallaga Valley of Peru may have contributed to the estimated reduction within the project area from 24,500 hectares of cultivation in

1987 to 8,479 hectares in 1995 (projects AD/PER/86/465, 467, and 458, and in the Aguaytia and Pachtea river basin in projects 459, 601, and 759), a reduction due mainly to a combination of crop disease and migration away from fighting between government and insurgent forces. Work in the Valley of the Convencion and Lares since 1985 has resulted in an expansion of licit economic activities, the development of agricultural research and training, and the increasing utilization of credit facilities (projects AD/PER/85/466, 454, and 749). In 1995, after an expenditure of approximately \$17 million, coca cultivation within the project area was estimated at 34,000 hectares, of which 21,000 were in production.

In both Bolivia and Peru there have been overt attempts by coca growers and insurgent groups to disrupt alternative development work. The Shining Path movement in Peru has destroyed roads and bridges to disrupt transportation from the Upper Huallaga Valley. In Bolivia, coca growers have been responsible for destruction of licit crops, though cooperation has improved in recent years. Drug traffickers, besides manipulating prices to encourage illicit cultivation, have also used threats and violence as a means of coercion, and traffickers are reported to have given credit to farmers to ensure continuation of coca bush cultivation.

Trade agreements promoting the export trade from the Andean region are intended to support alternative development work. The United Nations has recently sponsored studies of marketing and export opportunities for selected alternative crops in the Andean region and a study of access to the markets of the United States and the European Community (International Trade Centre 1994). The Generalized System of Preferences, which has been implemented since 1976, grants some preferential treatment to Andean products in the U.S. market, while the Andean Trade Preference Act of 1991 gives preference in the U.S. market to the products of Bolivia, Colombia, Ecuador, and Peru, in order to increase the licit economic opportunities available to those countries. Andean countries are granted some reductions in customs duties on their exports to the European Community, and duties are eliminated on goods that cannot be supplied by producers within the European Community.

Cannabis plant

In the Bekaa Valley of Lebanon, previous efforts at crop substitution by the U.N. Food and Agriculture Organization were abandoned because of an escalation of armed conflict. In 1993, UNDCP initiated an alternative development project in the Baalbeck-Hermel areas of the Bekaa Valley, which, prior to the eradication carried out in the 1990s, had been an area of significant illicit cannabis plant and opium poppy cultivation (AD/LEB/95/813). At the time of writing, the alternative development work is not aimed at reducing illicit cultivation, but is intended to create licit economic activities that will reduce the incentive to return to illicit cultivation, as a pre-emptive investment against recidivism.

The only other documented U.N. efforts relating to cannabis are in Morocco, where a 3-year pilot project began in 1988. It focused upon a village in the Er Rif region and aimed to determine the extent to which alternative development could be used to reduce economic dependence on cannabis cultivation (project AD/88/530). Several development objectives were achieved but with no reductions in cannabis growing, amid undocumented reports that irrigation was used to water cannabis plants. After expenditures of \$2.4 million the project was not extended.

Discussion and Conclusions

The empirical evidence regarding eradication policies suggests that isolated reductions in illicit cultivation have occurred. However, the aggregate risk of eradication is relatively low as farmers have a range of adaptive responses that minimize the impact upon production and manufacture in the short term, and upon illicit cultivation in the medium and long term. When eradication is applied periodically rather than simply as a one-off application, it may even lead to the response of increasing areas of illicit cultivation in anticipation of eradication.

A summary of the impact of U.N. efforts in socioeconomic development projects to reduce illicit cultivation is given in table 6. For clarity, the table groups development and drug control impact into the three categories of "no" reduction, "limited" reduction, and "yes" for a reduction. These are intended as approximate assessments of impact that are hard to quantify. Lebanon is not included because although earlier FAO efforts were abandoned, results of ongoing efforts are not known at the time of writing. With regard to results, partial reductions were recorded in three of the five Asian countries with opium poppy, but for the most part these do not appear to be directly attributable to alternative development work: in Thailand the major reductions occurred before the bulk of the U.N. drug-control investment in alternative development was made and decreases in Pakistan were largely due to law enforcement and reduced opium prices, although alternative development may have sustained reduction efforts in some areas. There were no reductions in one of the Laos programs, and reductions in the other were probably attributable to poor weather and other factors outside the program.

There is no evidence that the progressive limited reduction of coca bush within project areas in Latin America have had an effect in the aggregate. In Lebanon, illicit cultivation of opium poppy and cannabis plant was reduced in the 1990s through eradication, whereas alternative development efforts in Morocco did not reduce cannabis cultivation.

Despite the range of efforts described, only two instances of near-absolute reductions in illicit cultivation have been recorded at the national level: in Thailand and Turkey. Both of these cases occurred prior to recent severalfold increases in global cultivation of opium poppy and are not without caveats: the reduction in opium poppy cultivation in Turkey coincided with increases in the opium supply from Mexico (for the heroin market in the United States) and from parts of Asia (Reuter 1985; McCoy 1992); The reductions in opium cultivation in Thailand were more than accounted for at the global level by increases in neighbouring Myanmar. Hence, even the impact of those cases of reduction at the national level was greatly diluted at the regional and global level. The other major supplier that came close to absolute reductions at the national level due to intense eradication efforts was Mexico in the mid-1970s, which by the mid-1990s had substantial areas of illicit cultivation. Large increases in illicit cultivation in Afghanistan may account for much of the reductions in illicit cultivation in Pakistan. At both the national and the global level, the adaptability of the illicit market caused by robust economic incentives is reflected in the so-called balloon effect, that is, the displacement and replacement of illicit crops. Although evidence from crime-prevention work suggests that crime is often not displaced or only displaced to a limited extent (Hesseling 1994), it seems more likely in the context of the cultivation of illicit crops. The evidence suggests it has served to minimize the overall efficacy of measures to reduce illicit cultivation.

Table 6
The Impact of United Nations Socioeconomic Development Efforts in Areas of Illicit Cultivation, A Global Summary

Country	Development Impact?	Drug Control Impact?	Sustainability of drug control	Displacement of cultivation?
Africa				
Morocco	Some	No	n/a	n/a
Asia				
Afghanistan	No	No	n/a	n/a
Laos	Some	Some	-	-
Myanmar	No	No	-	-
Pakistan	Yes	Some	Yes	Over border to Afghanistan. Total displacement outside project area (Dir).
Thailand	Yes	National 88% reduction poppy cultivation	Yes	Over Myanmar border
Latin America				
Bolivia	Some	Some reductions within project areas.	-	Displacement and expansion elsewhere
Colombia	Some	Some reductions within project areas.	-	Displacement and expansion elsewhere
Mexico	Some	No	-	Illicit cultivation and expansion elsewhere
Peru	Limited	Some reductions within project areas.	-	Displacement and expansion elsewhere

Note: Lebanon excluded since impact of ongoing efforts not known at time of writing.

In short, the empirical evidence suggests that alternative development, and its previous manifestations, have had little if any significant impact upon illicit cultivation at the national and regional levels and less at the global level. Multi-million dollar investments have achieved little by way of drug control. In some circumstances, socioeconomic development has been achieved. However, if this was the aim, then it seems reasonable to infer that the money might have been better spent where conditions were less adverse to implementation and sustainability.

Having drawn the conclusion above, there is some evidence that, *within targeted areas*, alternative development work can serve to facilitate a transition from illicit to licit cultivation, given the conditions outlined below. It is necessary to highlight this, in order not to trivialize the massive amount of work and effort put in by many people over many years. Some of the projects have noted reductions within the area that they were initially designed to affect. The persons implementing those projects in the field cannot be blamed for the fact that they do not necessarily cause an impact upon illicit cultivation in the aggregate. The three prerequisites for success appear to be the following. The first is effective control of an area by a central government and an absence or weakening of insurgent groups. The second is the existence of market forces that make illicit cultivation less attractive, primarily in the form of increased competition from expanding illicit cultivation elsewhere, as in the case of Afghanistan and Myanmar, neighbouring, respectively, Pakistan and Thailand. The third is consistently applied disincentives through law enforcement and eradication. Where those three prerequisites converge, a fourth, namely incentives in the form of reasonable alternative sources of income in the area, may make a negotiated reduction in hectareage attractive at a time when illicit cultivation is less profitable and more risky, and likely to become increasingly so. Although alternative development work might accelerate a transition to licit activity, or help to prevent recidivism through creating the incentives that constitute the fourth prerequisite referred to above, it does not necessarily give rise to the other three. Furthermore, for the most part, it seems that the conditions under which reductions in illicit cultivation were achieved are unlikely to arise in most of the major areas of illicit cultivation, and that the result in some instances can be increases in illicit cultivation. In some conditions, alternative development work can provide, in effect, an economic safety net into which farmers of illicit crops can jump.

Without quantification of their respective importance, the empirical evidence suggests that there are five key constraints upon alternative development as an appropriate technique for reducing illicit cultivation. In the order of the project cycle those constraints are as follows:

- (a) failure of development implementation due to the logistical complexity of implementation in a multi agency (and sometimes competitive) funding and executing environment that requires cooperation from all tiers of government in areas where the conditions are non-conducive, and where there is sometimes overt hostility, to development work (in such circumstances, the chances of implementation failure are far higher than for normal development work and the negotiation process can easily break down);
- (b) failure to achieve the drug control objective because even where development work is implemented it does not necessarily bring reductions in illicit cultivation;
- (c) reverse conditionality, whereby development work may catalyse illicit cultivation;

(d) lack of sustainability of the economic viability of substitute crops and activities; and

(e) replacement and displacement of illicit crops, to which alternative development is particularly prone because of its lengthy duration.

All the above-mentioned factors are independent of the expansion of illicit cultivation due to exogenous factors.

The bottom line for policy-makers is one of whether resources should continue to be poured into more of the same. The principal aim of this paper was to consolidate information into a format from which it may inform such decision making. All indicators suggest that 2 decades of UN programs have shown little success in terms of drug control and that if socioeconomic development were the aim, then the resources might have been better used elsewhere, or used more efficiently in the same areas without the added complexity of a drug-control component. A thorough discussion of the myriad of possible policy implications and alternatives that might be related to this conclusion would be sufficiently lengthy as to justify its exclusion from the present paper. However, it does not seem inappropriate to end on a modification of John Kaplan's comment relating to heroin policy, in that, although we may only strive to achieve the least worst international drug policy, the evidence suggests there may be the requirement and scope for measured change.

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Note

1. This could also be due to the type of opium poppy under cultivation.

References

- Buddenburg, D.
 1996 *Illicit Drugs and Drug Policies in Pakistan*. United Nations Research Institute for Social Development and United Nations University Studies on the Impact of the Illegal Drug Trade. London: Lynne Rienner.
 Bundesministerium für wirtschaftliche Zusammenarbeit und Entwicklung (BMZ) (German Federal Ministry for Economic Cooperation and Development)
 1992 *Conclusions of the seminar on alternative development as a tool against illicit drug cultivation* (Berlin, April 1992). Paper presented to Organization of American States Inter-American Drug Abuse Control Commission (CICAD), September 7 1993, Lima, Peru.
 Bundesministerium für wirtschaftliche Zusammenarbeit und Entwicklung (BMZ) (German Federal Ministry for Economic Cooperation and Development)
 1995 *Drug Control with the Scope of Development Cooperation*. Bonn: BMZ April.

REVIEW OF DRUG-CROP ERADICATION

- CICAD (Organization of American States, Inter-American Drug Abuse Control Commission)
- 1993 *Alternative development: A critical dimension of illicit international drug traffic*. Paper presented to Organization of American States Inter-American Drug Abuse Control Commission (CICAD), September 7, Lima, Peru. Washington, D.C.:CICAD.
- Clawson, P.
- 1994 *How Profitable for Farmers Is Production of Coca Leaves?*. Washington, DC:U.S. Department of State report of 'the economics of the narcotics industry' conference.
- Clayton, R.R.
- 1995 *Marijuana in the "Third World": Appalachia, U.S.A.* London:Lynne Rienner, United Nations Research Institute for Social Development and United Nations University Studies on the Impact of the Illegal Drug Trade, vol. 5.
- Coleman, G.
- 1987 Logical framework approach to the monitoring and evaluation of agricultural and rural development projects. *Project Appraisal* 2(4)251-259.
- Colombia, Republic of
- 1995 *National Alternative Development Plan 1995-1998, Action Plan*. Republic of Colombia:Office of the President.
- Durana, P.J.
- 1994 *Alternative Development as a Coca Reduction Strategy in the Andean Region: Lessons from past Efforts*. Washington, DC:U.S. Department of State report of 'the economics of the narcotics industry' conference.
- Falco, M.
- 1996 U.S. drug policy: Addicted to failure. *Foreign Policy* 102(Spring)120-133.
- Farrell, G.
- 1996 The global rate of interception of illicit opiates and cocaine, 1980-1994. *Transnational Organized Crime* vol. 1, no. 4.
- Farrell, G., and P. O'Brien
- 1995 Para la reduccion de oferta de drogas ilicitas. *Debate Agrario*, 22, 81-117.
- Farrell, G., K. Mansur, and M. Tullis
- 1996 Cocaine and heroin in Europe: A cross-national comparison of trafficking and prices. *British Journal of Criminology* 35(2)255-281.
- Goldstein, P.
- 1985 The drugs/violence nexus: A tripartite conceptual framework. *Journal of Drug Issues* 4:493-506.
- Gutelman, M., J. Dorsey, and J. Jhones
- n.d. Informe de la Mision Evaluacion de la Estrategia del UNDCP: Bolivia; Informe de la Mision Evaluacion de la Estrategia del UNDCP: Colombia;and Informe de la Mision Evaluacion de la Estrategia del UNDCP: Peru. Vienna: UNDCP unpublished manuscripts prepared in 1993.
- Henkel, R.
- 1994 *Coca Crop Substitution and Alternative Development in Bolivia*. Washington DC:U.S. Department of State report of 'the economics of the narcotics industry' conference
- Hesseling, Rene
- 1994 Displacement: A review of the empirical literature. In *Crime Prevention Studies*, vol. 3, ed. R.V. Clarke. New York:Criminal Justice Press.

International Fund for Agricultural Development (IFAD)

1992 *Participatory Evaluation of Rural Development Projects*. Rome:IFAD Monitoring and Evaluation Division, Report No. 0385, December.

International Narcotics Control Board

1995 *Narcotic Drugs: Estimated World Requirements for 1995, Statistics for 1993*. New York:United Nations.

International Trade Centre

1993 *Market Access to the United States and the European Community for Selected Products from the Andean Region*. Geneva:UNCTAD/GATT.

Kahn, S.

1991 Poppy cultivation in north-west frontier province 1991. Report prepared for the Rural Development Division, U.S. Agency for International Development, Islamabad, Dec., p.31.

Kaplan, J.

1983 *The Hardest Drug: Heroin and Public Policy*. Chicago:University of Chicago Press.

Keh, D., and G. Farrell.

1997 Trafficking drugs in the global village. *Transnational Organized Crime* 3(2):90-110

Kellerman, T.

1994 *Overall Importance and Impact of the Coca Subsector with Regards to the Economies of the Andean Countries of Bolivia, Colombia and Peru*. Washington, DC:U.S. Department of State report of 'the economics of the narcotics industry' conference.

Kennedy, M., P. Reuter, and K. J. Riley.

1993 A simple economic model of cocaine production. *Mathematical and Computer Modelling* 17(2):19-36.

Kumar, K.

1986 *A Review of AID's Narcotic Control Development Assistance Program*. U.S. Agency for International Development Evaluation Special Study No. 29.

Kumar, K.

1994 Measuring performance of agricultural and rural development programs. Paper presented to Conference on Evaluation and Development, hosted by the World Bank, December 5 and 6, 1994. Centre for Development Information and Evaluation, U.S. Agency for International Development.

Lasselin, D., and B. Galtier

1993 *Survey of the Opium Growing Areas using SPOT imagery: Teaching Kit*. France International:Institute Geographique National.

Lee, R.

1994 *Controlling Production of Opiates: The Case of Thailand*. Washington, DC:U.S. Department of State report of 'the economics of the narcotics industry' conference.

Lee, R., and P. Clawson

1993 *Crop Substitution in the Andes*. Washington, DC:Office of National Drug Control Policy.

Littoy, S.

n.d. Opium poppy cultivation report (Viet Nam Drug abuse control masterplan formulation exercise VIE/92/660). Vienna:UNDCP unpublished manuscript, 1993.

REVIEW OF DRUG-CROP ERADICATION

Lyon, D.L.

1993 Alternative development as a tool against illicit drug production. U.S. Department of State, Bureau of International Narcotics Matters, Office of Transnational Issues, paper presented to Organization of American States Inter-American Drug Abuse Control Commission, Sept. 7, Lima, Peru.

Mansfield, D., and C. Sage

n.d. Drug crop producing countries: A development perspective. *The Control of Drugs and Drug Users: Reasons and Reactions*. Harwood Academic Press, in press.

McCoy, A.W.

1992 Heroin as a Global Commodity: A History of Southeast Asia's Opium Trade.

Moore, M.R.H.

1973 Policies to achieve discrimination on the effective price of heroin. *American Economic Review* 2:270-277.

Moore, M. R. H.

1991 Supply reduction and drug law enforcement. In *Drugs and Crime*, vol. 13 of *Crime and Justice: A Review of Research*, eds. M. Tonry and J.Q. Wilson. Chicago:University of Chicago Press.

Morales, E.

1990 Comprehensive economic development: An alternative measure to reduce cocaine supply. *Journal of Drug Issues* 20(4):629-637.

Moreland, R., K. Kampe, and B. Shinawatra

1993 Evaluation of assistance in alternative development in Thailand. Vienna: UNDCP report to the United Nations International Drug Control Programme unpublished manuscript, May.

National Narcotics Intelligence Consumers Committee (NNICC)

1995 *The Supply of Illicit Drugs to the United States*. Washington, DC:Drug Enforcement Administration, August.

Painter, J.

1994 *Bolivia and Coca: a Study in Dependency*. London:Lynne Rienner, United Nations Research Institute for Social Development and United Nations University Studies of the Impact of the Illegal Drug Trade vol. 1.

Pakistan Narcotics Control Board (PNCB) PNCB)

1974 *Buner Pilot Project*. Islamabad:PNCB..

Pakistan Narcotics Control Board (PNCB)

1975 *Socioeconomic Survey of Buner*. Islamabad:PNCB.

Pool, D.J.

1994 *Prospects for Alternative Development*. Washington, DC:U.S. Department of State report of 'the economics of the narcotics industry' conference.

Renard, R.D.

1996 *The Burmese Connection: Illegal Drugs and the Making of the Golden Triangle*. London:Lynne Rienner, United Nations Research Institute for Social Development and United Nations University Studies on the Impact of the Illegal Drug Trade, vol. 6.

Rerkasem, K., B. Rerkasem, M. Kaosa-ard, C. Roongruangsee and A. Israngkura

1989 Highland development as a narcotic prevention strategy. UNISERV, Chiang Mai University report prepared for U.S. Agency for International Development.

Reuter, P.

1985 Eternal hope: America's quest for narcotics control. *Public Interest* 79:79-95.

Reuter, P.

- 1992 The limits and consequences of U.S. foreign drug control efforts. *The Annals of the American Academy of Political and Social Sciences* 521:521-162. Santa Monica, CA:RAND Corporation reprint.

Reuter, P.

- 1994 *the Organization and Measurement of the International Drug Trade*. Washington, DC:U.S. Department of State report of 'the economics of the narcotics industry' conference.

Reuter, P.

- 1996 The mismeasurement of illegal drug markets: The implications of its irrelevance. In *Exploring the Underground Economy*, ed. Susan Pozo. Kalamazoo, MI:W.E. Upjohn Institute.

Reuter, P., and M.R. Kleiman

- 1986 Risks and prices: An economic analysis of drug enforcement. In *Crime and Justice: An Annual Review of Research*, vol. 7, eds. M. Tonry and N. Morris. Chicago:University of Chicago Press.

Reuter, P., and D. Ronfeldt

- 1992 *Quest for Integrity: The Mexican-U.S. Drug Issue in the 1980's*. Santa Monica, CA:RAND Corporation.

Riley, K.J.

- 1993 *Snow Job: the Efficacy of Source Country Cocaine Policies*. Santa Monica, CA:RAND Corporation.

Riley, K.J.

- 1996 *Snow Job: The War Against International Cocaine Trafficking*. London: Transaction.

Rosenquist, E.

- 1994 *Narcotics and Agricultural Economics*. Washington, DC:U.S. Department of State report of 'the economics of the narcotics industry' conference.

Sader, S.A.

- 1991 Remote sensing of illicit narcotic crops from aircraft and commercial satellite platforms. Paper presented at the 24th international symposium on remote sensing of environment, Rio de Janeiro, Brazil, May 27-31.

Sage, C.

- 1989 Drugs and economic development in Latin America: a study in the political economy of cocaine in Bolivia. In *Corruption, Development and Inequality: Soft Touch or Hard Graft?*, ed. P.M. Ward, 38-57. New York:Routledge.

Stares, Paul

- 1995 The global drug phenomenon: implications for policy. In *Policies and Strategies to Combat Drugs in Europe*, ed. Georges Estievenart. London: Martinus Nijhoff.

Thoumi, F.E.

- 1987 Some implications of the growth of the underground economy in Colombia. *Journal of Interamerican Studies and World Affairs* 29(2):35-53.

Thoumi, F.E.

- 1995 *Political Economy and Illegal Drugs in Colombia*. London:Lynne Rienner, United Nations Research Institute for Social Development and United Nations University Studies on the Impact of the Illegal Drug Trade, vol. 2.

REVIEW OF DRUG-CROP ERADICATION

Toro, M.C.

1995 *Mexico's "War" on Drugs: Causes and Consequences*. London: Lynne Rienner, United Nations Research Institute for Social Development and United Nations University Studies on the Impact of the Illegal Drug Trade, vol. 3.

Tullis, L.

1991 *Handbook of Research on the Illicit Drug Traffic: Socioeconomic and Political Consequences*. London: Greenwood Press.

Tullis, L.

1995 *Unintended Consequences: Illegal Drugs and Drug Policies in Nine Countries*. London: Lynne Rienner, United Nations Research Institute for Social Development and United Nations University Studies on the Impact of the Illegal Drug Trade, vol. 4.

United Nations

1977 *Single Convention on Narcotic Drugs, 1961 as Amended by the 1972 Protocol Amending the Single Convention on Narcotic Drugs, 1961*. New York: United Nations.

United Nations

1991 *United Nations Convention Against Illicit Traffic in Narcotic Drugs and Psychotropic Substances, 1988*. New York: United Nations.

United Nations Administrative Committee on Coordination

1995 *Report of the Subcommittee on Rural Development on its Twenty-Third Session*. Paris, May 31 - June 2, 1995.

United Nations Development Programme (UNDP)

1995 *Human Development Report 1995*. Oxford: Oxford University Press.

United Nations Economic and Social Council (ECOSOC)

1989 Report of the expert group meeting on environmentally safe methods for the eradication of illicit narcotic plants held in Vienna Dec. 4 to 8, 1989. Commission on Narcotic Drugs, 11th special session document E/CN.7/1990/CRP.7.

United Nations Economic and Social Council (ECOSOC)

1973 *Operations Financed by the United Nations Fund for Drug Abuse Control: Report of the Executive Director*. Commission on Narcotic Drugs, 3rd special session document E/CN.7/562.

United Nations Economic and Social Council (ECOSOC)

1995a *The Economic and Social Consequences of Drug Abuse and Illicit Trafficking, An Interim Report: Note by the Secretariat*. Commission on Narcotic Drugs, 38th session document E/CN.7/1995/3, March 14-23.

United Nations Economic and Social Council (ECOSOC)

1995b *Proposed Final and Performance Report for the Biennium 1994-1995 for the Fund of the United Nations International Drug Control Programme and Proposed Initial Budget for the Biennium 1996-1997 for the Fund and Programme Support Cost: Report of the Executive Director*. Commission on Narcotic Drugs, reconvened 38th session document E/CN.7/1995/21, Dec. 13-14.

United Nations Economic and Social Council (ECOSOC)

1996 *Crops from which Drugs are Extracted and Appropriate Strategies for their Reduction*. Commission on Narcotic Drugs, 39th session document E/CN.7/1996/11, April 16-25.

- United Nations Food and Agriculture Organization (FAO)
 1985 Drug crop substitution. Geneva:United Nations Food and Agriculture Organization background paper prepared by the for the inter-agency meeting on coordination in matters of international drug abuse control, Rome, Sept. 11-13.
- United Nations Fund for Drug Abuse Control (UNFDAC)
 1986 Drug problems and development. Staff paper for the OECD ad hoc meeting on the role of development agencies in narcotics reduction, May 27-28.
- United Nations International Drug Control Programme (UNDCP)
 1993 Alternative development as an instrument of drug control. Vienna:UNDCP Technical Information Paper No. 5, November.
- United Nations International Drug Control Programme(UNDCP).
 1994 *UNDCP Activities in Peru 1984-1993*. Vienna:UNDCP.
- United Nations International Drug Control Programme (UNDCP)
 1996 *Statistics on illicit trafficking in and supply of narcotic drugs and psychotropic substances in 1994*. Document E/CN.7/1996/CRP.6 to the Commission on Narcotic Drugs, April 1996. Vienna: UNDCP.
- United Nations International Drug Control Programme (UNDCP)
 n.d.a Afghanistan: Opium cultivation and production 1994. Vienna:UNDCP unpublished manuscript by UNDCP Regional Office for Southwest Asia, 1994.
- United Nations International Drug Control Programme (UNDCP)
 n.d.b The illicit opiate industry of Pakistan. Vienna:UNDCP unpublished manuscript, 1994.
- United Nations International Drug Control Programme (UNDCP)
 n.d.c Afghanistan: Opium cultivation and production 1995. Vienna:UNDCP unpublished manuscript by UNDCP Regional Office for Southwest Asia, 1995.
- U.S. Agency for International Development (USAID)
 1993 *Andean Counter-Drug Initiative, Objective IV: Sustainable Development and the Counter-narcotics Strategy: Transition to New Realities*. U.S. Agency for International Development Semi-annual Report Sept.
- U.S. Department of State
 varied *International Narcotics Control Strategy Report*. Washington, DC:U.S. Department of State, various dates.
- U.S. Department of Agriculture
 1992 *Thailand Opium Yield Project 1991-1992*. Beltsville, MD:U.S. Department of Agriculture Agricultural Research Service, Systems Research Laboratory.
- Whynes, D.
 1991 Illicit drug production and supply-side drugs policy in Asia and South America. *Development and Change* 22:475-496.